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Greater Newcastle Metropolitan Strategy - Economic Prospects to 2036

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1 EXECUTIVE SUMMARY

- The Greater Newcastle Story – Change and Growth

The history of Greater Newcastle (GN) is of an economy which up to the 1990s was a major manufacturing centre in Australia. In response to globalisation and the decline of industry protection, GN has successfully responded to those powerful global forces of change, and transformed itself into a modern, diversified economy.

In the late 1990s, when the steel industry closed, it faced tough times and a period of high unemployment. In the near two decades since, a mix of established and new firms have created a revitalised economy with minimal intervention by government. This has generated economic opportunities and sufficient new jobs to offset employment losses in steel and related manufacturing sectors. Strong economic growth has since brought GN close to full employment. Despite its disruptive past, the people of GN have accrued significant benefits, with real incomes rising about 2.0% per annum[1] in the period 1996-2016.

- Greater Newcastle Today

The long-term transformation of the GN has seen it transform into a largely service-based economy, with professional services and the health, education and tourism sectors being its largest and fastest growing industries. Resource and agricultural industries in the Hunter region are still important and continue to generate a significant level of economic activity.

For manufacturing, the transition has not been easy. The sector is still a large employer in GN with core strengths in mining-related activity, food and beverage manufacturing and a range of niche areas in advanced manufacturing as firms have utilised GN's depth of the engineering skills and competitive cost base. The arrival of aerospace activity at Williamtown has provided a fillip to firms in advanced manufacturing. GN's refocussed manufacturing sector has sufficient natural advantages to remain competitive and sustainable into the future.

- Greater Newcastle Tomorrow

Greater Newcastle is projected to grow, from its present population of 570,000 to a city of 690-750,000 in the period 2016-36. This population growth reflects Australia and NSW's population growth in this period which will lift population in all urban areas, but it also reflects GN's comparative strengths. As identified in the Hunter Regional Plan 2036 and the RDA Smart Specialisation Strategy, GN's growth is expected to be led by high value knowledge and advanced manufacturing sectors, which have the potential to grow prosperity and a sustainable competitive economy into the future.

This is complemented by a growing health, social support and home maintenance sector required to support aging in place and retirement living. Together with growth in the retail and tourism sectors, those sectors will importantly provide jobs for residents with lower human capital. That growth will lift living standards in the GN economy, with real household incomes expected to rise by an average

[1] Census estimates of Median Household Income for the GN local government areas for 1996 and 2016, has household income rising by 2% per annum in real terms over this 20-year period. This rise reflects growth in wages of about 1.2-1.5%, the increase in female participation and the decline in unemployment over this period. See Appendix B Note 1.

of 1.3% or better in the next two decades.[2] GN's projected population growth will also deepen labour markets and create more opportunities for the young people to stay and build careers in GN.

Greater Newcastle's Strengths

- Geared into Global Economy

About 50% of the GN economy is in traded goods and services which ties it into the global economy much more than other Australian cities. That necessarily exposes it to competitive global forces that drive the GN economy to maintain a "competitive" edge.

Greater Newcastle's recent economic renaissance tells us that it has both the capacity and resilience to respond to global forces of change and the competitive pressures they pose. Globalisation has made GN more integrated with the world economy and this trend is set to continue. Growth in China and India will see demand for resources and resource-related engineering services, food and beverage manufactures, education, tourism and health services from those countries increase. These forces of global economic growth will also see the GN economy integrate more into the domestic economy.

- Liveability

Greater Newcastle shares with most Australian cities a high quality of urban amenity. Its climate, its natural environment (beaches, lakes, national parks), its cultural and sporting facilities, its high-quality health and education infrastructure all make GN a highly liveable city.

Whilst Sydney offers deeper labour markets and a broader range of amenities, GN competes on lower cost housing and a lower cost of doing business, with city-like amenity that is relatively easily accessible. In addition, its dispersed employment and transport infrastructure make it the 30-minute city Sydney can only dream of. For firms, the lower cost of land, its efficient transport infrastructure and a lower cost of skilled labour make GN a sensible business choice. The challenge for businesses and policymakers is to recognise, sustain and build on these strengths as GN grows into a city with a population heading towards one million.

- The Port and Airport

Newcastle Port is a world class deep water port which has been central to GN's development. Policy needs to protect its role as a working port and allow scope for its further development, including potential growth as a container port for the greater region and NSW. The proposed cruise ship terminal is an important complementary initiative. This would support the development of other sectors in the GN economy, for example tourism and business services.

Newcastle's Williamtown airport and defence hub is crucial to GN's access to domestic and global markets. Expansion of its capacity and increased connectivity to Inner Newcastle and other parts of the Hunter, will support economic growth in all industry sectors, including tourism and business services. Aerospace and defence activity will also help drive specialised advanced manufacturing and professional and technical engineering services.

- Connectivity to Sydney

While direct access to world markets provided by its port and airport is a great advantage for GN, significant numbers of domestic and foreign tourists access the GN market from Sydney, along with

[2] The lift in household incomes is predicated on a rise in real GRP per capita of 1.3-1.4% per annum. See Table 6 and Appendix B Note 1 for more detailed discussion.

significant volumes of trade. The combination of the new Hunter Expressway (HEX) and North Connex will increase that access, as would potential future investment in faster or high-speed passenger rail, and new freight rail capacity. This would further integrate the GN and Sydney markets which would increase competition for some GN firms but would be more than offset by creating more opportunities overall. This would boost the GN economy.

- Abundance of Well Located Land

The Hunter Expressway has also increased connectivity for industry within GN and opened up potential new industrial land with proximity to the wine, agricultural and mining industries, which will attract the wide mix of firms supplying those sectors and support their growth. This will see some shift in the location of industry within GN. With an abundance of well-connected industrial land options, this will in turn induce movement of industry out from inner locations, particularly inner Newcastle, where, at the same time, the pressure for residential and commercial development will only grow. Policymakers needs to accommodate this significant market dynamic for change.

- New transport technology – Automated Vehicles

Greater Newcastle is developing possibly the world's first automated vehicle (AV) implementation strategy supported by the NSW government that will leverage its advanced manufacturing sector and the aeronautical technology park. It is well positioned with its aeronautical, defence and smart technology sectors to develop niche manufacturing and technology to be able to leverage AV early adopter status. If this is managed well, GN will be able to export to Australia and the world, high value AV technology, goods, and services.

It will also build capability and experience in modifying the urban environment to facilitate AV implementation to maximise the benefits of this new technology through solving the first and last kilometre dilemma with public transport, making the urban environment legible for AVs and strategizing around how to make no-regrets infrastructure decisions to reduce potential redundancy before the value of the asset is realised.

- Greater Newcastle as a Service Hub for Wider Hunter Hinterland

Greater Newcastle is the centre for the provision of health, education, and a broad range of services for the Hunter hinterland, the North Coast, and the New England and North-West regions. This has underpinned significant growth in the health sector, and given the critical mass for John Hunter Hospital (JHH) and the University of Newcastle (UoN) to become major players in medical education and research, and for UoN to become a significant educational institution Australia and internationally.

The projected growth of GN will continue to support development in these two sectors. In the case of education, the increase in demand for education and skills is expected to outpace population growth as demand for workers in the knowledge economy accelerates and grows this sector. This will provide opportunity for new players to establish in GN, providing some competition and in doing so growing the overall education market. As GN continues to transition to new industries, the expectation should be that the tertiary institutions will respond, supporting the growth potential of these sectors with graduates and in their research focus. The potential is also there for GN institutions to increase their share of the foreign education market. The renewal of Inner Newcastle into a more vibrant city centre will increase the appeal of GN institutions.

- Hunter Region Centre of Excellence

The increase in demand generated by the combination of population growth in the broader regional catchment and an aging population, will increase the critical mass of the health sector. This will increase the teaching and research potential of the sector, and build the foundations for a potential centre of excellence based around the JHH precinct. The key to centres of excellence is capacity to attract top researchers. Experience elsewhere has demonstrated that clusters with clinical, teaching and research together and critical mass are the key ingredients for success. The proposed new Maitland hospital can add to the teaching and research capability of GN with a complementary business strategy and good transport connectivity.

In addition to the growing demand for medical and health graduates to service GN and surrounding region, the demand for medical services and hence training in the Asian region is expected to grow exponentially and present significant opportunities. While public funding will be a domestic constraint, foreign demand based on fee for service can allow scope for significant investment and growth.

- A Changing Inner City

The Newcastle CBD plays a lesser role in the GN economy than is the case with other similar sized cities. This is the down-side to GN's dispersed population and employment which delivers a 30-minute city but at the expense of well-activated city centres. Renewed interest over the last decade or so in inner city living has seen a rejuvenation of inner cities nationally and internationally. That growth is built on a mix of high density residential and commercial activity, with increasing populations supporting retail and entertainment activities and higher frequency public transport. This has made the inner city more connected and attractive for tourism and hotels. It is also more attractive as an environment for high value, high human capital finance, education, and professional service sectors.

In keeping with these trends, inner Newcastle is expected to expand its footprint and its share of employment, while the centre of gravity will shift west towards Broadmeadow. The forthcoming GN metropolitan plan needs to be able to facilitate this growth.

- Strategic Centres and Higher Order Retail

Greater Newcastle has a range of well-established strategic centres dispersed across its metropolitan area which have the potential to accommodate significant growth in the economy and become important residential, employment and entertainment precincts. To the extent that growth is concentrated in these centres, it will increase accessibility to jobs and reduce the transport task. This can allow investment in public transport infrastructure to be better directed and improve connectivity within GN, which in turn will encourage growth in these centres.

However, policy needs to be flexible. As the GN economy expands, the capacity of these centres to accommodate growth will become constrained and new strategic centres can and will likely emerge. In addition, some current retail centres do not necessarily meet the needs of some higher order retail businesses which need good connectivity for a customer base which will stretch from Central Coast to North Coast/Taree and out to Upper Hunter. Likewise, some retail and business operations are not tied to centre locations. It is important that new growth can be accommodated on the trunk transport network within GN in order that a full range of business opportunity is recognised and accommodated.

- Transport Infrastructure

Greater Newcastle has an underutilised urban rail system. Land use planning needs to allow for transport-oriented development around train stations, light rail stops and along transport corridors to

improve labour mobility and to increase the poor patronage figures of public transit. This becomes more important once light rail services commence.

Increased density and improved urban amenity will increase utilisation of services and improve their value to GN residents, particularly for residents who are less mobile. A better functioning public transport system (train, light rail, and bus), enhancing the connectivity of Inner Newcastle, will reduce the need for investment in parking in the inner city and encourage a modal shift in transport choices. In this regard, currently underutilised employment land may transition to more productive use. High value workers expect high amenity work environments. Internationally they are moving away from office parks on the edge of cities to inner city locations close to residential, entertainment and service hubs. They want to walk or cycle to work, live and play.

This is particularly important to the deepening of GN's service economy. There is increasing evidence that millennial graduates are prioritising lifestyle choices[3] ahead of careers, seeking inner city locations with high amenity and access to the experience economy. They are also being priced out of some markets to pursue this, including the Sydney market. This presents a pivotal opportunity for GN.

There is a continuing need to keep a focus on improving city amenity to re-image GN, to attract and retain talent, develop a stronger tourism economy, grow the arts and education sectors, attract investment, attract the well-off baby boomer retiring generation, and to develop the Hunter regional cuisine industry in the same manner as has been successfully achieved in Victoria and for a hundred years in France and Italy.

- Policy, Change, and Growth

Greater Newcastle emerged from the economic turmoil of BHP closing by making tough decisions on what it needed to do to resurrect its economy. Novocastrians tend to roll up their sleeves when the going gets tough.GN needs to build on that success by maintaining vigilance on good policy making. For a modern, urban economy to maximise its potential over the next 20 to 40 years new policies are needed to support change. Governance structures must be nimble and responsive to maintain a competitive advantage.

An important part of the GN evolutionary story is to remake its image in the eye of the nation as a desirable high amenity modern society with a beautiful natural environment and great coastal beach assets that make people want to come and stay.

[3] Richard Florida (2002) 'The Rise of the Creative Class.' Basic Books; Edward Glaeser (2011) 'The Triumph of the City.' Macmillan; Enrico Moretti (2012) 'New Geography of Jobs' Houghton Mifflin Harcourt

2 INTRODUCTION

One of prime objectives in the Hunter Regional Plan 2036 was a strategic plan for the expected growth and change in the Greater Newcastle (GN) metropolitan area in the next two decades to 2036. GN embraces five local government areas (LGAs) which have become merged into a city of 575,000 expected to grow to 690,000 – 750,000 by 2036 and heading towards a city of a million people. Achieving growth requires that careful consideration is given to the economic foundations of the city - what makes it work and how to improve its productivity. Without a strong employment base and/or ability to develop or grow one, projected population growth will not be achieved. It is imperative therefore that the GN metropolitan strategy creates the fabric for a productive, efficient, nimble, and flexible 'working Greater Newcastle'. The other dimension to growth is the spatial demands which housing GN's growing population presents, while at the same time maintaining the essential character which makes GN such a highly liveable city.

Greater Newcastle's history is one of significant and continuous evolution in its economic structure and this points to a capacity for the GN economy to successfully adapt to a changing world economy. Change and growth, and the creation of opportunities for the coming generations, requires innovative and dynamic firms. But it also requires policymakers to invest in the public infrastructure, particularly transport infrastructure, and allow spatial development, which will be conducive to optimising that growth.

The report is structured into four parts, starting with a strategic overview.

The strategic overview provides an overarching economic narrative which explores GN's achievements, sets out a vision for a future which this growing city will have every reason to be confident. The next chapters present a brief history of the magnitude of economic change experienced by the GN economy; the degree to which the GN economy is tied into the global economy; the latter two to emphasise its success in responding to change; and the global megatrends – the rise of China, emergence of global cities and transport technology - that will influence growth and change in the GN economy.

The economic analysis looks at population and employment scenarios for GN, looking at the factors which could see GN grow faster than generally expected in 2016-36. It then looks in more detail at the industries that are expected to drive employment growth. Mining is expected to remain a major influence, while manufacturing to evolve on the back of GN's historical and emerging strengths. But the shift to a modern service-based economy will see professional and technical services, health, education, tourism taking the lead. The potential for National Centre of Excellence for Health and Education, which would build on GN's regional strength in these two areas, is explored.

A spatial analysis then looks at how GN might develop, looking at the spatial demand and supply of employment land in GN. It then looks broadly at the different strategic centres in GN and the role they will play, starting with the likely evolution of Inner Newcastle area and the potential for it to play a bigger role in the GN's future.

The final part looks at planning for growth. How GN's current strong core transport infrastructure, from GN's underutilised rail network to the new Hunter Expressway, can be better utilised and enhanced going forward. That is needed to allow GN to develop into a modern city with the agglomeration benefits and efficient transport which will make its industries competitive and global. The report then looks at industry specific development strategies.

The report's conclusion summarises the challenges and opportunities for Greater Newcastle as it heads towards 2036.

3 STRATEGIC CONTEXT

3.1 Economic Narrative

Greater Newcastle has an extremely robust and diverse economy with strong global links. It has successfully transitioned from a 'steel' city to a services-based economy since the closure of BHP in 1999. This is evidenced by its low rate of unemployment, the net inflow of workers into the increasingly knowledge based economy, and its highly specialised health, education, defence and tourism and creative sectors comfortably filling the gap created by the relative decline of the manufacturing sector.

A key economic objective is to support the growth of a strong diverse economy in the context of emerging global megatrends which will influence the future of GN:

- Transformative technologies: internet of things (e.g. on-line retailing, e-commerce); automated vehicles (e.g. a new ecology of mobility); and robotics (e.g. in manufacturing).
- The growth of China and Asia is driving the Australian economy, and positive impacts on GN include increased tourism, demand for niche high value goods (wine, health products) and international student enrolments.
- The sharing economy including Airbnb, Uber, GoGet, and on-line entertainment, are already entrenched in GN and will have major impacts on economic geography.
- The growth of small and medium size business (SMEs) contributing disproportionately to net job creation.
- High growth in air travel, and freight and logistic volumes.

Growth in GN could be faster than anticipated. While the official 2016 NSW population projections have GN's population reaching 692,000 in 2036, a MacroPlan high growth scenario has a population of 750,000 as reality by 2036, and heading to a city just short of one million by 2056. This higher growth scenario reflects a combination of faster economic growth and higher than forecast migration (due to house price differences with Sydney), and an ageing Sydney retirement cohort seeking to 'cash out' of an expensive housing market and looking further than the Central Coast.

Current infrastructure plans underpin a broader GN catchment which, together with the wider secondary catchment of the Hunter, suggests a realistic service catchment of well over one million people could be achieved by 2056. This could drive:

- Higher order retail
- Creative industries
- Air flight frequencies
- Higher quality tourism options
- Specialised health services; and
- A wider breadth of educational opportunities.

As critical 'effective' population service benchmarks are reached, this will deliver a significant increase in service sector employment and generate new value chains. Recent research by the Reserve Bank of Australia details the increasing value-add of business services to the Australian economy through

increasing specialisation and the lengthening of value chains so that more players are participating in the production of business services and the opportunities this provides for firms.[4]

If a higher growth trajectory was to be pursued, critical economic elements of the metropolitan strategy should be to:

- Transition from car-based to Public Transport / active transport commuting
- Provide the right land in the right place to accommodate growth in:
    - Retail
    - Health
    - Education
    - Residential (including niche residential such as students and elderly housing)
- Focus on 'growing' key elements of the connected city network to create localised live, work, and play opportunities i.e. plan the key elements for:
    - High levels of self-containment
    - Consolidated parking solutions with new 'last mile' solutions such as automated vehicles

The primary beneficiary of service sector growth will be the central zone of Newcastle-Lake Macquarie, which will benefit from the largest increase in service sector jobs as the de facto hub of activity within the GN metropolitan area. This is driven by its existing infrastructure, most notably its health sector. The agglomerative pressure this area will exert will drive jobs growth at a rate much faster than for the wider region.

The shift of freight and logistics and large floorplate industries to the HEX corridor impacts a relatively small number of jobs, but provides new opportunities for niche manufacturing and specialised business services better located close to the Newcastle City Centre (NCC) and its increasing amenity.

Experience in the ACT of trying to build a defence industries high technology cluster at the Airport Business Park has come under pressure from high value workers wishing to work and live closer to the higher amenity Kingston Foreshore precinct in the inner south of Canberra. The migration of these high value industries to this location has contributed to a greater than 40% vacancy rate at the business park.

The economic geography of GN has resulted in a series of dispersed employment nodes. Land availability and planning decisions (Newcastle University, John Hunter Hospital, Westfield Kotara) have 'created' additional significant employment nodes.

The focal point of the NCC is migrating to the west towards Wickham. In combination with East End (residential focus) and Civic (civic focus), inner Newcastle has morphed into a quality residential, emerging tourist and student precinct. The urban renewal strategy, through the Honeysuckle Project and now the proposed West End and Wickham employment and transit precinct, coupled with the sporting precinct at Broadmeadow, has potential to reinvigorate inner Newcastle.

At a GN metropolitan area level, both economic geography and industry structure suggest that a 'networked' city spatial framework forms the basis for future planning. This would include primary and secondary precincts or centres which can grow in residential and job density over time, and in the future become the key points to 'connect'. This is consistent with the Hunter Regional Plan 2036. GN

[4] Alexandra Heath (2017) 'Structural Change in Australian Industry: The Role of Business Services' RBA Speeches: https://www.rba.gov.au/speeches/2017/sp-so-2017-09-06.html

therefore becomes a connected network which seeks to maximise the use of existing infrastructure by comprehending the spatial requirements of key growth industries and acknowledges the existing scale of development and diverse role of inner Newcastle.

The 'connected network' model needs to have regard to the critical requirements of small business in an era of globalisation and technological change. It is likely that a substantial portion of new jobs will be created in new/emerging small businesses. This will require a flexible approach to planning and building regulations.

In the short-term the connected networks must rely on private vehicle, active transport and re-worked public transport. A parking strategy which supports the connected network is essential in the short term to focus activity levels. This parking strategy should consider the long-term accommodation of automated vehicles and connections with automated shuttles. This consolidated parking solutions can link to public transport hubs.

The mass transit requirements generated by the connected network of centres should provide the foundation for identifying the route and frequency of public transport. GN has major underutilised anchor public transport infrastructure and the forthcoming metropolitan plan needs to start making better use of its latent capacity.

Early consideration should be given to an Automated Vehicle Acceleration Strategy given that coverage of light rail will remain low until the mid-2020's – the time at which Passenger AV technology will become increasingly widely used.

The 'connected network' strategy will require consistency in implementation and governance. Each municipality should have a series of strategic frameworks and projects which form part of a city deal approach to the State and Federal Government.

Transport infrastructure is an essential ingredient for an economy to grow. Key infrastructure projects recently completed, underway or currently under consideration by the NSW State Government will help to remove barriers to growth.

The Hunter Expressway (HEX) and a related group of infrastructure projects will also shape the economic geography of GN. These projects have reduced travel times to and from the NCC and will increase the attraction of living in the HEX corridor. At the same time, this new infrastructure should be used to draw industry, in particular, freight and logistics (including intermodal facilities) from inner Newcastle and free up major sites for residential, recreational, tourism and mixed uses.

This strategic economic approach will create a value proposition for infill, supporting higher density living and working, including opportunities for smaller businesses. These strategies should seek to minimise vehicle movement patterns by providing opportunities for people to live close to where they work and establishing employment nodes close to where people live.

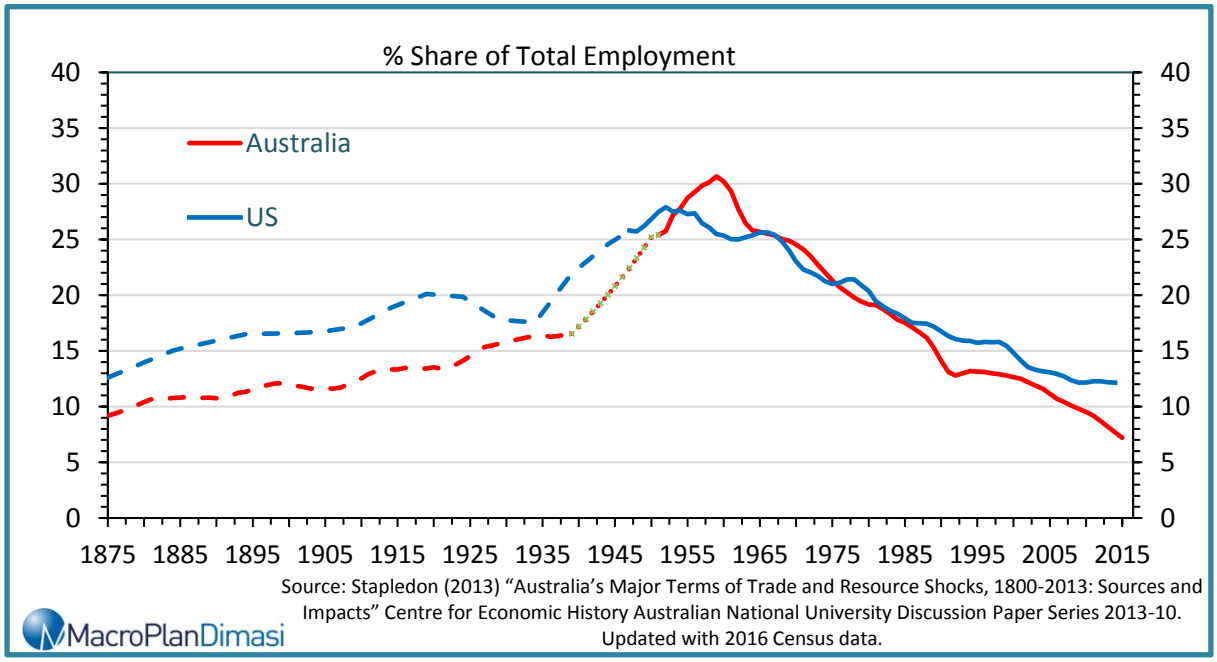
3.2 Greater Newcastle - Its History

3.2.1 Long-term Shift from Manufacturing to a Diversified Service-Based Economy

The history of Greater Newcastle in the past 50 years has been very much tied to the story of manufacturing in Australia. Up until the early 1960s, manufacturing was an expanding sector of the Australian economy, and this very much reflected a broad global trend in the developed economies, as evidenced by the US (Figure 1). In 1961, when the manufacturing sector share of employment for Australia peaked at 28%, for GN, the share was 36% (Table 1). At that time, GN's strength in manufacturing was based on its natural advantage with coal and an excellent port, which led it to be the centre for the steel industry in Australia.

For Australian manufacturing, the past 50 odd years has seen a structural decline in manufacturing, with the share of employment in manufacturing declining to 9.2% in 2011 and then sharply to 6.7% in 2016. The decline has reflected long term trends to larger scale manufacturing, declining international shipping costs, the consequential pressure to reduce protection, and the global shift in manufacturing to the new industrial economies of first Japan in the 1960s-1980s, then South Korea and Taiwan, and since the 1990s the rise of China. These factors all impacted on developed economies around the world (US, Canada, Europe, Australia, NZ). Australia's comparative advantage in natural resources had seen the mining and energy sectors continue to expand, particularly during the resources boom 2004-11, adding to the pressure on the manufacturing sector in Australia. Thus, while for example the decline in manufacturing in the US had appeared to stabilise by the early 2000s, in Australia the sector continued to contract sharply between 2001 and 2016.[5]

Figure 1. The Rise and Decline in Manufacturing in the US and Australia



Source: Stapledon (2013) "Australia's Major Terms of Trade and Resource Shocks, 1800-2013: Sources and Impacts" Centre for Economic History Australian National University Discussion Paper Series 2013-10. Updated with 2016 Census data.

[5] Downes, P., Hanslow, K. and P. Tulip (2014) "The Effect of the Mining Boom on the Australian Economy." Reserve Bank Discussion Paper 2014-08; and
Stapledon, N. D. (2013) "Australia's Major Terms of Trade and Resource Shocks, 1800-2013: Sources and Impacts" Centre for Economic History Australian National University Discussion Paper Series 2013-10.

For Greater Newcastle, these big trends have transformed the economy. From that peak of 36% in 1961, manufacturing employment declined to 10.4% in 2011 and then very sharply to 6.5% in 2016. The impact of the decline of manufacturing on the GN economy has been softened by the continued strength of the coal industry which has benefitted from the high demand for coal from the rising industrial economies of Asia, with flow-on effects to service industries and some segments of manufacturing from higher demand for inputs to mining.

Like the Australian economy, the GN economy has made the structural change necessitated by the decline in manufacturing. Some of that growth in employment has been linked to the expansion in coal industry exports, but the large bulk of jobs has been generated in the service sector which has transformed the structure of the economy to one which is more broadly based (Table 1). The economy absorbed the structural decline and through strong direction and structural adjustment support from Commonwealth and State governments, it has emerged in good shape today.

Table 1. Greater Newcastle Industry Shares of Employment 1961-2016

	1961	1991	1996	2001	2006	2011	2016
Agriculture, forestry and fishing	2.3%	1.3%	1.2%	1.2%	1.0%	0.6%	0.8%
Mining	6.2%	4.1%	3.3%	2.2%	2.3%	3.4%	3.6%
Manufacturing	36.3%	14.7%	14.0%	12.0%	11.1%	10.4%	6.5%
Electricity, gas, water and waste services	3.1%	2.5%	1.6%	1.4%	1.4%	1.6%	1.4%
Construction	8.0%	7.4%	6.9%	7.2%	8.0%	8.0%	9.1%
Wholesale trade	15.8%	5.0%	4.9%	4.5%	3.4%	3.0%	2.0%
Retail trade		10.5%	11.4%	12.6%	12.4%	11.3%	10.3%
Accommodation and food services	4.6%	6.2%	7.0%	7.6%	7.2%	7.4%	7.9%
Transport, postal and warehousing	7.4%	4.9%	4.7%	4.4%	4.4%	4.4%	4.2%
Finance and Insurance	2.3%	3.3%	3.0%	2.7%	3.0%	2.8%	2.9%
Property and Business Services	na	6.7%	8.6%	9.5%	9.8%	10.3%	10.3%
Public administration and safety	1.9%	6.3%	6.0%	5.9%	6.5%	6.5%	6.7%
Education	8.7%	7.0%	7.5%	7.9%	7.9%	8.0%	8.5%
Health and Community Services		9.4%	11.1%	11.6%	12.8%	13.9%	15.9%
Other Services	1.9%	10.8%	8.7%	9.2%	8.8%	8.5%	10.0%

Source: Census data and MacroPlan. The data for 1961 is not directly comparable with later data and marginally overstates the decline in manufacturing. Employment is by place of residence, not place of work. For purposes of historical comparison, the ASIC industrial categories are used in this table. In Tables with 2011, 2016 and projections to 2036, the ANZSIC industrial categories are used.

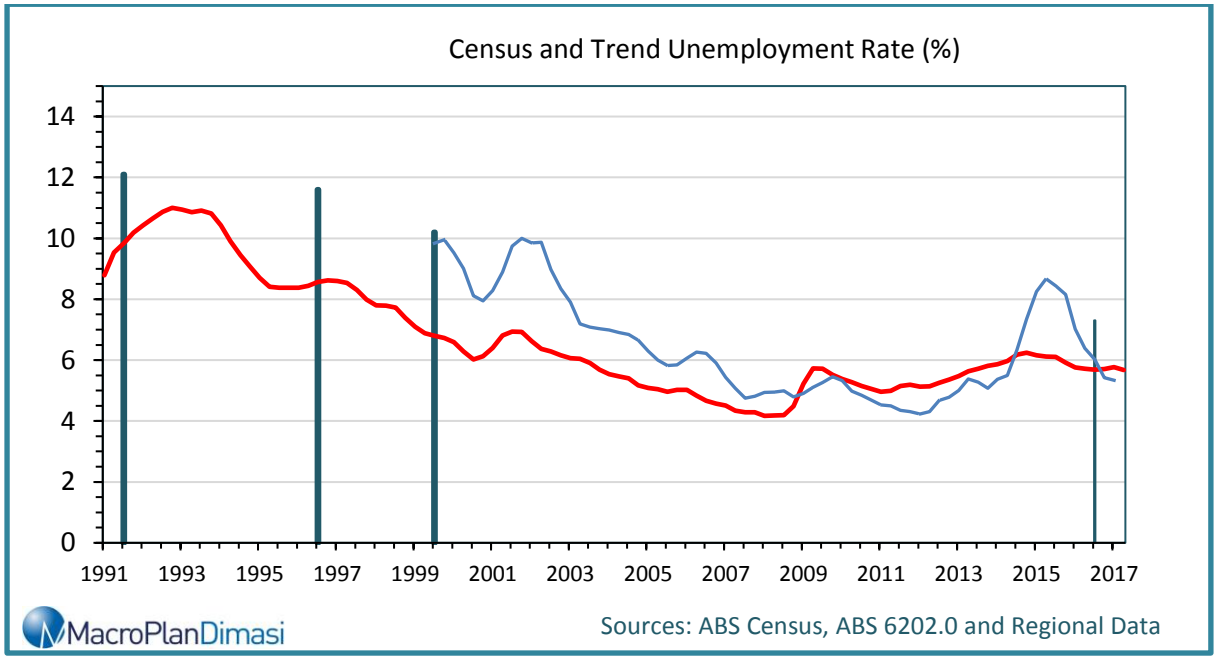
3.2.2 Greater Newcastle - Recent Strong Economic Performance

The 1990s was a difficult period for the Australian and GN economies. In the period 1989-1991, the Australian economy suffered its last major recession which caused unemployment to hit post-WW2 highs nationally and given the propensity for recessions to have a more pronounced effect on manufacturing, the recession hit the GN economy hard (Figure 2). The shadow of that recession persisted well into the 1990s and was overlaid with the effect of Government decisions to reduce the previous high levels of protection for the manufacturing sector.

In the late 1990s, when the steel industry closed, the GN economy was still experiencing elevated levels of unemployment. While Australia's unemployment rate had declined to 7% in 2001, in GN the unemployment rate was still a high 10%. Moreover, under-employment - reflected in a low participation rate and high part-time work (see Tables 5 and 6 below) was also high in 2001.

In response to these difficult conditions, there was a net movement of younger people out of GN seeking employment in Sydney and other markets where there were more employment opportunities. Since then, assisted by the resources boom but coping with on-going contraction in manufacturing, the GN economy has staged a strong recovery in the period 2001-16 which has seen the unemployment rate moving into line with the national figure. The end of the resources boom caused a short, sharp rise in unemployment in 2014-15 which saw the unemployment rate above 8%, but only briefly as the unemployment rate fell to below 6% in 2017.[6]

Figure 2. Greater Newcastle Unemployment Rate 1991-2017



This latter period was a reminder of the boom–bust volatility that is sometimes a feature of the resources sector. At the same time, it was a demonstration of an economy able to respond. For GN, its direct exposure to the coal industry is relatively small. However, the coal industry in the upper Hunter is integral to the GN economy with the associated significant employment in manufacturing, transport and a whole range of services linked to the coal industry (see discussion below[7]). In 2017,

[6] 2016 Census had unemployment at 7.3% but ABS Regional data has it lower and heading below 6% in 2017.
[7] See section on Mining and Appendix B Note 2 for discussion of impact of mining on the GN economy.

the bottom line is that the GN economy looks in its best shape for a long time and its prospects for the future are strong.

3.2.3 Greater Newcastle is tied into Global Economy

The structure of the GN economy is more directly tied to global supply chains than Australia as a whole. For Australia, it is estimated that the traded goods and services sector comprises 28% of economic activity, or 33% if we include the service sector inputs into resources (mining and agriculture). For GN, 32% of activity is in traded goods and services. However, this traditional measure only counts mining activity within GN as part of traded goods and services. If we include the aggregate mining-related activity in GN, and service sector inputs into manufacturing, agriculture, and tourism, then about 50% of activity in GN is in traded goods and services.[8]

The proportion of output generated by the GN economy which is exported to foreign markets is less than the 50%, but it does mean that the GN economy is subject to the disciplines imposed by competing in world markets. That had not been the case 20 years ago when much of its manufacturing relied on tariff and other forms of protection, but these protections were stripped away in the 1990s. This exposure to competitive pressures and with it the need for constant adjustment to changes in foreign economies and product markets, makes the GN economy more resilient and dynamic.

For Australia and GN, the residual manufacturing sector has a natural home bias or is building off a comparative advantage in mining and energy resources and agriculture. Those firms with an innovative edge are still able to compete despite the higher costs of operating in Australia. The coal industry, directly and indirectly, remains an important contributor to GN economy in 2016 and, while there are concerns about the long-term role of coal, the International Energy Agency is forecasting that demand for coal will rise over the next 20 years, so that the base assumption is that the industry will maintain its role in the GN economy. The legacy of the manufacturing and mining sectors gives the region a skill base which has contributed to its emerging role as a defence industry hub.

Table 2. Projected Growth in Global Middle Income Population

	2010		2020		2030		Growth 2010-30
	No. bn	% share	No. bn	% share	No. bn	% share	
North America	0.34	18%	0.33	10%	0.32	7%	-5%
Europe	0.66	36%	0.7	22%	0.68	14%	2%
Central/S. America	0.18	10%	0.25	8%	0.3	6%	73%
Asia-Pacific	0.5bn	28%	1.7bn	54%	3.2bn	66%	515%
Sub-Saharan Africa	0.03	2%	0.05	2%	0.1	2%	234%
N. Africa/ME	0.1	6%	0.16	5%	0.23	5%	123%
World	1.8		3.2		4.9		165%

Source: OECD Development Centre - Working Paper 285 The Emerging Middle Class in Developing Countries

3.3 Global Megatrends

3.3.1 World (and Asian Middle Class) Closer to Australia

In 1961, Australia and GN were seen as being a long way from the centre of global economic activity which was then anchored in the Atlantic between the US and Europe. That started to change with Japan, then South Korea and Taiwan, and since the 1990s, China and more recently India. This has

[8] See section on Mining and Appendix B Note 2 for discussion of shares of traded goods and services in the Australian and GN economies. The figures quoted are indicative only.

shifted the centre of world economic activity to the Asia-Pacific, putting Australia and GN close to the centre of action.

Importantly, while growth rates in the Asia-Pacific economies have been high for a sustained period, there is still significant up-side potential for activity and demand in the area to grow strongly in the next two decades. There is projected to be substantial growth in the middle class in the Asia-Pacific. (Table 2) This is expected to generate demand for niche consumer goods (wine, quality foods), tourism and leisure, education, and health, all of which play to Greater Newcastle's strengths.

3.3.2 Global Cities

One of the other global trends has been the shift towards urbanisation of the world's population and the rise of so-called global 'superstar' cities.[9] New York, London and San Francisco are standouts, but Tokyo and Shanghai in the Asia-Pacific are in this category and closer to home, Greater Sydney is seen as Australia's global 'superstar' city. These global cities are seen as magnets for growth and Sydney's high growth will be a growing source of demand for GN for tourism, food, and manufactured goods.

Greater Sydney is also a gateway to the world for GN. In the case of tourism, its capacity to draw international tourists leads to increased opportunities for GN to tap into the international tourist market.

3.3.3 Greater Newcastle and Transformative Technologies

A forthcoming report on Automated Vehicle (AV) strategies for GN[10] will identify that some of the advantages of the transition to AVs over coming decades can start now, by adopting some of the future benefits into current transport and land-use planning and strategies. This includes using ride-sharing capability and technological platforms to service the first and last kilometre of public transport trips. This will allow commuters to better access direct fast trunk services.

The ride-share vehicle fleet could then seamlessly transition to an AV fleet over time, particularly as that is the future desire of some providers like Uber anyway. It can suspend the expensive and disruptive implementation of additional road capacity and complement public transit though integration with transit hubs.

It could also ensure that future "redundant" infrastructure and land-use regulations are transitioned out of transport and land-use plans early, particularly as they reconsider the 30-40 per cent of the built environment currently dedicated to parking at home, work, and retail venues. Road capacity augmentation could also be fundamentally disrupted.

[9] Gyourko. J. Mayer, C. and T. Sinai (2013) 'Superstar Cities' American Economic Journal Economic Policy vol. 5 no. 4 pp 167-199.
[10] MacroPlan Automated Vehicle (AV) implementation Strategy for Newcastle

4 ECONOMIC CONTEXT

4.1 Population Growth Scenarios for Greater Newcastle

4.1.1 Australia, NSW and Greater Sydney Projected to Grow

Official projections are for Australia's population to rise by 1.5% per annum from then 23.9 million in 2015 to 32 million in 2035 and then by 1.1% per annum to 40 million in 2055.[11] The NSW Government's projections have the NSW population rising from 7.6 million in 2016 by 1.1% per annum to 9.5 million, then by 0.8% per annum to 11.2 million in 2056.[12] The growth rates for the next 20 years, and the projected gap between Australian and NSW growth, are in line with the average growth rate for the period 1981-2017 of 1.4% and 1.1% respectively[13]. The NSW report notes that "the recent lift in relative NSW housing prices is likely to deter potential overseas migrants and encourage migration to other states."[14] It is important to note that there have been periods of lower population growth associated with periods of weakness in economic conditions and higher population growth associated with periods of rapid growth (e.g. the recent resources boom).

A key influence on this population growth is immigration, influenced by economic conditions and Commonwealth policy, which is expected to contribute more than half of the population growth. While mitigated by immigration, the low birth rate is expected to see the population age profile continue to shift towards an older population.

4.1.2 Potential for Higher Growth

MacroPlan believes a good case can be made for higher population growth scenarios for GN. If we factor in GN lagging Sydney's population growth but matching the population growth rate it achieved in the period 2001-16 (Table 3), then population growth will approach 1.1% per annum, which would lift population to 718,000 by 2036.

But over and above that, there are a number of factors including economic drivers discussed later in this regard, that point to the potential for GN's population growth to be relatively faster in the period ahead. This underpins a high growth scenario with 1.3% average growth lifting GN's population to close to 750,000 in 2036.

Looking beyond 2036, these population growth scenarios point to GN's population approaching and potentially passing the one million mark on a fifty-year horizon to 2066.

4.1.3 Why Higher Growth to 2036?

Greater Newcastle's population growth has lagged NSW in the past several decades but that should not be surprising given the decline in manufacturing and the associated weakness in the economy's performance before the turnaround in the 2000s. But, despite navigating that structural change, the GN economy continued to grow. Now with the structural decline in manufacturing essentially finished and the economy now more diverse and robust, this past history is not a good guide to the future. GN

[11] 2015 Intergovernmental Report (Australian Government) Chapter 1, Table 1.3 page 12. https://static.treasury.gov.au/uploads/sites/1/2017/06/04_Chapter_1.pdf

[12] 2016 NSW Intergovernmental Report Appendix Projections Summary page 95 https://www.treasury.nsw.gov.au/sites/default/files/2017-02/2.%20The%20Shape%20of%20our%20Future%20Economy.pdf

[13] ABS 3101.0 Australian Demographic Statistics Table 4. This series starts in 1981.

[14] The NSW Intergovernmental Report also noted (page 37) that, assuming prices moderated, the impact of relatively high house prices would be expected to abate.

is an economy which has performed strongly in more recent years and clearly has the potential to grow more strongly in the future.

Table 3. Historical Population and Population Growth

	Population No.'000							Period Average Growth Rate % per annum			
	1961	1991	1996	2001	2006	2011	2016	1961-16	1961-91	1991-01	2001-16
NSW	3919	5899	6176	6530	6743	7219	7727	1.24%	1.37%	1.02%	1.13%
Sydney	2030	3433	3588	3808	3953	4286	4671	1.53%	1.77%	1.04%	1.37%
GN	321	445	463	489	508	542	575	1.06%	1.09%	0.95%	1.08%
RoNSW	1513	1781	1857	1939	1978	2068	2147	0.64%	0.54%	0.85%	0.68%
Central Coast	53	240	269	295	303	323	335	3.40%	5.15%	2.08%	0.86%

Note: Rest of NSW excludes GN and Central Coast, as well as Sydney. Sydney excludes Central Coast.
Source: ABS 3101.0 Australian Demographic Statistics; ABS 3105.0.65.001 - Australian Historical Population Statistics, 2014; ABS 3218.0 Regional Demographic Statistics; and Census for GN 1961

The broader point is the presumption that population growth can be absorbed by the capital cities. Historically, Australia has been one of the most urbanised countries in the world, with a high concentration of its population in its capital cities and population growth skewed to these cities. Attempts by governments to promote decentralisation have come up against strong forces favouring population growth in established, coastal cities. The rise of the Gold Coast and Sunshine Coast, without government intervention, are the only examples in recent history of new cities emerging in Australia. There are potentially diseconomies with size as large cities generate higher housing costs and increased congestion, as evidenced by Sydney's experience. These factors will inevitably increase over time and constrain the population growth of these big cities. Sydney has and will continue to grow but out-migration has been a feature subtracting from otherwise faster population growth and this out-migration is built into the official forecasts.

One of the significant trends to emerge in the US has been the increasing importance of amenity in determining the relative growth of cities in the US.[15] The productivity of cities still matters but, in the age of the knowledge economy with the skill of workers being more critical, industry has tended to follow the highly talented workers with their preference for lifestyle and the experience economy. The old northern industrial states around the Great Lakes, which prospered when proximity to those shipping routes was critical, have declined. Industry has shifted offshore but also elsewhere in the US.

The other major parallel shift in the US has been the shift in retirees from the colder northern states to warmer climates in the south and west (coastal) areas in retirement. Reflecting these trends, the high growth has been in the west and south. California, which shares similarities with Australia [especially in the Sydney to Noosa coastal corridor], has been a beneficiary of this shift.

In the Australian context, many Australian cities rank highly in terms of amenity (climate, coastal location), so the shifts within Australia are less pronounced than in the US. Growth in Queensland has partly reflected climate (Gold Coast and Sunshine Coast attracting tourists and retirees) but mining has also been drawing an inflow to the State. WA's high growth is linked to mining but its capital Perth offers a high level of amenity.

In an absolute sense, GN does not compete with Sydney with its high level of expert services, deep labour pools, senior public and private sector decisions makers, international entertainment, cultural and tourism industries. There are businesses that need to operate in Sydney to take advantage of the agglomeration benefits that Sydney has. But at the margin there will be businesses and people that

[15] Glaeser, E. Kolko, J. and Saiz, A (2000) 'Consumer City' Harvard Institute of Economic Research Discussion Paper 1901

have less need to be close to big city markets, and will trade off the agglomeration benefits for lower property and congestion costs offered by smaller cities.

In the case of GN, following the same logic, lower property prices and lower congestion, an increasingly high level of amenity and access to world class education and health services should be a factor that encourages movement, at the margin, from Sydney to GN. If we look at alternative cities to Newcastle, the Gold Coast has absorbed some of the spill-over, but is now itself showing signs of some of those diseconomies that Sydney suffers from. The assumption that people leaving Sydney will by-pass GN and simply leave NSW, is becoming contestable.

In the period 2006-11,[16] there was a net outflow out of Sydney of 90,000 people, of which 44,000 moved inter-state and 46,000 intra-state. Illawarra (7,000) and the Central Coast (11,500), both of which are commuting distance to Sydney, took the largest net flows, while the North Coast took 10,500, a result heavily skewed to retiree age groups.

Over this period, there was net migration of about 11,500 people into GN. Of that, about 4,000 or one-third were people moving into GN from its hinterland. About 6,000 were from Sydney and most of the balance from the Central Coast. While GN is taking only a portion of Sydney's outflow, it still matters to GN with a net flow of people that added 0.45% per annum (about 2300 each year) to its population growth.

Greater Newcastle's experience is not unusual. Within Australia, there has been movement from both remote inland towns and the capital cities to larger regional cities (see Box 1). The capital cities are capturing the great bulk of foreign immigration flows and showing the fastest growth, but the spill-over is going to larger regional cities such as GN and that reflects the economic opportunity these cities offer.

During the period of the last Sydney property boom 1997-2004, Sydney prices rose relative to prices in GN (Figures 3 and 4) but in this period, it is difficult to observe any resultant positive flow from Sydney to GN. However, that should not be a surprise. At the time, GN was being hit by the BHP closure of its steelworks (1999) and structural decline in the manufacturing base. So, the potential positive boost from cheaper land (for houses and business) was negated. But today, GN is in much better shape – a more balanced economy, a better city image and higher amenity. Hence, it is in a better position to be an option for people migrating out of Sydney.

A second and significant advantage is the quality of GN's infrastructure.

During the 1990s and 2000s, there was underinvestment in transport infrastructure in Sydney which, in the face of Australia's growing population, translated into congestion and contributed to the price pressures which have pushed growth interstate. By contrast, GN has a relatively good road infrastructure, an underutilised public transport network and also ample spare capacity in its port and airport infrastructure. With judicious new investment, the transport infrastructure can be developed to cater for a city of 750,000 by 2036 and over 900,000 by 2056. That is, GN has a substantial transport infrastructure advantage over Sydney which gives it a competitive edge in the medium term.

[16] NSW Department of Planning Population Explorer www.planning.nsw.gov.au › Research and Demography › Demography. MacroPlan has netted the data for the 5 LGAs to determine estimates for Greater Newcastle.

Box 1: Net Internal Migration to Inner Regional Cities, including Greater Newcastle

The State of Australian Cities (SoAC) report for 2015 identified net internal migration in Australia from the capital cities, outer regional and remote areas to inner regional areas, including GN. For these inner regional areas, the contribution to population growth was over 0.4% per annum in the period 2006-11. In the case of GN, internal migration added 0.45% per annum in 2006-11 and the higher population growth in GN for 2011-16 indicates a contribution to population growth from internal migration of more like 0.6% per annum in the latest period.

The SoAC report identified income/employment opportunities, amenity and the cost of housing as the three key influences. This is consistent with the Roback-Rosen theory on movement of people between cities (see Roback, J. (1992) Wages, Rents and Quality of Life *Journal of Political Economy* vol. 90 pp 257-278). The SoAC report identified retirees as one group moving from capital cities to inner regional areas. No longer needing to live close to work, amenity and cost of housing become more important factors than income/employment for retirees. It also identified that younger adults (15-24 age cohorts) are more likely to move to capital cities but that the opposite is true for 25+ age cohorts more likely to be settling down and for whom the cost of housing is a consideration. The increase in leisure and tourism industries in the inner regional areas was identified as a factor drawing workers to these regional areas.

Sources: Commonwealth Department of Infrastructure and Regional Development State of Australian Cities 2014-2015 Chapter 2
https://infrastructure.gov.au/infrastructure/pab/soac/files/2015_SoAC_Chapter_2.pdf

Figure 3. Greater Newcastle vs. Sydney Median House Prices 1991-2016

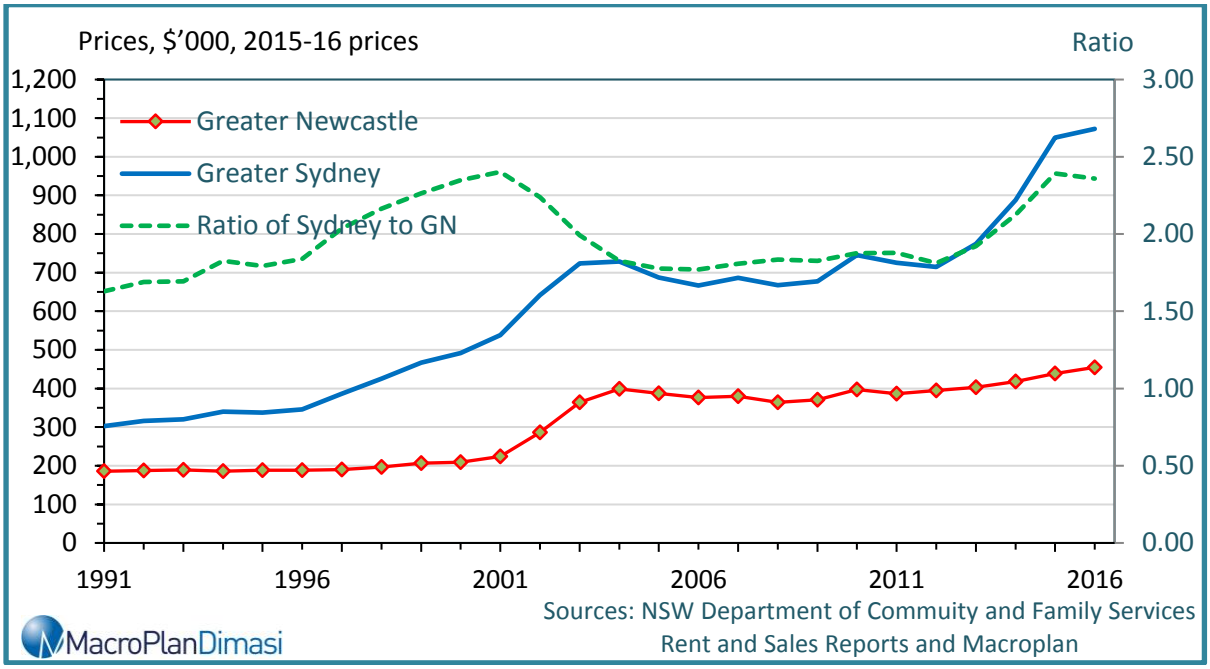
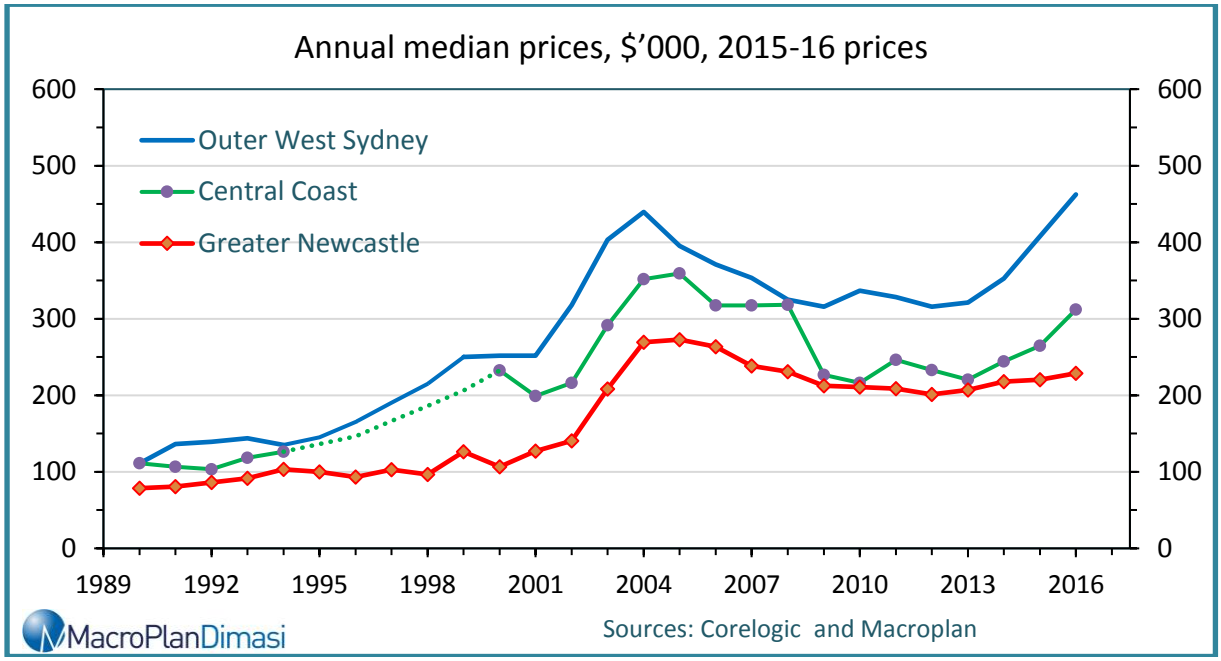


Figure 4. Greater Newcastle vs Outer West Sydney and Central Coast Land Prices 1990-2016



A related and significant point is there are some growth sectors which could pull along growth in GN. The Defence/Airport Hub at Williamtown, for example, has the capacity to boost growth directly and indirectly. The Defence work can generate spill-overs into specialist manufacturing and professional services and there is some evidence of this. More significantly, airport expansion can open up links to the fast-growing Asian markets. This will create opportunities for intensive agriculture and food manufacturing exports into Asia and also increased tourism and education exports into the region. More broadly, as the critical mass of the GN's population increases, the level of specialist services that are viable to be offered increase.

A final point is that the growth profile will be a function of government policy. If housing supply is constrained and this leads to higher prices, growth will be less. State and Local Government policy can influence the rate of growth through its approach to greenfield and brownfield housing opportunity. Proactively planning for high growth will require the release of greenfield and brownfield land for development and in rezoning established areas for redevelopment for higher density along transport routes and in activity centres.

4.1.4 Impact of Higher Growth on Greater Newcastle Age Profile

The higher growth scenarios for GN will mean that the shift to older age cohorts will be less pronounced. The effect of higher growth will be a function of the age cohorts of the inflow of people into GN. A higher influx of retirees migrating from Sydney will tend to accentuate the aging of the population. In contrast, a (net) influx of younger people (e.g. 25-34 age cohort), attracted to employment opportunities and a lower cost of housing, will keep the age profile younger. In life cycle terms, these younger age groups are 'settling down' and having families, and an increase in their number will also be reflected in an increase in births and subsequently in higher growth in the 0-14 age groups.

As discussed in Box 1, there is a trend for the younger 15-24 (career establishing) age cohorts to move out and older 25+ (settling down) age groups to move in. From an Australian perspective, this

movement is a positive thing. From a GN perspective, as its labour market becomes deeper and offers a broader range of careers, a measure of GN's economic success will be less movement out by this younger age cohort.

The MacroPlan high growth scenario incorporates a higher inflow of retirees in absolute numbers but also a higher inflow of the younger age cohorts, both 15-24 and 25+, will outweigh that in the period 2016-36. In the period 2016-36, the 75+ age cohort is projected to grow by 94% on the high scenario, marginally more than on the low growth scenario (90%). The high growth scenarios imply that demand for independent living units (ILUs), aged care facilities and hospital services will be higher.

This will have a beneficial spin-off in stronger growth in the health and social support workforce which can absorb some of the lower skilled workforce currently under employed and those being displaced from the manufacturing and agricultural sectors into the social support, community transport and home maintenance services sector. On the other hand, the increase in the working age population will mean that more labour will be available to accommodate growth from other industries.

Table 4. Greater Newcastle Population, Labour Market, and Retirement Cohort Projections

		2016	2036 [0.9% Growth]	% Change	2036 [1.3% Growth]	% Change
		No. '000	No. '000		No. '000	
	Population	575	692	20%	747	30%
Labour Market	15-64 Age Group	363	408	12%	442	21%
	% of population	63.2%	58.9%		59.1%	
	Labour Force	280	320	18%	347	29%
	Participation Rate	57.8%	56.1%		56.3%	
	Employment	251	304	21%	330	31%
Retirement Cohorts	65-74 Age Group	59	74	26%	80	36%
	% of population	10.2%	10.7%		10.7%	
	75+ Age Groups	46	89	91%	94	103%
	% of population	8.1%	12.8%		12.6%	

Source: ABS Census and Population Data; Department of Planning and Environment 2016 Population Projections for 0.9% Projection and Age Profile; MacroPlan Projections for 1.3% projection and age profile. The 1.1% projection would give outcomes broadly between the two projections.
Note: Census 2016 data aligned with ABS adjusted population estimates. Participation rate uses ABS definition – labour force as % of population 15+. On OECD measure as % of 15-64 age group, the participation rate will likely rise between 2016-36.

4.2 The Employment/Growth Outlook

There is a two-way relationship between population growth and employment. The combination of housing affordability and amenity which attract people to GN will also attract business. Firms are attracted by the cost of doing business (land, labour, and transport costs) and by the size of urban markets. GN has a core strength in mining but also increasingly ranks high in terms of amenity. The direction of change in the GN urban economy towards a knowledge and services economy will transform inner Newcastle and continue to drive improvements in amenity.

This increase in amenity, which will develop even more momentum over time, is a key driver of future growth. In absolute terms, it will not match Sydney's critical mass in terms of cultural facilities, but it can close the gap by offering an affordable alternative value proposition. If GN can maintain this cost advantage in terms of housing and business establishment costs, it will draw people and businesses to GN.

In terms of the economic output that the GN economy will generate, this is typically constructed as a function of the three Ps: people, participation (proportion of population working), and productivity (output per person working).

The official 2016 NSW population and household projections have the 15-64 age group – the prime working age population increasing by 0.6% per annum over the period 2016-36. Wilkins and Wooden (2014) see "scope for further increases in age-specific labour force participation rates, especially among older people"[17] and this is incorporated into the Australian and NSW projections. One factor is Government policy on retirement incomes.

Government decisions to increase age eligibility for pension and access to super, is expected to see higher work participation in the 55-64 and 65-74 age cohorts in the period 2016-36. The shift to the service sector economy, coupled with technological change, will create more opportunities for older workers to work longer. If unemployment can be assumed to average 5% in this period, this increase in the working age population would translate to growth of 0.7% or higher in the number of workers.

The broader measure of labour supply is numbers of hours worked, which incorporates the first two Ps – people and participation in the growth equation. That is a function of workforce participation rates, but also the proportions of part-time and full-time workers and more specifically the number of hours worked per worker. As discussed above, there was a period of significant change in workforce patterns in the 1990s but these patterns appear to have stabilised in the 2000s.

In the case of the projected increase in participation rates in the older age cohorts (55-64; 65-74), that is expected to be partially mitigated by the likelihood that hours worked by these age groups will continue to be shorter than for younger workers.

The net effect of that mix of factors is that hours worked in the GN economy is projected to rise by about 0.7%. How that translates to economic growth will be a function of the industries which GN attracts. The Defence Hub, for example, is a high skill/productivity and hence high earnings generator. If GN can attract advanced manufacturing around that Hub, then it will be positive for growth in the GN economy.

[17] Wilkins, R. and M. Wooden (2014) Two Decades of Change: The Australian Labour Market, 1993-2013" *The Australian Economic Review*, vol. 47, n0. 4, pp 417-31. See page 429.

There are some empirical studies which would point to higher population growth, to the extent it is largely led by immigration of workers into GN, translating higher productivity growth potential. [18] That is, the higher growth scenarios can translate into higher growth in output (Gross Regional Product) and, more importantly in output (and income) per capita.

Over the period 2016-36, the base case growth scenario will have GN's Gross Regional Product (GRP) rise from $38 billion to $58bn, lifting real income per capita from $66,000 to $83,000, or 26% (Table 5). The higher (1.3%) population growth scenario would lead to 29% growth in real income per capita between 2016-36. The higher incomes point to a benefit to the people of GN if the higher growth projections do materialise.

Table 5. Projections of Real Gross Regional Product /Income for Greater Newcastle

$ 2015/16 prices	2016	2036 base case		2036 high growth	
	$bn	$bn	Growth rate %	$bn	Growth rate %
GRP $bn	38	58	2.1%	65	2.6%
GRP per worker $'000	170	216	1.3%	220	1.4%
GRP per capita $'000	66	83	1.2%	85	1.3%

See Appendix B Note 1 for discussion of Gross Regional Product estimates and differences in growth scenarios.

The "steel industry shock" to GN in 1999 caused the economy to transform quickly. To some extent the expansion in the coal industry in the region has cushioned the loss of the steel industry, with its demand for manufacturing and service inputs. More broadly, however, the manufacturing sector has rationalised, with firms reliant on protection and unable to adapt to the more competitive environment exiting. The majority of firms have transformed into what is in 2017 a more resilient manufacturing sector. These firms are more global in their outlook, have invested in automation to increase efficiency and quality, and demonstrated innovation in adapting to the global market in which GN and Australia now operate.

The GN industrial revolution has evolved faster than the labour market. Human capital is a critical ingredient to the growth of cities. For example, firms expanding into the Defence/Williamtown Airport Hub will be needing a highly skilled workforce. GN has a heritage of engineering so in the near-term firms are going to need to import skills for these new economy jobs. Longer term, this industry demand for skills presents opportunities for the education sector.

4.3 Key Sectoral Drivers of the Greater Newcastle Economy

The major sectoral trend in developed economies has been the decline in goods production shares of economic output/activity and the rise in service sector shares. Official projections for future sectoral growth expect that trend to continue. In term of employment, productivity gains in the goods producing sectors have tended to be much larger, with those productivity gains a factor accentuating the decline in employment shares for those industries. Those same productivity gains have underpinned real income growth and as incomes have risen, leisure time has increased. A rising share

[18] An IMF Paper by Jaumotte, F., Koloskova, K. and S. Saxena (2016) 'Impact of Migration on Income Levels in Advanced Economies' IMF Publications, 24 October, 2016 looked at the impact of higher immigration on productivity and income for high income developed economies. It found a 1 percentage point increase in the share of migrants in the adult population can raise GDP per capita by up to 2 percent in the long run. It is perhaps problematic to apply those results to migration into a region, although the principles should be the same. A fuller discussion in Appendix B Note 1.

of income has also been expended on services, for example, on leisure related activities (tourism, entertainment) and on health.

While the overall competitiveness of the GN economy is crucial to the long-term performance of the economy and its capacity to attract both people and firms, there are specific sectors which will be important drivers of growth.

Table 6. Greater Newcastle Comparative Employment Shares

2011 Share of Employment by Industry	Greater Newcastle	Sydney	NSW	Australia
Agriculture, forestry and fishing	0.6%	0.4%	2.3%	2.5%
Mining	1.8%	0.2%	1.0%	1.8%
Manufacturing	11.1%	8.7%	8.7%	9.2%
Electricity, gas, water and waste services	1.7%	0.9%	1.1%	1.2%
Construction	6.6%	7.2%	7.5%	8.4%
Wholesale trade	3.0%	5.4%	4.5%	4.1%
Retail trade	12.2%	10.1%	10.6%	10.8%
Accommodation and food services	7.9%	6.4%	6.9%	6.6%
Transport, postal and warehousing	4.3%	5.4%	5.1%	4.9%
Information media and telecommunications	1.0%	3.1%	2.4%	1.8%
Financial and insurance services	3.2%	6.7%	5.2%	3.8%
Rental, hiring and real estate services	1.7%	1.8%	1.7%	1.6%
Professional, scientific and technical services	6.2%	9.9%	8.1%	7.4%
Administrative and support services	2.7%	3.6%	3.3%	3.3%
Public administration and safety	6.8%	5.8%	6.3%	7.0%
Education and training	8.6%	7.8%	8.1%	8.2%
Health care and social assistance	15.0%	11.2%	11.9%	11.9%
Arts and recreation services	1.2%	1.6%	1.5%	1.5%
Other services	4.4%	3.8%	3.8%	3.8%

Source: ABS Census 2006.0 Working Population Profile, Table W09 Shares of Employment by Place of Work.

4.3.1 Employment Profile of Greater Newcastle

The profile of the GN economy is diverse but certain features stand out. (Table 6) For GN, mining represents just 1.8% of jobs which is on par with the Australian average. However, as discussed below, this significantly understates the importance of mining to the GN economy.

While declining significantly from historical levels, the manufacturing share counts for 11% of jobs which still has it about 2 percentage points above levels for Australia, Sydney and NSW. But what also stands out is the high shares of activity accounted for by retail, accommodation and food services, education and particularly health where 15% employment share contrasts with under 12% elsewhere.

If GN is expected to converge to the Australian average as it grows and diversifies, this may indicate some caution in expectations going forward. However, the age profile and the wider hinterland it serves would explain the high share of health and the projections for growth in the aged cohorts says that that sector should still generate high growth. Similarly, if the tourism sector reaches or even approaches its stretch targets, then further expansion of accommodation and food services can be expected.

On the flipside, GN has a low share in construction, wholesale trade, IT, financial services (not surprisingly about half the share of Australia's financial capital, Sydney), and professional, scientific, and technical services. The latter will expand on the back of the economic growth generated by the defence/aerospace hub at Williamtown and the general shift toward more human capital-intensive service industries. Construction reflects GN's rate of economic and population growth. The 0.9% low growth scenario for GN would see construction activity subdued and this sector's share remain flat. The higher growth scenarios would dictate high levels of construction activity, boosting this sector.

Table 7. MacroPlan Projections of Greater Newcastle's Employment Shares

% Shares of Employment	2011	2016	2036F
Agriculture, Forestry & Fishing	0.6%	0.9%	0.4%
Mining	1.8%	1.8%	1.2%
Manufacturing	11.1%	7.0%	6.4%
Electricity, Gas, Water & Waste Services	1.7%	1.4%	1.3%
Construction	6.6%	8.0%	8.0%
Wholesale Trade	3.0%	2.1%	2.5%
Retail Trade	12.2%	11.4%	11.0%
Accommodation & Food Services	7.9%	8.9%	10.0%
Transport, Postal & Warehousing	4.3%	4.4%	4.0%
Information Media & Telecommunications	1.0%	0.9%	0.7%
Financial & Insurance Services	3.2%	3.2%	3.5%
Rental, Hiring & Real Estate Services	1.7%	1.6%	1.5%
Professional, Scientific & Technical Services	6.2%	5.9%	6.7%
Administrative & Support Services	2.7%	3.1%	3.0%
Public Administration & Safety	6.8%	7.1%	7.0%
Education & Training	8.6%	9.3%	9.5%
Health Care & Social Assistance	15.0%	17.5%	18.0%
Arts & Recreation Services	1.2%	1.2%	1.1%
Other Services	4.4%	4.4%	4.2%

Source: As per Table 6.; See Appendix: Economic Estimates for estimates for 2016 and projections for 2036. The different growth scenarios only marginally change projected shares.

4.3.2 Small Business Driver of Growth

Research of Australian firms by Hendrickson et al (2015) [19] shows that new firms (0-2 years), which employed 15% of the workforce, generated 40% of new jobs created in the period 2006-11, while accounting for 16% of jobs lost. Older firms employed 81% of the workforce, created only 42% of new jobs and accounted for 61% of jobs lost in the period. This emphasises the role of new firms in job creation. As firms age they contribute less to job creation and more to job destruction. Young firms in Australia contribute disproportionality to net job creation.

[19] Hendrickson, L., Bucifal, S., Balaguer, A. and D Hansell (2015) 'The employment dynamics of Australian entrepreneurship.' Department of Industry, Innovation and Science, Office of the Chief Economist, Research Paper 4/2015

The Hendrickson study also indicated the risk these firms take in starting up a business. Of micro-start-ups (new firms with 0-3 employees) 97% either exit or grow very little. It is a small fraction (3%) of these micro start-ups grow dramatically over five years post-entry and these firms account for the majority (77 per cent) of job creation of all micro-start-ups in their cohort. These high growth start-ups are found in all sectors of the economy.

This research points to favourable environments which are conducive to business start-ups and expansion, being a positive influence on economic growth. Most of the discussion on impediments to business start-ups relates to factors such as tax and the regulatory costs of establishing new businesses, which are issues for national governments.[20] However, spatial policy needs to be flexible to allow these new businesses to thrive. In inner areas, gentrification pressure will tend to push start-ups and small and medium enterprises (SMEs) away. Change is a constant and the response should not be to stand in the way of gentrification but to ensure that there are plenty of spatial options available for firms.

If we look at GN, large firms dominate employment in health and education but (Table 8) small firms are significant players even in these industries, and small firms feature strongly in the high growth sectors. Professional and technical services, which is one of the fastest growing sectors (see below), is dominated by small firms, while financial services and rental/real estate are dominated by small firms and sole operators. These firms might start small but the evidence is some of them are going to be successful and expand into larger firms, as evidenced by the numbers of medium-sized firms (5-19 and 20-199 employees) in professional and technical services.

Small firms, particularly in their start-up years when income can be volatile, tend to be mobile in their locational needs. On the one hand, proximity to other businesses can generate agglomeration economies (e.g., attract new clients) and this can favour location at centres or inner Newcastle. This is where some of the shared office space operations, or innovation hubs, have found a ready market. But other firms, partly out of financial necessity, will comfortably operate from out of centres, based from home (for 1-2-person operations) or in more distant (low cost) commercial/industrial land, and rely on mobility and electronic communications. In effect, the spatial needs of these firms are very diverse.

In terms of innovation hubs, the University of Newcastle's Three76 program[21] is an initiative worth following. It aims to brings together the various elements of the 'local innovation ecosystem' required to support start-ups in the Hunter Region - researchers, students, developers, entrepreneurs, investors, technical specialists, and business advisors. The expectation is that it will attract investment and businesses to the Hunter Region, encourage innovation and commercialisation and produce the next generation of entrepreneurs, business leaders and inventors. More broadly, a number of Local Governments have looked to provide a platform for a complementary SME sector spin-off economy by allowing or encouraging use of the large amount of old building stock available for cheap office, retail, and food premises for start-ups.

[20] A good discussion on policy and business growth can be found in Bravo-Biosca, A., C. Criscuolo and C. Menon (2013), "What Drives the Dynamics of Business Growth?", OECD Science, Technology and Industry Policy Papers, No. 1, OECD Publishing, Paris. http://dx.doi.org/10.1787/5k486qtttq46-en

[21] https://www.newcastle.edu.au/research-and-innovation/innovation/three76hub

Table 8. Small Business Count in Greater Newcastle 2016

	Non-employing	1-4 Employees	5-19 Employees	20-199 Employees	200+ Employees	Total
Agriculture, Forestry and Fishing	930	167	25	23	0	1,145
Mining	53	47	15	9	0	124
Manufacturing	521	490	344	109	0	1,464
Electricity, Gas, Water and Waste Services	46	27	27	3	0	103
Construction	3,135	2,529	608	98	0	6,370
Wholesale Trade	439	306	208	38	0	991
Retail Trade	848	813	493	80	0	2,234
Accommodation and Food Services	347	519	538	170	3	1,577
Transport, Postal and Warehousing	988	634	178	23	0	1,823
Information Media and Telecommunications	133	52	15	3	0	203
Financial and Insurance Services	3,236	581	93	14	0	3,924
Rental, Hiring and Real Estate Services	3,128	388	145	29	0	3,690
Professional, Scientific and Technical Services	1,829	1,729	410	79	0	4,047
Administrative and Support Services	648	483	202	91	0	1,424
Public Administration and Safety	23	62	21	15	0	121
Education and Training	195	157	102	36	3	493
Health Care and Social Assistance	1,455	822	351	72	6	2,706
Arts and Recreation Services	284	114	53	18	0	469
Other Services	605	842	288	34	0	1,769
Total	18,843	10,762	4,116	944	12	34,677

Source: ABS 8165.0 Counts of Australian Businesses, including Entries and Exits June 2012 - June 2016.

4.3.3 Retail

Greater Newcastle's retail sector employs more people than the size of the GN market would suggest. It employs 11.5% of the workforce (Table 6). This reflects the wider market in the upper Hunter and north coast which the retail sector caters to, and on the supply side, the lower cost of space for retailers compared with the high-cost Sydney market. The sector faces challenges from on-line retailing (see spatial section). The sector's demand for space per capita is expected to remain at present levels and demand for space to grow significantly. Retail centres are responding to the changed environment by including more in the way of food services and entertainment, which is drawing in the customers for an experience which on-line retailing cannot offer. This is changing the nature of centres and making them potentially more attractive to other service providers.

In terms of growth, one potential source of growth is attracting some higher-level retailers to the GN market. These are retailers that typically need a market of 500,000 – 1 million to make them financially viable. For these retailers, their required catchment includes the broader GN hinterland (south to Central Coast, up to North Coast and west into Upper Hunter). From a spatial perspective, the established retail centres are not optimally connected to all parts of the GN and hinterland catchment.

But the connectivity offered by the M1, HEX, and New England Highway provide access to the size of market they need, both for access for customers and for delivery to customers.

4.3.4 Mining

The mining industry in Greater Newcastle accounted for $1.5bn or 6.2% of GN's Industry Value Added (IVA) in 2011 and employed about 3,500 workers or 1.8% of the workforce.[22] However, the sector's impact is much broader. A significant amount of mining activity occurs in the Upper Hunter, and is shipped through GN. Related to that, intermediate inputs into mining in GN and Upper Hunter account for a significant part of the value added to the mining output shipped overseas, with most of that activity occurring in GN.

MacroPlan estimates that in 2011 (Table 9), intermediate inputs into mining output would have accounted for an additional $3.75bn, lifting total mining sector IVA to $5.25bn or 21% of total IVA.

About $0.7bn or 20% of manufacturing output were direct inputs into the mining activity in 2011. This covers a broad range of manufacturing, from basic chemical manufacturing to metal fabrication, to transport equipment and advanced scientific and specialised equipment.

However, the bulk of inputs are service sector inputs. Mining inputs accounted for about 30% of activity in the transport and warehousing sector, in rental hiring services, and in construction activity, and about 22% of wholesale industry activity. The most significant contribution is from firms in professional, scientific, and technical services, where it accounted for over 40% of output, and in the past, has underpinned the growth of this sector. While GN-based firms have captured a large portion of the business, some of this activity is sourced to firms based in Sydney or elsewhere.

As identified in the RDA Smart Specialisation Strategy, the skills developed in and used in supplying the mining sector give those firms the capacity to compete in other sectors in domestic and foreign markets: "in a post-mining boom economy… it is not a matter of finding alternatives, but building on the strong knowledge base in mining (and) energy"[23] These spill-over effects can contribute to further growth in advanced manufacturing and in engineering consulting services.

With climate change a global issue and coal a carbon-intensive source of energy, the long-term place of coal in the global energy mix is under a cloud which might threaten the mining industry with negative implications for the GN economy. The International Energy Agency (IEA, 2016)[24] is projecting a shift in investment towards renewables in the period 2016-40. It is forecasting that 60% of investment will be in oil, gas and coal extraction and supply, down from 70% in the period 2000-2015, and with most of that investment in replacing exhausted mines. In terms of demand, the major players are China and India.

Coal declines as the share of China's energy mix drops from 75% to 45%. With energy demand growing by 85% that still entails some growth in absolute demand for coal. In the case of India, coal's share drops from 75% to 55% but with demand more than tripling, India's demand for coal is set to grow significantly. How much growth that means in the period 2016-36 and beyond will depend on how technology changes the energy market? Given the high quality of the Hunter Valley coal, the downside risks over the period 2016-36 are judged to be low.

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[22] See Table 9 and discussion in Appendix B – Economic Notes for industry value added, and Table 6 for workforce.
[23] The RDA Smart Specialisation Strategy also identified agriculture and medical technology as other sources of strength on which GN could generate new sources of growth.
[24] International Energy Agency, World Energy Outlook 2016
https://www.iea.org/Textbase/npsum/WEO2016SUM.pdf

In the short term, the latest forecasts from the Office of the Chief Economist (OCE)[25] have relatively slow growth in Australian coal exports. After growth of 5.3% per annum in the 20 years to 389 million tonnes in 2015/16, Australian coal exports have experienced a period of slower growth. Over the next 5 years to 2022, the OCE's projections have export volumes for thermal and metallurgical coal increasing just 5% or less than 1% per annum.

Table 9. Greater Newcastle and the Contribution of Mining 2011

Industry Value Added (IVA)	IVA $bn	% Total IVA	Mining Related IVA $bn	% of Sector IVA
Agriculture, Forestry & Fishing	0.2	0.7%	0.02	11.7%
Mining	1.5	6.2%	1.5	100.0%
Manufacturing	3.6	14.5%	0.7	19.3%
Electricity, Gas, Water & Waste Services	0.9	3.5%	0.1	14.9%
Construction	1.4	5.5%	0.4	30.1%
Wholesale Trade	1.2	4.9%	0.3	21.7%
Transport, Postal & Warehousing	1.4	5.6%	0.5	32.5%
Financial & Insurance Services	2.1	8.5%	0.3	11.9%
Rental, Hiring & Real Estate Services	0.6	2.3%	0.2	31.1%
Professional, Scientific & Technical Services	1.3	5.3%	0.6	44.1%
All other Services	10.7	42.9%	0.7	6.5%
Total IVA	25	100%	5.25	21.0%

Note on Table: Analysis by MacroPlan draws on work by Rayner, V, and J. Bishop (2013) 'Industry Dimensions of the Resources Boom: An Input-Output Analysis.' Research Discussion Paper 2013-02. See brief discussion in Appendix B - Economic Notes, Note 2

A period of slower growth in the mining industry will have flow-on effects to all suppliers, from manufacturing to all the service sectors involved in the mining industry. For these sectors, this will incentivise seeking other market opportunities. The past record suggests that a sizeable number of GN firms will respond positively to that challenge.

The outlook for coal has specific flow on effects to the Port of Newcastle. There are three coal terminals at the Port. Newcastle Coal Infrastructure Group operates a terminal on Kooragang with a capacity of 66 million tons per annum, while Port Waratah Coal operates two terminals with capacity of 145 million tonnes per annum. This gives the port a total capacity of about 210 million tonnes per annum.[26] In 2015, the NSW Planning Assessment Commission (PAC) gave approval for Port Waratah Coal to construct a new terminal (T4) at the Port which would add capacity of 70-120 million tonnes per annum.[27] This approval has a 5-year term. Port Waratah, which is currently shipping about 110 million tonnes per annum (76% of its capacity) has not at this stage proceeded with construction of the T4 terminal, preferring to wait to see whether demand materialises.

[25] Historical data and March 2017 forecasts from the Office of the Chief Economist, Department of Industry, Innovation and Science.
https://industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Resources-and-energy-quarterly.aspx

[26] See Newcastle Coal Infrastructure Group at https://www.ncig.com.au/ ; Port Waratah Coal at http://pwcs.com.au/terminal-4/story-of-the-terminal-4-site/

[27] NSW Planning Assessment Commission (PAC) report of 30 September 2015
www.pwcs.com.au/media/1773/t4_determination_report_20160805.pdf

4.3.5 Manufacturing

Manufacturing has declined significantly and the global trends which underpinned that decline are expected to continue. However, a sizeable portion of manufacturing that remains in Greater Newcastle is linked to mining, is not dependent on the tariff protection now withdrawn, and has natural advantages which are expected to keep those firms competitive and operational. Demand from Asian markets and from the domestic east coast market, principally driven by the Sydney market, will underpin some growth in this sector.

Traditionally, productivity growth has accounted for a good portion of growth in manufacturing, so that even while demand will be there, employment growth in the sector will be low and its share of employment will likely still decline.

The outlook for manufacturing also has implications for demand and supply of industrial land. A long-term trend has been for the scale of plants to rise and this has led firms to shift out from inner to outer metropolitan industrial sites with more space, less restrictions e.g. noise, odour, dust, and less congestion. This trend is expected to continue. The scale efficiencies also mean more efficient use of land, so that as with employment, that output growth will translate to only a marginal increase in aggregate demand for industrial land. This provides the opportunity to re-consider land uses for inner city industrial land.

The manufacturing sector supplies inputs to the mining sector. While other areas of manufacturing have contracted, there has been some evidence of expansion of firms (e.g. Orica)[28] which has highlighted the sounder fundamentals on which this segment of manufacturing is founded. However, given the uncertainties surrounding coal, this segment is not a major source of growth potential in the period 2016-36.

Food and beverage manufacturing, which accounts for 17% of employment, is another sector of manufacturing which has held its employment levels and has a reasonably secure future. It is linked to the strong agricultural and viticultural base in the Hunter region which, with increased capital intensity, has significant scope to increase output. If GN's air freight links to the Asian markets can be strengthened, this would be a significant boost to agriculture and food manufacturing in the region. Increased capacity to ship out of Newcastle port would also be positive for this sector's potential to increase exports into Asia.

But more significantly, as the Sydney market grows and Sydney's urban expansion displaces agricultural production in the Sydney basin, demand from this source will grow. This will see tonnage on the M1 and rail freight line into Sydney grow, including for on-shipment to Asian markets. Access into the Sydney market will require further investment in transport infrastructure in this critical corridor. In addition, demand will also grow as the size of the GN market itself expands.

Advanced manufacturing activity, which includes fabrication and equipment manufacturing, will benefit from the synergies which the Williamtown Defence Hub will generate. As the RDA Smart Specialisation Strategy observes[29], there are skill spin-offs from supplying these sectors which lead to other opportunities. A feature of firms in this segment is they are mostly small to medium size firms.

[28] In January 2016, Orica received approval for an expansion of its Kooragang Island ammonium nitrate plant which had undergone a major expansion in 2009 www.theherald.com.au/story/3664794/orica-gets-approval-for-expansion/ However, by contrast earlier in 2012 when the outlook was not as good, Incitec-Pivot put on hold plans to construct an ammonium nitrate plant http://www.theherald.com.au/story/360327/incitec-pivots-plant-plans-on-hold/

[29] RDA Smart Specialisation Strategy report page 14

These are often not the type of business that needs to be segregated for environmental reasons due to their generally clean operations. While location in business parks in proximity to other related businesses has agglomeration benefits, these firms operate in a very competitive environment and need flexibility to expand and contract as demand dictates.

Table 10. Greater Newcastle Manufacturing Profile 2016			
	No. Employed	% Share	Comment
Food product manufacturing	2572	17.1%	Hunter agriculture
Beverage manufacturing	660	4.4%	Viticulture – located in rural areas
Basic chemical and chemical product manufacturing	705	4.7%	Mining inputs
Primary metal and metal product manufacturing	2898	19.3%	Aluminium smelter – at risk
Fabricated metal product manufacturing	1469	9.8%	Shifting focus to advanced manufacturing
Transport equipment manufacturing	1852	12.3%	
Machinery and equipment manufacturing	357	2.4%	
Other manufacturing	4502	30.0%	
Total	15015	100%	
Source: ABS Census 2006.0 Working Population Profile, Table W09 Shares of Employment by Place of Work.			

The one notable known risk is to the Tomago Aluminium Smelter which was built 1980-1983. Its construction followed the significant expansion in electricity generation in the Hunter region in the 1980s in the wake of the 1970's oil crisis. The smelter's economics are based on the Hunter's natural advantage as a source of low cost power. Tomago Aluminium is one of the larger employers in GN, directly employing 1150 workers and contractors. With multipliers, the number of jobs in GN dependent on the smelter would be 2,000-3,000.

With Australian energy policy favouring renewable energy, a consequence is that the cost of power has risen significantly, removing that original advantage relative to locations in other countries. At the very least, further expansion is highly unlikely and employment is likely to decline. The management of Tomago Aluminium has outlined these concerns in a submission to the Australian Competition and Consumer Commission in July 2017.[30]

4.3.6 Professional, Scientific & Technical Services (Knowledge Economy)

The professional, scientific, and technical (PST) sector has been one of the growth sectors in the Australian and GN economies. A high proportion of its workforce are professionals and managers by occupation, with a significant engineering presence (in GN) but also design, science, transport and ICT, and business (accounting, auditing), HR and marketing areas. Outside of education and health, it is the major source of knowledge economy jobs and it is a sector dominated by small firms in GN

The mining sector has been one of the key sources of demand for the sector in GN. With an orientation to engineering-based work, mining accounts for about 40% of activity in this sector. Inputs into manufacturing account for about another 20% of demand for these services.

Looking forward, there are three potential major sources of growth. In the case of the mining sector, GN-based firms are dominant. However, a large portion of services, particularly specialised services, are provided by firms based in Sydney or elsewhere. This presents the potential for GN-based firms to

[30] Submission letter dated 12 July 2017.
https://www.accc.gov.au/system/files/Tomago%20Aluminium%20Company.pdf

capture a bigger share of that business. Secondly, the expansion of the Defence/aerospace sector and the related potential for advanced manufacturing, will also increase demand for PST sector work, as the high-level nature of the work in these sectors will generate demand for PST firms. By the same token, the depth and strength of the PST sector in GN will also be a factor in the competitiveness of defence/aerospace firms and their capacity to capture business.

The third source is the increased competitiveness of the PST sector. Firms in GN have the advantage of lower land and space costs and lower labour costs. If this advantage can be enhanced, there is potential, as the sector builds more depth, for it to compete for a larger share of the work in e.g. mining or aerospace, and also compete more strongly for the same or related types of work in foreign and other parts of the domestic market. That could be through growth of local firms, or through firms with a network of offices choosing to locate a larger share of their workforce in GN.

The lower labour costs reflect in part the lower cost of living (housing) in GN translating to lower wages. It is crucial that this competitive advantage is maintained. Another important advantage is the lower staff turnover which allows development of a more experienced workforce. This growth in the workforce will provide deeper labour pools so better job matching can be achieved. This is important for building careers locally and for workers to be remunerated for their more specialised knowledge. The benefit for firms is the improvement in productivity and capacity. For the workforce, it not only makes it more attractive to pursue long-term careers in GN, it importantly increases the scope for new graduates to find positions with good career prospects.

Firms in this sector tend to be small to medium size and have a variety of locational needs. Whilst there will be some with a preference for an inner Newcastle location, for others with clients located in dispersed sites in the region, low cost sites with connectivity to transport infrastructure will be paramount. Policymakers, in addition to an objective of maintaining its advantage in terms of land/space costs, need to provide flexibility in the planning schemes to allow these firms to secure locational preferences that maximise their competitive advantage.

The potential for GN-based firms to capture more work outside GN will also be a function of connectivity. While internet/skype communication make location less important, physical connectivity still matters. So, the greater the options (frequency/destinations) offered by Newcastle Airport, the more competitive it will make GN-based firms.

On the downside, one of the risks to the sector is the potential closure of one or more of the coal-fired power stations in the Lake Macquarie area. Given the state of flux in energy policy it is uncertain, but closure would see a loss of work for the sector and also the loss of professional and technical skill jobs for those directly employed by power stations. The experience with closures of this type is that workers with high skills generally make the transition to other related work. So, a positive from these closures would be to create a pool of skilled workers which would give a supply-side boost to the growth of other sectors in the GN economy, but particularly in PST.

One other possibility is that, with the existing energy distribution infrastructure at these site(s), the owners of the coal-fired power stations will invest in other energy types, e.g. gas-fired power stations or some form of renewable energy, which will also utilise the skills of the current workforce and potentially create the demand for additional skills.[31]

[31] AGL and Delta Energy have expressed an interest in pursuing alternative energy or renewables in the Hunter - http://www.theherald.com.au/story/4870297/30m-solar-farm-plans-for-power-station/ http://www.theaustralian.com.au/news/nation/agls-500m-solar-boost-as-it-shuts-coal-station/news-story/bda799b49a9aa16f1173a4fe98d66080

4.3.7 Defence Hub/Airport

The Williamtown RAAF base, which shares Newcastle Airport, employs 3,500 people, making it one of the largest single employers in GN. In addition, in 2016, there were about 700 people working in the domestic airport cluster, making the total employed directly on the hub about 4,200.[32]

The potential of the hub is significantly enhanced by the presence of the domestic airport as a shared facility which gives the area added critical mass. In addition to Newcastle Airport Limited (NAL), other aviation firms operating in the precinct include BAE Systems Australia (maintenance workshops, including for F35), the Lockheed Martin radar operations facility (opened 2015), Jetstar Engineering and Newcastle Helicopters.

The number of persons employed at the domestic airport are projected to increase by about 20% to 850 with the upgrading of the runway and facilities at Newcastle airport which will expand the passenger capacity of the airport (see below). But the biggest catalyst for employment growth at the hub will be the arrival of the F35 fleet from 2018.

The base is currently undergoing a $1.5 billion upgrade to accommodate the new F35 fighter fleet, with the first of the new fleet of 58 aircraft to be based at Williamtown due in 2018. While the number of Defence personnel is not projected to increase significantly, employment in air defence related firms is projected to grow. Already, companies such as BAE have indicated expansion plans for the work in servicing the F35 fleet (see Box 2). In the US we have examples of significant clusters of aerospace related firms clustering around major US air bases, with Tampa, Florida a major centre for such companies. The agglomeration benefits are significant and with GN's engineering history and strength, it is an opportunity that needs it be taken seriously.

Box 2: Defence-Related Work Starting to Happen

BAE indicated in June 2017 that it would be recruiting an additional 200 skilled workers, primarily engineers, as it gears up for its servicing contract for the F35. Key roles will focus on aircraft maintenance, planning, supply support, engineering and specialist training staff. These are high skill/high wage jobs which will present significant opportunities for graduates from University of Newcastle.

In June 2017, it was announced that Lockheed Martin had awarded a contract to Varley, a manufacturing firm at Tomago, for the construction of mobile facilities related to the new fighters. It was indicated that this contract would require Varley to take on an additional 20 workers.

http://www.baesystems.com/en-aus/article/sky-is-the-limit-for-hunter-valley-students-seeking-defence-careers

http://www.lockheedmartin.com.au/au/news/press-releases/2017/31052017.html

Five airlines service Newcastle Airport: Flypelican, Jetstar, Qantas, Rex, and Virgin linking Newcastle and its extended region to Brisbane, Canberra, Gold Coast, Melbourne, Taree, Ballina / Byron Bay, Dubbo, Port Macquarie, and Sydney.

In the early 2000s, passenger numbers were about 200,000 per annum but then grew strongly from 2003 when Jetstar and Virgin started flights to and from Melbourne and Brisbane, lifting the numbers five-fold to 1.15 million in 2008. The airport then experienced another period of negligible growth to 2015 before recording growth to 1.2 million passengers in 2016. Airlines operating into the airport

[32] The Remplan report for 2014 has 654 direct employees, with an additional 39 to be added when the next expansion was complete. These numbers exclude Remplan's estimates of indirect employment. https://www.newcastleairport.com.au/corporate/about/economic-impact

increased their 2017 summer-time capacity by 15%, allowing for significant further short-term growth and which has numbers up 5-6% on 2016.

In December 2016, the State Government committed to an investment to upgrade the terminal to take international flights.[33] Newcastle Airport Limited was expected to negotiate with airlines in a bid to have flights to New Zealand, Bali and Fiji leave from Newcastle, with an expectation that international flights would be in operation in late 2017 or by 2018. That could boost growth in the period 2016-21.

Newcastle Airport Limited forecasts that it has a capacity to achieve between 2 million and 5 million passengers per annum. The impact of connections to Brisbane and Melbourne indicate that, to achieve increased passenger traffic, direct flights to international destinations are probably a key. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) in 2012 forecast that passenger numbers would rise by 3.1 per cent a year over the next 20 years to 2.2 million in 2030–31.[34] To achieve this ambitious goal will require a significant shift from an origin airport to a destination airport.[35] In turn, this will require tourism infrastructure, including hotels and conference facilities to draw in business tourists.

MacroPlan is optimistic that strategic investment can boost tourism growth. However, the 2012 BITRE forecast looks somewhat optimistic as growth has fallen well short of the 3.1% growth rate in the subsequent six years. While the more recent performance is encouraging and indicates potential growth of 4% per annum for the period 2016-21, subsequent growth in passenger numbers of more like 2% per annum to 1.7 million in 2031 and 1.9 million in 2036 seems to be a more feasible long-term outlook. That forecast assumes 1.75% growth in domestic numbers and a contribution from international passengers (business and tourism) to lift that towards 2%.

4.3.8 Health and Aged Care

Health and aged care services has been a major source of new jobs in the Australian and GN labour markets since the 1990s. The factors that have driven that growth are still very relevant to the period ahead. The major driver is the aging of the population which, in conjunction with increased incomes, has increased the focus on health issues and demand for health and medical services. In the period 2016-36, the 75+ age cohort is projected to grow by over 90%. Whereas the younger retiree cohorts are largely independent, this 'older' retiree group will generate significant demand for independent living units (ILUs), a range of aged care facilities and significant demand for hospital and medical services.

The potential growth in the GN is higher than for Australia generally because the region attracts a retiree cohort from Sydney. From a regional perspective, the national taxpayer funding of a sizeable portion of health services means that there is less of a burden on the local workforce than implied by the rise in the dependency ratio.

Greater Newcastle is the centre for the Greater Hunter region, with a population projected to be over a million by 2036.For people on the Central Coast, GN can be a more convenient location than accessing major hospitals in Sydney. The high level of specialist services offered by the John Hunter Hospital and the new Maitland Hospital will be central to capturing this broader market and the level

[33] Newcastle Airport international flights a step closer after Regional Tourism Infrastructure Fund injection' http://www.theherald.com.au/story/3552082/newcastle-airports-international-wings-closer/

[34] BITRE (2012) report on 'Air Passenger Movements Through Capital and Non-Capital City Airports to 2030–31' https://bitre.gov.au/publications/2012/report_133.aspx

[35] By origin, it means most of the traffic is generated by GN residents travelling to/from GN. Destination means more of the growth would come from visitors into GN.

and range of these services can be expected to rise. While the focus is on an aging population, the region will also have absolute growth in all age groups, so that demand for children's health services will also be growing.

The rise in health and social assistance requirements of the GN presents enormous economic and workforce participation opportunities. The experience in other states e.g. Victoria with the closure of all their car manufacturing plants, saw substantial work progressed on the adaptability of these workforces. Government sponsored work aptitude testing found significant correlation between the skill matching of manufacturing plant workers and attendant care workers, and strong interest in the training for this career conversion especially amongst the female portion of the workforce. The experience borne out by workers in this new field was that they felt more empowered, entrepreneurial, and brought expertise and understandings in the setting and adherence of service standards, the use of technology and efficiency in work practices for the benefit of the consumers of these services.

With the rollout of the National Disability and Insurance Scheme (NDIS), an increase in ageing-in-place, and more wealthy retirees, the growth potential for this sector represents an important component of the future economy.

4.3.9 Education

The Education and Training sector has been a key source of growth in the GN economy in the period 2001-16, with employment in the sector rising 25%. While the 5-14 age cohort's share of the population has been in decline, numbers have risen absolutely and student numbers at primary and secondary school have risen roughly in line. The driver of growth has been the Higher Education Sector which has seen significant growth in the past 15 years. In GN, the numbers attending a tertiary institution, principally the University of Newcastle, have risen by 32%, with the share of the 15-24 age group attending rising from 24% to 30%. An offset to this high growth has been a decline in numbers attending TAFE.

This growth in numbers at tertiary institutions corresponds with the numbers for UoN which show growth in its domestic student numbers of over 11,000 or 59% in the period 2001-2015. This compares with growth in domestic numbers at Sydney's six universities of 37%. The growth in domestic students was boosted by changes to Government policy lifting the cap on student numbers which generated very strong growth in the period 2006-2011.As the one-off impact of this policy change has waned, the growth in numbers has levelled off but more so for University of Newcastle.

The other source of growth has been overseas students. In 2001, overseas students at Sydney's six Universities represented 19.5% of their students. Over 2001-15, numbers grew 91% to represent 25% of the student population. From a lower base of 10.6% of students, UoN experienced 135% growth in its overseas student numbers, to 15% of its student population in 2015. But the period 2011-15 saw a decline.

Business faculties at Universities have accounted for the bulk of growth in overseas students. In that light, The University of Newcastle's investment in shifting its Business and Law faculties from the Callaghan campus to inner Newcastle is targeted at that market. In 2017 Japan's Nihon University announced the purchase of the former Newcastle Law Courts, establishing a site to house the university's first ever campus outside of Japan.[36] Inner Newcastle, with its more urban environment and potentially more access to employment opportunities as the inner area employment market

[36] https://www.industry.nsw.gov.au/media/media-releases/2017-media-releases/2017-media-releases/japanese-university-to-open-first-offshore-campus-in-newcastle

expands, has the potential to make it more attractive to overseas students and more competitive with the Sydney universities.

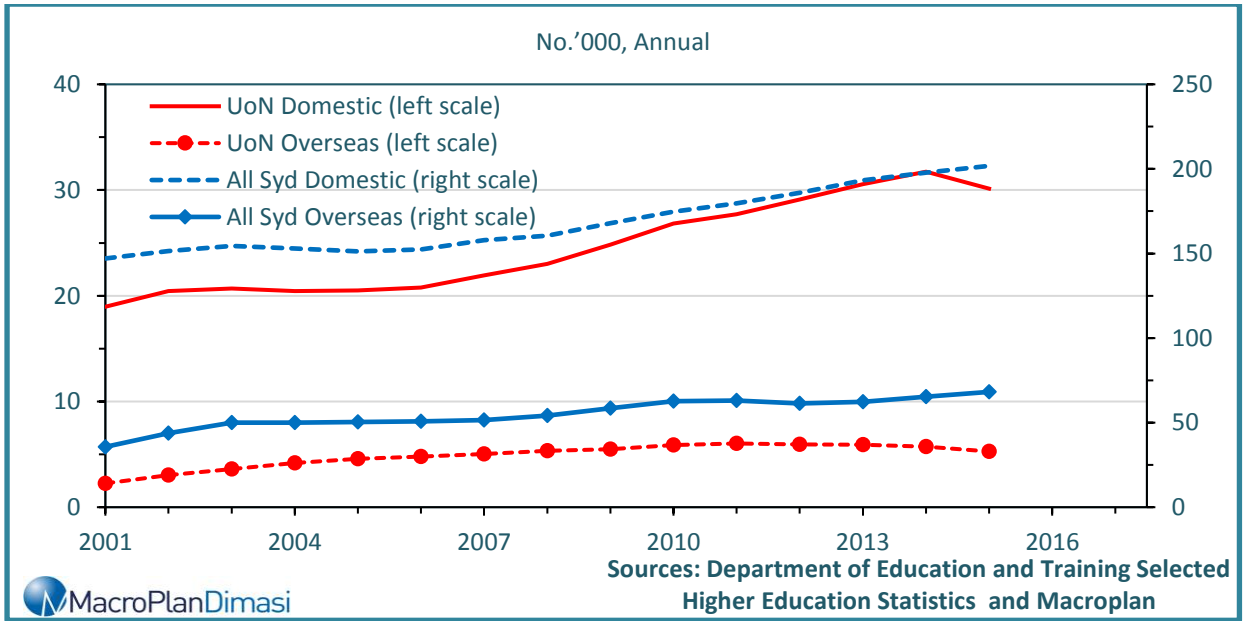
That would build on Newcastle's principle advantage with its lower cost of housing. As inner Newcastle changes that also has the potential to make it more attractive in competing for domestic students, particularly if an expanding urban centre can provide the part-time job opportunities that students need to finance their education.

Table 11. Growth in University Student Numbers 2001-15

Uni of Newcastle	2001	2006	2011	2015	Change 2001-15: No.	Change 2001-15: %
Domestic	18,962	20,787	27,716	30,146	11,184	59.0%
Domestic Growth Rate		2% pa	6% pa	2% pa	3.4% pa	
Overseas	2,252	4,790	6,027	5,283	3,031	134.6%
Overseas Growth Rate		16% pa	5% pa	-3% pa	6.3% pa	
Total	21,214	25,577	33,743	35,429	14,215	67.0%
Total Growth Rate		4% pa	6% pa	1% pa	3.7% pa	
Six Sydney Unis	2001	2006	2011	2015	2001-15	2001-15
Domestic	147,045	152,313	179,567	201,788	54,743	37.2%
Domestic Growth Rate		1%	3%	3%	2.3%	
Overseas	35,677	50,806	63,070	68,169	32,492	91.1%
Overseas Growth Rate		7%	4%	2%	4.7%	
Total	182,722	203,119	242,637	269,957	87,235	47.7%
Total Growth Rate		2%	4%	3%	2.8%	

Source: Department of Education and Training Selected Higher Education Statistics
https://www.education.gov.au/selected-higher-education-statistics-2015-student-data

Figure 5. University of Newcastle and Sydney Universities Student No.'s 2001-15



A core strength of the UoN has been its Medical faculty which is based at the Callaghan campus. Its medical students benefit from the opportunity for training at the John Hunter Hospital and other Hunter-New England hospitals, while the University has built a major medical research facility at the JHH site. With the area's population growth leading to the expansion of hospital facilities, in particular the proposed new Maitland Hospital at Metford, there is potential for the UoN medical program to continue to grow.

The general expectation is that Education and Training sector will continue to be a high growth sector. However, after the easy growth of the 2000s, the future growth is likely to be harder. Institutions need to increase their appeal to international students in what is a competitive market. This will be helped by the transformation of the inner Newcastle urban area which will give it the more cosmopolitan feel that international students seek.

Tertiary institutions can also contribute to the vitality of the business sector. The UoN's three76 initiative discussed above is one example. Institutional linkages between the University, CSIRO, the John Hunter Hospital and relevant industries, such as those in the aerospace sector, can be deepened to improve agglomeration benefits to all parties.

4.3.10 Accommodation, Tourism

Tourism has been a significant growth industry for Australia, NSW and the Hunter/GN, with the wine industry a significant drawcard for both domestic and international tourists, and beach holidays a prime drawcard for domestic holidaymakers, particularly from Sydney. The profiles of the LGAs indicates that, while the wine industry is the region's icon, in absolute terms the Newcastle LGA attracts bigger numbers of tourists.

Domestic tourism is the biggest component of the market, accounting for 96% of the 3.5 million overnight visitors in 2016, and international tourists 155,000 or 4%. However, international tourists stay longer and accounted for 22% of nights stayed and 11% or $177 million of total spending of $1.6 billion. Domestic day trippers, mostly from Sydney, are also a significant source of tourism with 6.7 million visiting the region in 2016 and spending $715 million. But, GN's proximity to Sydney is a major asset with the missing statistic here being international visitors staying in Sydney and making a day trip to the Hunter. With 3.6 million international visitors to Sydney in 2016, international day trippers could represent 300-400,000 tourists to the region.[37]

Growth in tourism is heavily influenced by the level of the $A and its high level during the resources boom led to a stagnation in both domestic and international tourism numbers in the period 2007-12. However, with the end of the resources boom and the $A declining to closer to its long-term average, the sector has returned to a growth path. In the period 2012-16, domestic overnight visitors have risen 3% per annum. International overnight visitors have risen just 1% per annum, but with international tourists into the Sydney market rising by 40% or 7% per annum, the number of international day trippers from Sydney would have risen substantially in this period.

Over the period 2015-25, Tourism Research Australia (TRA) forecasts that domestic overnight tourism numbers to regional areas in NSW, including the Hunter region, will grow about 3% per

[37] All data sourced from Tourism Research Australia: TRA State Tourism https://www.tra.gov.au/Research/View-all-publications/All-Publications/Forecast-reports/state-tourism-forecasts-2016

annum.[38] In terms of day trip numbers, population growth and the faster growth in the retired cohort with leisure time, coupled with improved access to the region with the North Connex out of Sydney and the Hunter Expressway into the Hunter wine region, should see day trip numbers grow by 2-3% per annum. In terms of international visitor numbers, driven largely by growth from the Asian markets, TRA is forecasting numbers into the Sydney/NSW market will rise by 5.5% per annum. In terms of overnight stayers and day trippers from Sydney, this will see the international market continue to increase in importance to the region.

The Newcastle CBD Masterplan (2015) has 'stretch growth' target of 3.7% per annum for tourism into the Newcastle CBD. The target was aligned to the growth projections for Australia/NSW so is not unrealistic. However, converting forecasts into actual numbers requires investment in new anchor infrastructure (e.g. conference and exhibition centre, sports and recreation precinct) and industry investment in new and expanded attractions and in the quantity and quality of accommodation offered to tourists.

The individual businesses in the Wine Industry have been innovative in expanding the appeal of tourism to the Cessnock region, and this investment in new accommodation and attractions is expected to continue to drive tourism growth in the region. The gradual transformation of inner Newcastle, with increased amenity, is increasing the potential of this area to draw tourism. Sporting events are a traditional drawcard for visitors, with Newcastle Stadium a major venue for the various codes of football, and, for example and more recently, the V8 Supercar race to be held in the city annually 2017-2021.[39]

But, the growth of the creative industries is helping to soften GN's image and increase the attraction of the region to tourists. The Newcastle Art Gallery was the first purpose built art gallery in regional Australia and puts on regular exhibitions, but it is strongly supported by a growing number of smaller galleries and an active artist community. The Newcastle Museum is also a major drawcard and displays the economic and social history of Newcastle. Then there is the emergence of cultural events with as the Newcastle Writers Festival which started in 2013 and is now a well-established annual event with the 2017 Festival attracting 9,000 visitors, and the 11-day Newcastle Music Festival which started in 2015.

The Newcastle CBD Masterplan highlights a number of initiatives which could also draw business and holiday tourists to this area. That plan reflected in part the organic transformation underway but proposed a convention centre as a key drawcard for business tourism (see discussion of Inner Newcastle and the proposed sports and entertainment precinct at Broadmeadow).

Proximity of the GN to the Sydney market is crucial and the combination of the Hunter Expressway and the North Connex will improve access to the Sydney market. However, a sizeable proportion of interstate and international tourists come via Sydney airport and are adding a visit to the GN (Hunter Valley) to a visit to that market. The two markets complement each other in that the combination increases demand in each but GN is the major beneficiary of Sydney's capacity to draw international tourists.

Newcastle port and its capacity to take tourist cruise ships has been a boon to tourism. In 2017, there are five cruise ships scheduled to visit GN.[40] These numbers will expand in 2018 and beyond

[38] TRA State Tourism https://www.tra.gov.au/Research/View-all-publications/All-Publications/Forecast-reports/state-tourism-forecasts-2016
[39] http://www.dailytelegraph.com.au/sport/motor-sport/v8-supercars/why-newcastle-supercars-track-could-bring-title-hopes-undone/news-story/fd2a39de49a32810390cbd7cadce5943
[40] http://crew-center.com/newcastle-australia-cruise-ship-port-schedule-2017

with the 2016 decision by the State Government to fund the upgrading in 2017 of a section of the port into a permanent luxury cruise terminal facility.[41]

Longer term, beyond 2036, a new fast train service from Sydney would, by reducing travel times, increase access. As the Masterplan (page 44) points out, the "intercity rail trip from Sydney is very attractive but lacking necessary rail infrastructure and speed to appeal to the wider visitor economy market." The Newcastle Airport's expansion of routes to include Brisbane and Melbourne from 2003 opened up these markets, and highlighted the prime importance of good connectivity. Adding international routes into the Asian markets has the potential to boost numbers.

4.4 National Centre of Excellence for Health and Education

The potential benefits of national centre of excellence are significant. One of the keys to success for cities is their human capital and a national centre of excellence offers a platform for building high level capacity. The long-term funding commitment which centres offer gives researchers the scope to undertake more innovative and potentially more transformational research. A Centre would also help build critical mass in research. Agglomeration benefits are critical to research success, with ideas floating around between researchers a source of innovation.

It would also be the case that the presence of a Centre of Excellence in the GN would reflect on the GN community, both domestically and international standing. From an employment perspective, a Centre of Excellence would offer the potential for interaction between higher education institutes (UoN, HMRI), governments, and industry. A strong research centre would attract funding from firms and might also see ideas transformed into new products and/or services, thereby generating employment opportunities in skilled job markets.

Building the foundations for establishing a centre of excellence is the challenge, not least because funding for research is a highly competitive market place. The key ingredient is to have in place a cohort of top researchers in a field for a sustained period. There are no short cuts to success. The funding is attracted to people with some established record of success. From that perspective, the University of Melbourne Parkville Medical Precinct and the UNSW Randwick Precinct (see Box 2) are exemplars. The key ingredient in both these precincts is the clustering together of clinical, teaching and research activities in close proximity and the level of amenity offered to workers in the precinct.

In GN, John Hunter Hospital and the University/HMRI provide a solid base for research in the medical field which presents the opportunity to attract and keep top researchers and develop young researchers with potential. However, as the hospital sector in GN grows and the critical mass of medical specialists in the GN hospital system grows, the attractiveness of GN as a place for research will grow. Secondly, from a spatial perspective, the development of a second major hospital in GN at East Maitland needs to have good connectivity to the John Hunter, to support the scope for interaction between people working and researching in the field. If new smaller private, specialist hospitals are, for example, needing proximity to John Hunter Hospital, the planning system needs the flexibility to allow this.

Thirdly, it is not just the actual hospital system and facilities which matter. The life-style offered by the urban environment matters to those researchers and their families. So, the broader success of GN in transforming itself into a modern vibrant city still able to offer affordable housing options and good amenities, is going to be a necessary ingredient to attracting a centre of excellence to the GN.

[41] http://www.theherald.com.au/story/4191140/dedicated-cruise-terminal-for-newcastle/

Box 2: Randwick Hospital Precinct

The Prince of Wales Hospital, Sydney Children's Hospital and Royal Hospital for Women at Randwick have a combined 700 beds which makes it similar in size to the JHH. As a precinct, however, it has the advantage that it is adjacent to the UNSW campus/Medical School and Medical Research Facilities on one side and to the Randwick retail and entertainment precinct on the other. Given the cross-over between research, teaching and applied medicine, the close proximity of the medical school, and the research and hospital facilities presents significant agglomeration economies which can only enhance the productivity and reputation of the precinct. The presence of substantial range of retail and entertainment facilities contributes to the work environment at the Randwick precinct. In addition, there are childcare and accommodation facilities reasonably adjacent but given demand from the Hospital and UNSW, supply is inadequate.

One weakness of the Randwick precinct is traffic congestion which makes access for staff and patients an issue. For staff, most cannot afford to live locally given the high cost of housing in the Randwick area, so many commute long distances. However, the Randwick precinct is going to be the junction for the new Light Rail from the CBD opening in 2019. This will improve the connectivity of the site for both patients and staff.

A significant upgrade (valued at $720 million) to the Randwick precinct has been announced, with full details likely to be announced in late 2017 or early 2018. To date it has been announced that there will be a new Acute Services Building for the Prince of Wales Hospital that will include: a new emergency department, extra beds, expanded rehab and ambulatory care facilities, and new shared operating theatres for the Randwick Campus. And masterplan for a dedicated mental health precinct has also been completed. In addition to new research/hospital buildings, there is discussion of the need for substantial investment in childcare and high-density housing to meet demand from staff and more generally including the possibility of some key worker accommodation. There is also the potential for hotel developments to meet demand from visitors, including patients and their families, to the Randwick precinct.

In short, the development of the precinct is encompassing the broad range of tertiary, hospital, retail, commercial and residential uses which all go to making a hospital precinct a productive and attractive environment.

Hotels in Hospital Precincts

In the US, there has been a trend for hotels to be located within medical centres, including hospitals such as the Houston Medical Centre, the University of Pittsburgh Medical Centre, the Duke University Hospital in Durham, N.C and the Cleveland Clinic, in Cleveland, Ohio. The 1,400-bed Cleveland Clinic, one of the top medical centres in the US, built the 300-bed InterContinental Cleveland itself in 2003. Since then, two more hotels have been added.

UNSW Medical School

The UNSW Medical School is also affiliated with 19 other hospitals. The School is one of the top five medical schools in term of domestic students, and is third in term of international medical students. The capacity to offer students the potential for placements as interns on graduation is crucial to the capacity to attract international students, so that the expansion of the hospital capacity at the Randwick precinct will benefit the Medical School. For international students, the living environment offered by proximity to the UNSW campus, the Randwick shopping centre and the connectivity to the rest of Sydney which will be offered by the Light Rail, will also enhance its capacity to attract international students.

Source: For updates on the redevelopment of the Randwick Hospital precinct, see: http://www.randwickcampusredevelopment.health.nsw.gov.au/

5 DEVELOPMENT IN GREATER NEWCASTLE

5.1 Spatial Demand and Supply of Land in Greater Newcastle

5.1.1 The Supply of Land

A key feature of the GN area is that, apart from its significant waterways, it has a significant amount of non-urban land - rural and national park areas - within its notional urban boundary. This can be seen from the level of area zoned for urban and non-urban purposes (Table 12 below), with just 17% zoned for urban use.

Proximity to this amenity is one of the attractive features of urban living in the GN. This supply of land has also given policymakers ample scope to increase the urban footprint and still maintain the essential character and environment qualities of the area. It can also be noted that the land zoned for urban use includes land not yet developed, so that it incorporates scope for significant expansion of urban use in the period 2016-36 and with urban use staying below 20%.

Table 12. Greater Newcastle Zoned Land Profile

Hectares	Cessnock	Lake Macquarie	Maitland	Newcastle	Port Stephens	GN	% Land
Industrial	1017	630	566	1111	1502	4825	1.6%
Commercial	388	406	160	339	83	1377	0.4%
Low Rise Residential	4862	8337	4682	4102	3394	25377	8.3%
Medium Density	585	1382	634	715	57	3374	1.1%
High Density	0	0	0	42	0	42	0.01%
Sub-Total Residential	5447	9719	5317	4860	3452	28793	9.4%
Recreation Land	653	2012	709	1158	537	5069	1.7%
Infrastructure	2306	4049	361	1581	4183	12480	4.1%
Total Urban Uses	9811	16815	7113	9048	9757	52544	17.1%
% Land	8.5%	26.0%	18.1%	56.9%	13.7%	17.1%	
Total Land	115875	64615	39291	15915	71345	307042	100
Industrial Land Developed	98	435	375	645	609	2162	
% developed	9.6	69.2	66.3	58.1	40.5	44.8	

Sources: MacroPlan and DPE. Note: These estimates include significant parts of Cessnock Region and parts of lower Port Stephens, which are rural and not likely to become part of the urban area of GN in the next 50 years or on any reasonable time horizon. If these areas are excluded the urban share of total land increases to closer to 20%. The Grahamstown dam has also been excluded from the infrastructure component.

5.1.2 Industrial Land

Greater Newcastle has 4,825 hectares of land zoned for industrial use, of which 45% or 2162 hectares is developed. MacroPlan's estimate of current demand is about 1700 hectares, accounting for 80% of developed land, with about 10% vacant[42] and at least another 10% under-utilised or effectively vacant.

In the period 2016-36, growth in industries using industrial land is projected to create demand for a net addition to industrial land of 170 hectares (low growth scenario) to 300 hectares (high growth scenario) (Table 13 below). Allowing for normal vacancy of about 7%, that growth would be accommodated within existing developed industrial land although the specific needs of some firms will require some current undeveloped land to be developed. The current stock of zoned industrial land contains excess capacity which will not be absorbed on any reasonable long-term time horizon. However, some categories of land (e.g. freight and logistics and intermodal) will need to be developed reflecting the additional opportunities for this industrial land created by the HEX corridor and the proposed freight rail bypass project.

In urban markets, there has been a long-term trend for industries to move out of traditional inner urban locations in favour of outer locations with space to accommodate larger scale operations and to escape inner urban congestion. In GN, the outer is actually a middle area defined by the critical transport infrastructure (M1) which divides GN, with Lake Macquarie-Newcastle to its east and Cessnock-Maitland to its east. In addition, there is new transport infrastructure (HEX, new M1 connection) which have or will change the location dynamics, and should accentuate these longer-term trends. The spare capacity in GN's middle industrial areas close to transport infrastructure gives substantial scope for firms to re-locate but still be in reasonable proximity to e.g. inner Newcastle, and we expect this to occur as opportunities arise. By way of example, the expansion of the defence/airport hub should lift the agglomeration benefits to firms locating in the Tomago-Williamtown area; while the prime location of Kurri Kurri and other interchanges on the HEX on route to the Upper Hunter coal mines, and also proximity to the wine industry, could see these areas attractive to a number of businesses supplying inputs to the coal and wine industries.

This will create land for which the highest best use will be some combination of commercial/ residential uses. There would, in MacroPlan's view, be no merit in applying the precautionary principle to this land, except in the case of land in the port buffer which should remain until the future role of the port in relation to container traffic is finalised.

Analysis of the GN industrial market portrayed a relatively flat market. In terms of industrial land supply, MacroPlan found that there is 23 years of supply of vacant undeveloped industrial land and 25.5 years supply of vacant developed industrial land at current take-up rates.

Industrial parks have been highly successful in GN, with a prominent example the Steel River Business Park that has seen good levels of take-up from eco-industrial users clustered around the CSIRO Newcastle site.

[42] Raine and Horne (2017) report on Newcastle property estimates a 6-7% vacancy rate for industrial/commercial land in "Newcastle" in 2016. Our assessment is that this will be lower for commercial than for industrial, so we infer about 10% for industrial. With some industries/firms shrinking their operations as manufacturing has restructured, our assessment is that there is substantial underutilised industrial land which will gradually be more fully utilised.
See http://www.rhcommercial.com.au/cms_lists/10/cms_pages/19902

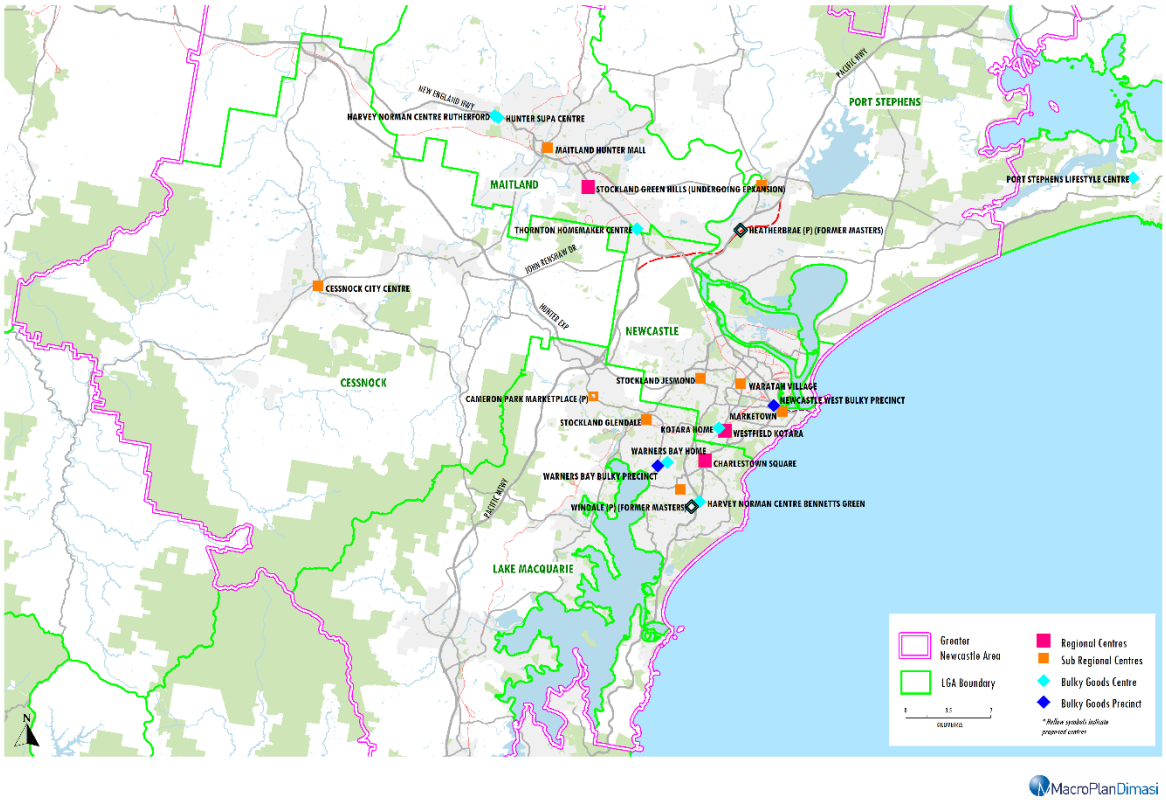
5.1.3 Commercial Land – Office, Retail and Accommodation

In the case of commercial land, there is not the apparent surplus that overhangs industrial land but there is some spare capacity. GN has 1377 hectares of land zoned for commercial uses and MacroPlan's estimate of demand for 1100 hectares accounts for 80% of that. In addition, factors such small lot sizes may constrain the future use of some of the land for commercial uses.

Office space, retail and accommodation are the three components of demand. As outlined above, despite the impact of on-line retailing, demand for floor-space for retail is expected to grow by 18%-28% over 2016-36. Faster growth in food services will offset slower growth in goods retailing. With more capital-intensive use of land, that translates to 13%-22% increased land use.

In the case of office space, this is expected to grow by 16%-24% in line with employment growth in key sectors such as professional, technical services. Compared with retail, where the expansion is going to be more dispersed to align with where retail customers live, increased office space capacity is expected to be more heavily concentrated in several key hubs. The Tomago-Williamtown hub, for example, with its aerospace focus, will be a major centre for professional/technical engineering service firms and advanced manufacturing firms with research arms, and this is likely to see a concentration of office space. If inner Newcastle's connectivity is enhanced, it should also see the significant expansion in office space and, in that case, that is expected to encourage an increase in office density.

Figure 6. - Greater Newcastle Retail Centres Network



Demand for floorspace for accommodation is expected to grow by 52%-87%, in line with the higher expected growth in business and tourism visits to the GN. New hotels located in the wine region are going to be relatively land extensive, but in inner Newcastle, the market is going to be for denser, high-rise which means floor-space translating to much lesser growth in demand for land.

In aggregate, the demand for commercial floor-space is expected to increase demand for commercial land by 16%-26%, or 180-280 hectares over the period 2016-36. With vacant/undeveloped commercial the order of 300 hectares that increase in demand can be accommodated, although whether the location of supply matches location of potential market demand, still means additional sites might be needed.

Demand for retail space is population driven. Projected residential development in the Maitland-Kurri-Cessnock corridor, for example, will generate the need for expanded commercial land which will create space for retail but also office and accommodation. Similarly, if transport-oriented development (TOD) is promoted on GN's underutilised train network, the increased populations living in proximity to those stations will mean demand for commercial space for retail and office in these locations.

Table 13. Employment Spatial Demand Projections 2016-36

Employment floor-space '000 m^2							
	2016	2036S1	Increase	2036S2	Increase	2036S3	Increase
Industrial	7711	8649	12%	9039	17%	9332	21%
Office	4037	4783	18%	4968	23%	5179	28%
Retail	1276	1500	18%	1564	23%	1630	28%
Accommodation	201	305	52%	349	74%	374	87%
Total Commercial	5514	6588	19%	6881	25%	7183	30%
Employment hectares							
Industrial	1542	1695	10%	1763	14%	1810	17%
Office	724	840	16%	869	20%	901	24%
Retail	319	362	13%	375	18%	389	22%
Accommodation	50	70	41%	80	59%	85	69%
Total Commercial	1093	1273	16%	1324	21%	1375	26%
Population	577	692		718		747	
Retail floor-space (m^2) per capita							
Retail ex food services	2.00	1.94		1.95		1.95	
Food services	0.21	0.23		0.23		0.23	
Total Retail	2.21	2.17		2.18		2.18	

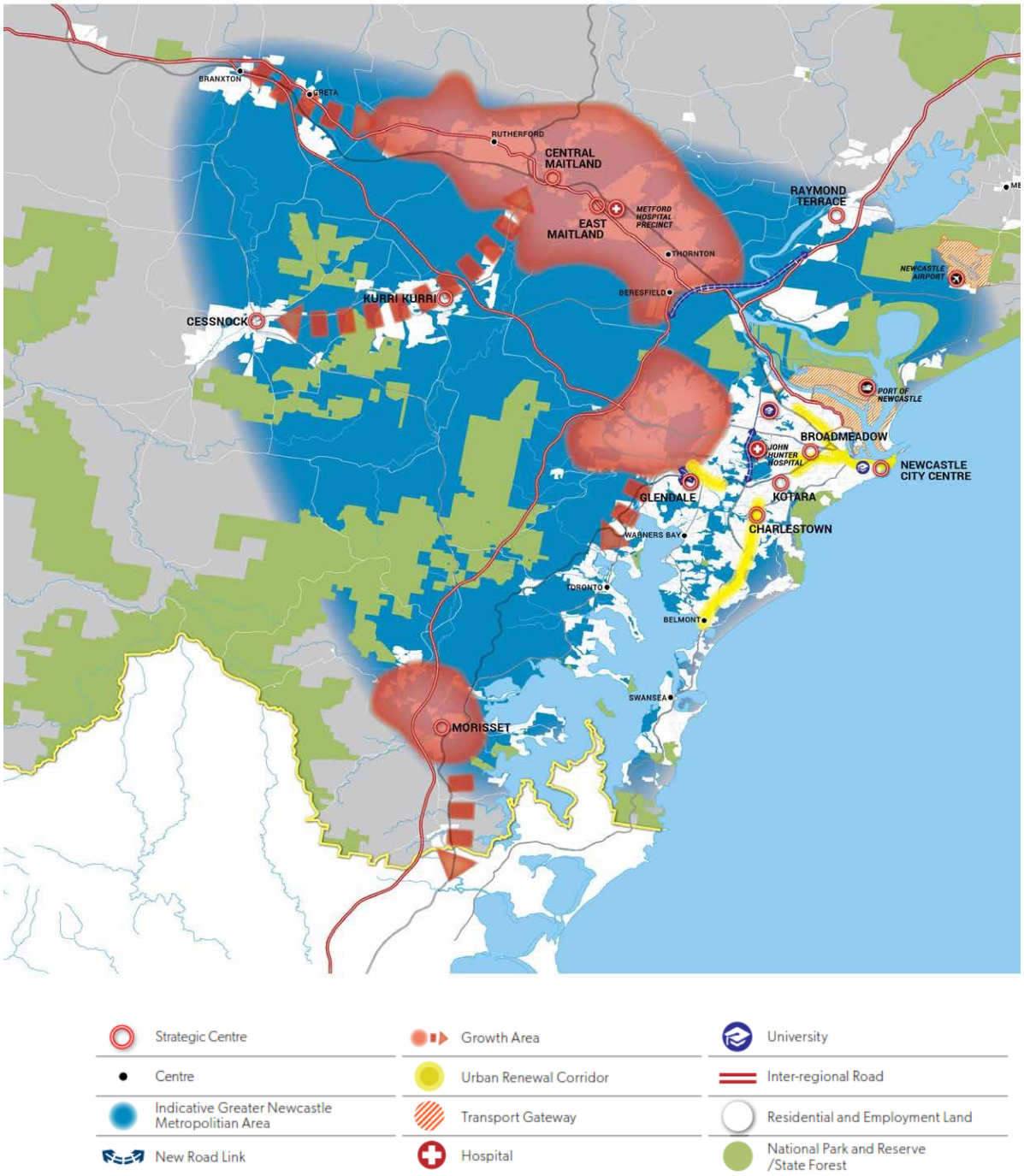
Source: MacroPlan estimates of demand based on floorspace requirements per employee. In case of retail, estimates also expressed in terms of space per capita (number of consumers).
Note; 2036S1 refers to scenario with 0.9% population growth to 2036; 2036S2 refers to 1.1% growth scenario; 2036S3 refers to the 1.3% high growth scenario.

5.2 Strategic Centres

5.2.1 Regionally Significant Centres and Their Role

The Hunter Regional Plan (HRP) 2036 identifies 13 regionally significant centres in the GN metropolitan area, which are the largest centres of activity and employment in the region. Known as Strategic Centres, they are intended to be the focus for population and/or economic growth in GN over the next 20 years.

Figure 7. Strategic Centres Network



Source: Hunter Regional Plan 2036

Strategic Centres are current and future employment nodes that will be higher density mixed-use hubs of residential, commercial, entertainment and dining activity connected to high frequency public transport. They contain significant clusters of professional, retail, health and education services that are projected to be major drivers of the economy in the future. They will be places where the needs of everyday living are within a convenient walking or cycling distance to homes, shops, cafes, parks, jobs, community facilities, services, and meeting places.

The HRP 2036 identifies priorities for each strategic centre that aim to guide further investigations and implementation of strategies to achieve outcomes on the ground. Whilst each strategic centre provides a different role and function in the region, they also operate as part of a network with each other and numerous smaller local centres that support the communities dispersed throughout GN, and the broader Hunter Region. Connectivity between these centres is therefore extremely important for improving agglomeration benefits through deepening labour pools and access to talent and consumers.

It is also important to ensure alignment for each of the Strategic Centres between the strategies of the GN metropolitan plan and those identified by local councils. Many of the Strategic Centres have been considered by its respective local council through strategic planning and/or master planning processes, such as Newcastle, Charlestown, Glendale, and Central Maitland. Other Councils are currently developing strategies in response to actions identified in the HRP 2036, including Cessnock and Kurri Kurri. There are also other Strategic Centres within the GN area that have yet to be considered through a comprehensive strategic planning/master planning process, or where this process has just begun. These centres include Broadmeadow, Kotara, Nelson Bay, and East Maitland.

5.2.2 Potential for New and Expanded Centres

While there is significant focus on existing strategic centres, the HRP (Direction 23.4) asks that locations for new and expanded centres ought to be investigated in areas where “high demand for housing is projected”. There is projected to be significant demand for housing and hence growth in the Maitland-Kurri-Kurri-Cessnock corridor and in the triangle defined by Kurri-Kurri- Branxton-Maitland. If these projections prove correct, the areas will potentially be under-serviced. It is likely that private sector investors will come forward with development proposals to fill these gaps.

While Direction 23.5 asks that policy focus on development within existing centres to ensure their viability and that any new centres “do not undermine existing centres”. This will be a sequencing issue to ensure that sufficient additional demand is created through population growth ahead of new centres being established. Well informed markets will help to keep the equilibrium between supply and demand with local council’s planning departments being a key arbitrator of that balance. From a consumer perspective, an advantage GN has had over Greater Sydney has been the greater level of competition between centres. Councils need to be careful to not be an impediment to healthy competition in the retail sector.

Direction 26.1 asks that land use planning should “maximise the use and capacity of existing infrastructure and the efficiency of new infrastructure”. One of GN’s under-utilised assets is its metro rail network. With the objective of a compact city in mind (Direction 21), allowing for increased development in established areas around train stations is both desirable and inevitable in a city heading to one million. It would also be consistent with promoting housing diversity (Direction 22) and, in increasing the population with good access to public transport network. It would increase the workforce and population with access to inner Newcastle reducing the reliance on cars, thus promoting its revitalisation whilst tackling congestion and parking issues. A part of the attraction of

higher density living around train stations is proximity to retail facilities, which raises the desirability of centres developing or expanding at these sites.

5.2.3 Profiling of Greater Newcastle Strategic Centres

In the following sections we look at inner Newcastle's pivotal economic role in GN and consider the key opportunities, transport, and strategic actions necessary to drive growth. We also consider the three key education/health precincts, and the eight identified commercial/retail strategic centres in the GN metropolitan area.

In the supplementary report, there is a more detailed profile of each Strategic Centre. This sets out each centres' current and intended future role and function, and also addresses:

- Planning Framework
- Strengths and Weaknesses;
- Opportunities and Threats: and
- Recommended Strategic Actions

The purpose of this centre profiling is to provide a deeper understanding of the potential of these centres to progress the key priorities identified by the HRP 2036. In addition, the strategic actions have been developed for each centre to identify infrastructure delivery that meets the needs of GN communities, encourage efficiencies in the allocation of resources and investment to improve the liveability and sustainability of GN, and to enhance connectivity between the centres.

It is also salutary to reflect on where this has been done before and what success looks like. In reviewing activity centre performance in previous Melbourne Metropolitan Plans for the recent Plan Melbourne strategic planning exercise, it has been observed that some centres have not prospered as intended. Only Dandenong has developed into a successful economic node and this happened over decades with substantial government intervention. Successful economic centres like the Monash precinct and Parkville developed organically based on the many micro decisions of business and institutions and most of the planned activity centres remain vacant or underdeveloped.

Similarly, Canberra which was developed as a multi-modal city, is struggling with what to do with its multitude of town centres. Whilst historically, there was substantial employment and retail containment in each town centre, the last 10-15 years has seen a strong centralisation of the workforce with 85 per cent of all high value jobs and over 60 per cent of all jobs now being in the central Canberra. Retail offerings in the town centres has been shrinking across this time period as well and some town centres have deteriorated e.g. Woden Town Centre, which is the geographical centre of Canberra. The business park at Canberra airport which established with some tier one firms, now has over a 40 per cent office vacancy rate as those firms have migrated back into central Canberra.

The lessons here are to prepare Activity Centres to be development ready through flexible planning that can accommodate a range of uses including services, residential and night time economies, promoting good connectivity with public transit and active travel. This will facilitate private investors making business decisions in their own best interests.

5.2.4 Inner Newcastle – Its Economic Role

The Newcastle City Centre (NCC) plays a lesser role in the GN economy than is the case with other cities. The NCC accounts for a relatively small share (8.5%) of total employment in GN. This compares with more than 20% in the major capitals and perhaps more pertinently about 15% on the Gold Coast. The enlarged Inner Newcastle (EIN)- which embraces the area out to Broadmeadow - still only accounts for less than 20% of total employment in GN. However, the NCC is more dominant for some

specific sectors, accounting for 34% of Finance (50% in EIN) and 20% of Professional Services (34% in EIN), sectors where agglomeration economies in locating in a central location can be significant for some firms.

This current lesser role is the flip-side to the dispersed population/employment which provides 30-minute city liveability for most residents. Whereas until recently, the movement was out of the inner, modern cities are seeing a rejuvenation of their inner cities. That growth is built on a mix of high density residential and commercial activity, with increasing populations supporting retail and entertainment activities and higher frequency public transport, which in turn makes the inner city more connected and attractive for tourism and hotels. It is also more attractive as an environment for high value, high human capital finance, education, and professional service sectors. This is expected to see the inner Newcastle expand its footprint and its share of employment, while the centre of gravity will shift west towards Broadmeadow.

Table 14. Employment in Inner Newcastle 2016

	GN	LM-N		Inner Newcastle (NCC)		Enlarged Inner Newcastle	
	No.	No.	% share	No.	% share	No.	% share
Agriculture	1,837	900	49.0%	12	0.7%	89	4.8%
Mining	3,852	2,233	58.0%	231	6.0%	339	8.8%
Manufacturing	15,015	9,285	61.8%	126	0.8%	982	6.5%
Utilities (Electricity, etc)	2,974	2,323	78.1%	393	13.2%	458	15.4%
Construction	17,262	11,560	67.0%	817	4.7%	2,113	12.2%
Wholesale trade	4,418	3,317	75.1%	115	2.6%	669	15.1%
Retail trade	24,465	16,423	67.1%	1,105	4.5%	2,606	10.7%
Accommodation & Food	19,057	12,200	64.0%	1,976	10.4%	3,229	16.9%
Transport, etc	9,447	6,698	70.9%	561	5.9%	1,637	17.3%
Information	1,986	1,682	84.7%	558	28.1%	797	40.1%
Finance	6,884	5,954	86.5%	2,326	33.8%	3,435	49.9%
Rental and real estate	3,473	2,333	67.2%	378	10.9%	649	18.7%
Professional Services	12,576	9,750	77.5%	2,574	20.5%	4,229	33.6%
Admin support	6,573	4,418	67.2%	664	10.1%	1,207	18.4%
Public admin	15,304	8,911	58.2%	3,231	21.1%	4,045	26.4%
Education	19,965	14,551	72.9%	708	3.5%	2,654	13.3%
Health	37,651	29,422	78.1%	2,072	5.5%	4,562	12.1%
Arts	2,613	1,877	71.8%	195	7.5%	647	24.8%
Other services	9,530	6,244	65.5%	451	4.7%	1,354	14.2%
Total	222,946	155,511	69.8%	18,971	8.5%	36,893	16.5%

Source: ABS Census 2006.0 Working Population Profile, Table W09 Shares of Employment by Place of Work.
Note: Inner Newcastle defined by the Newcastle-Cooks Hill SA2 area; enlarged Inner Newcastle adds the Hamilton-Broadmeadow and Wickham-Carrington-Tighes Hill SA2 areas

5.2.5 Newcastle City Centre and Broadmeadow – the Heart of Inner Newcastle

The development of Newcastle City Centre (NCC) and Broadmeadow are likely to be intertwined. In the table below, we set out the growth opportunities specific to these two strategic centres, the transport issues and some strategic actions which follow from this. A more detailed report on these two strategic centres is in the supplementary report.

Newcastle City Centre (NCC)		
Opportunities	Transport	Strategic Actions
• Significant economic and population growth in GN and the broader Hunter region will generate demand for retailing, personal and business services. • Knowledge-based industries desire centres with high amenity and critical mass for agglomeration benefits – opportunity to evolve in this direction. • Higher education expansion associated with UoN (i.e. New Space; Master Plan for city campus) and others (i.e. Redevelopment of Old Newcastle Court House). • Increased capacity for tourist/short-term accommodation to promote visitor economy.	• Better utilisation of GN's metro rail line with development at network stations will lift the population with access to inner Newcastle. • Wickham Transport Interchange with train, bus connectivity to other centres (e.g. airport) will promote public transport. Car congestion a constraint on growth. • Light Rail in Inner Newcastle will draw development to the corridor it creates. Extension to Broadmeadow would benefit these two inner precincts.	• Continue Revitalising Newcastle program and promotion of public infrastructure and private development and investment. This includes development of retail, hospitality, entertainment, commercial, institutional, and residential uses in the centre. • Promote international cruise ship terminal at Dyke Point connected to the city via ferry and road linkages. • Continue to promote Newcastle Mines Grouting Fund to facilitate and promote new investment in the centre. • Potential Exhibition/Convention Centre at Cottage Creek Precinct, Honeysuckle, to promote business visitor economy.
Broadmeadow		
• Emergence of nationally/internationally significant sport and entertainment precinct, along with supportive uses – tourist accommodation; cafes/restaurants; etc. • Other compatible land uses possible to increase diversity and level of activity – retirement living; aged care; Sport Medicine Centre of Excellence. • Relocation of industrial and manufacturing industries improves land use compatibility and enhances diversity of uses.	• Potential destination for extension of Newcastle Light Rail to improve connectivity between centres. • Strategic location for park'n'ride facility to services other strategic centres – NCC; Kotara; JHH; Callaghan Campus.	• Investigate expansion of public transit from NCC. • Continue with the planning for the Hunter Sports and Entertainment Precinct. • Investigate changes planning/land use of industrial land in urban renewal corridor to allow commercial/residential development. • Build density near centre and station to improve centre viability, housing choice and reduce car dependency. • Identify location/s for park'n'ride facilities.

5.2.6 Three Key Health and Education Precincts

The University of Newcastle (UoN) Callaghan Campus, the John Hunter Hospital (JHH) and East Maitland are three strategic centres of major importance to the development of health and education sectors of the GN economy. Below we set out the growth opportunities specific to these three strategic centres, the transport issues and some strategic actions which follow from this. A more detailed report on these three strategic centres is in the supplementary report.

East Maitland-Greenhills and New Maitland Hospital		
Opportunities	Transport	Strategic Actions
• Future major hospital at East Maitland (Metford) will attract other community services and health-related firms. • Some flow-on benefit to old East Maitland town centre inevitable.	• Access of GN population to the hospital enhanced by proximity to East Maitland (Victoria Street) and Metford stations. • Proximity to railway stations at East Maitland and Metford prioritises potential for ToD strategy. • Bus connections to New Hospital to maximise its accessibility.	• Structure plan to better integrate retail/hospital precincts within the centre and between the centre and surrounding areas to encourage pedestrian, cycling and public transport usage. • Investigate ToD strategy and opportunities for increased residential density. • Prepare health and medical cluster plan.
John Hunter Hospital		
• Further expansion of health cluster that provides world-class health, research, and education services. • Scope for health-related industries to co-locate and support health cluster. • Hotel, commercial/ retail and residential to support amenity of health cluster.	• Improved access through completion of full Newcastle Inner City Bypass. • Needs connectivity to Inner Newcastle and rail network. • Insufficient connectivity with Callaghan Campus to expand research and training opportunities.	• Prepare health and medical cluster plan. • Plan should consider opportunities for hotel, commercial/ retail and residential to lift amenity of health cluster.
University of Newcastle, Callaghan, and Warabrook Station		
• Opportunities for non-traditional university uses – primary/secondary schools; residential accommodation. • Given Callaghan campus focus on STEM, the associated/adjacent business park and station at Warabrook, and proximity to Port, means potential for 'high tech' industry precinct with STEM-related firms.	• Energex site located on the campus impacts on connectivity to Warabrook railway station. • Disabled accessibility to Warabrook station limited. • Potential for more ToD-focussed development around Warabrook railway station.	• Direct/rapid bus connection between Callaghan and NCC and JHH Centres. • Investigate and resolve permissibility/authority issues regarding Crown Land and current site zoning. • Improved connections to Warabrook business park and Station • Overall strategy for Callaghan/Warabrook.

5.2.7 The Commercial/Retail Strategic Precincts

Outside inner Newcastle and the specialised health and education precincts, GN has eight established commercial/retail precincts which each have unique characteristics and contribute significantly to the GN economy. Below we set out the broad opportunities, transport issues and strategic actions for these centres. The supplementary report contains more detailed assessment on the individual strategic centres of Cardiff-Glendale, Central Maitland, Cessnock, Charlestown, Kotara, Kurri Kurri, Morisset, and Raymond Terrace.

Opportunities	Transport	Strategic Actions

• Longer-term growth of GN, particularly in designated urban growth corridors, means market of each strategic centre will grow.
• Increased populations serviced by centres will increase scope, and need for, public transport connectivity with other centres.
• In some centres, large aggregated sites in single ownership provide significant opportunity for large scale, integrated redevelopment proposals.
• Better integration with surrounding precincts, residential areas, and employment areas.
• Higher density housing opportunities integrated with mixed-use and/or office developments, to optimise amenity offered by centres.
	• Increase in aged population with lower mobility and need for proximity to public transport options.
	• Desirability of high levels of bus accessibility to/between GN strategic centres and other activity centres in the GN.
	• In case of centres located at/near stations, is potential being fully utilised? ToD potential at Kotara, Cardiff, Central Maitland, and Morisset
	• Specific example – potential relocation of Kotara Rail Station closer to the centre **OR** plan for an increased residential density around current (or new) train station.
	• See Strategy for Hunter Expressway corridor (Kurri Kurri).
		• Strategic plans to boost connectivity of centres, to enhance appeal to residents and employers.
		• Specific proposed strategy – investigate relocation of Kotara Rail Station closer to the centre **OR** investigate and plan for an increased residential density around current (or new) train station.
		• ToD strategies to enhance viability of public transport.
		• Investigate changes to the land use planning controls at/around centres to allow:
		  • medium and higher density housing, in particular to cater for changing demographic; and
		  • increased employment opportunities and amenity

5.3 Global Gateways

Newcastle Airport and the Port of Newcastle benefit the economy of Greater Newcastle through direct access to national and international markets. These 'Global Gateways' to the Hunter have enabled the Hunter Region to become the largest regional economy in Australia and an important gateway for regional NSW for goods and tourists. The HRP 2036 acknowledges that the region's ongoing economic prosperity will depend on its ability to capitalise on these strategic assets. The gateways and their associated networks must be safeguarded so they remain viable, globally competitive, and adaptable.

The table below sets out the key opportunities, transport issues and strategic actions for the Port of Newcastle and Newcastle Airport. In the supplementary report, there is a more detail profile of each of these Global Gateways

Port of Newcastle		
Opportunities	**Transport**	**Strategic Actions**
• Significant land supply available for port-related uses. • Opportunity to create an intermodal port. • Scope for industries compatible with primary use as port. • While protecting port expansion, decline of manufacturing creates potential for other uses for old industrial land.	• Limited connectivity to Newcastle City centre for cruise ship berth at Dyke Point. • Road freight capacity limitations and impacts. • Construction of a second bridge crossing of the Hunter River at Tourle Street. • Insufficient rail lines to support the movement of non-coal products to the Port, in particular in the Carrington area	• Protect land required for expansion. • Promote funding and development of international cruise ship terminal at Dyke Point. • Overcome restrictions/limitations on development of container facility.
Newcastle Airport		
• Adjoining land available for expansion of defence and aerospace cluster. • Opportunity to create a broader knowledge precinct with the airport/defence aerospace activity as the anchor. • Growth in tourist and visitor numbers, freight movements and aviation activities can generate demand for a variety of land uses including aviation related uses and population-driven activities like visitor accommodation, retail/hospitality, and ancillary commercial / office activities.	• M1 upgrade and extension to Tomago will provide improved freeway access to airport. • Direct non-stop bus service to Wickham interchange would enhance connectivity. • Expansion of routes, including international routes, challenging but significant value to tourism and exporters.	• Protect land required for expansion. • Identify and secure corridor for future rail connection to the airport. • Support retail, commercial and entertainment activity to serve air travellers and employees of the airport precinct.

6 PLANNING FOR GROWTH

6.1 Transport Infrastructure to Reshape the GN economy

The Hunter Strategic Infrastructure Plan (HSIP) in 2013 set out a comprehensive strategy to address the long-term transport infrastructure needs of GN. Flowing from that, there are a number of current and proposed transport infrastructure projects that have significant potential to boost the GN economy, and it has been encouraging that since 2013 significant numbers of transport projects have been completed or are underway. Given the projected growth in the GN economy and the demands that will generate, a pro-active approach to transport infrastructure will be essential.

In terms of public transport, there some significant investments being made with light rail implementation, but there are still concerns about public transport patronage and access to employment for those who don't have ready access to a car.

The forthcoming (MacroPlan) report on Newcastle Automated Vehicle Implementation Strategy deals with a range of transport connectivity issues for GN. Particularly the need to develop transport integration hubs around rail stations, light rail stops and bus stops linking them with active travel options to move to a more desirable transport mode split, make access to the GN's employment, education and services more equitable and reduce car dependency and carbon and air pollution.

In the following we set out the opportunities, impact, and strategic actions in utilising GN's existing rail infrastructure and some specific proposals for new transport infrastructure. Given the pivotal role of the Hunter Expressway (HEX), this is looked at in terms of its role for both GN and nationally, with some key planning principles identified.

6.2 Utilising the Existing Infrastructure of GN and Key Proposed New Infrastructure

Existing Rail Infrastructure		
Opportunities/Weakness	**Impact of Growth**	**Strategic Actions**
• Newcastle-Lake Macquarie-Maitland suburban line is an under-utilised asset. GN travel to work by public transport low and access to inner Newcastle constrained. • Low density land use at stations is the general case. • Under-utilisation of network impacts on operational cost to TfNSW. • With an ageing population, increased demand for housing options with access to public transport network and services on its route.	• As GN grows, utilising this asset becomes more imperative. • Transport-oriented development (ToD) would entail higher density residential and commercial/retail development in proximity of stations. • Centres of varying levels, including potential new strategic centres, could develop around stations as GN's population growth generates place-based demand for new centres.	• Specific plans for Broadmeadow, Kotara, Cardiff, East Maitland, Maitland, and Callaghan (/Warabrook) should consider incorporating ToD principles. • Specific to Kotara, investigate relocation of Kotara Rail Station closer to the centre **OR** investigate and plan for an increased residential density around current (or new) train station. • Local Governments should consider rezoning around other stations as general medium and long-term strategy, or create/enable frameworks for the flexible consideration of private proposals

		• If new strategic centres develop, then desirable outcome if on rail network. • Transport for NSW to develop strategy for maximising value of its network. • Measure of success will be increased patronage of suburban network.
Opportunities/Weakness	**Impact of Growth**	**Strategic Actions**
Sydney-Newcastle High Speed Rail		• Corridor, or corridors, for High Speed Rail and Freight By-pass should be identified.
• A number of proposals for High Speed Rail Melbourne-Sydney-Brisbane put to Governments, but very long-term. Sydney-Newcastle would be part of network.	• As the volume of traffic on the Sydney-Central Coast-Newcastle line increases, difficult to stop travel times increasing. • High-speed Rail would be a significant economic benefit to GN.	
Fassifern-Hexham Freight By-Pass		
• Plan on the drawing boards since 1988. Still concept with no specific commitment.	• Diversion of freight traffic off suburban network would be positive for industry and commuters in GN.	
M1 By-Pass		
• Plans advanced for by-pass from Beresfield to Raymond Terrace	• Will complete a south-north route through the middle of GN, reduce congestion and increase connectivity between employment and residential areas	

6.3 The Hunter Expressway

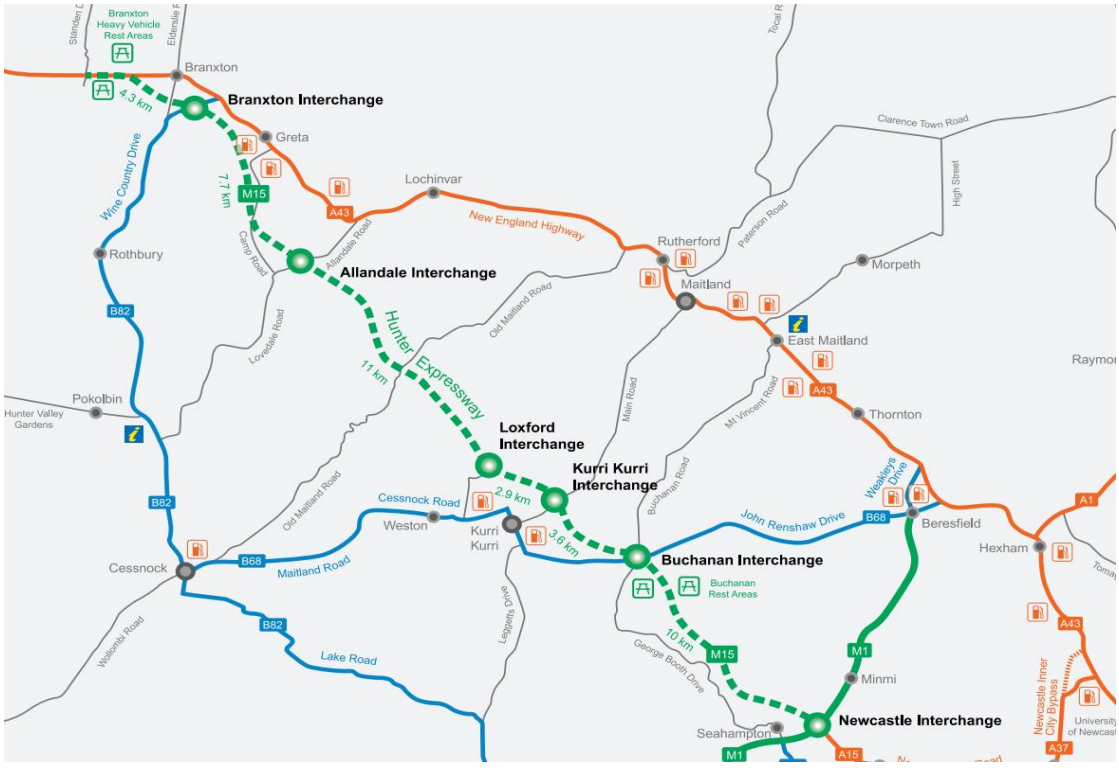
The Hunter Expressway (HEX) was opened in 2014 and has been described as a strategic or city-shaping transport infrastructure investment that has altered relative accessibility across GN. But it also has a much broader role in the national transport network.

The HEX has reduced travel times and provides access between the Upper Hunter and GN. From the perspective of GN, in combination with the M1 and NE Highway, it is part of a valuable transport-industrial corridor for the city which connects the various industrial areas and the Newcastle Airport and Newcastle Port.

<table>
<tr><th colspan="3">Hunter Expressway and Its Role for Greater Newcastle and its Broader National Economic Role</th></tr>
<tr><th>Industry and HEX</th><th>Residential and HEX</th><th>National Perspective</th></tr>
<tr><td>• For industry, proximity to the Interchanges along the HEX is a valuable asset and, there is likely to be demand over time for land by a range of industries/ firms.
• It will compete with established sites in the industrial corridor, e.g. Tomago. Proximity to wine/agriculture and mining will advantage these sites and see some long-term shift in businesses serving these sectors from other sites..
• Industries identified for HEX corridor are:
- Freight and Logistics
- Food and Beverage Processing
- Building and Construction
- Engineering Services
• Importantly, the expansion of the volume of employment land with good transport connectivity means that some of the employment land located in inner urban locations, e.g. close to NCC, could be repurposed as residential or mixed-used development sites.</td><td>• It also has region-shaping impact on residential development with, for example the Maitland-Kurri Kurri-Cessnock corridor already identified.
• At both ends of the HEX (Branxton and east of the Newcastle interchange), residential development has become more attractive.
• Diversion of traffic off the NE Highway boosts amenity in Maitland corridor.
• As the market and LGs respond, the population growth will create demand for place-based commercial/retail development.</td><td>• It is also a significant part of the national road network, connecting to Sydney and GN to New England and that second inland route to Brisbane. Also gateway to Golden Highway and Dubbo, and Gunnedah via Kamilaroi Highway. It has effectively replaced the New England Highway in this section, improving the connectivity of all these regions.</td></tr>
<tr><th colspan="3">HEX Planning Principles</th></tr>
<tr><th>Industry</th><th>Residential</th><th>National</th></tr>
<tr><td>• The precautionary approach historically adopted to not releasing old industrial land for alternative uses in inner GN should be reconsidered, particularly given the substantial structural decline in manufacturing (demand for space).</td><td>• Residential expansion in these growth corridors will need to be accompanied by investment in the “complementary road network” (e.g. Maitland-Kurri Kurri) to maintain efficient connectivity to HEX and NE Highway.</td><td>• As HEX is also a significant part of the national road network, future planning for land along the Hunter Expressway corridor will also need to consider the need to maintain an efficient national freight network.
• In the long term, that efficiency could potentially be</td></tr>
</table>

• Important to maintain buffers from residential use around commercial/industrial zones adjacent to interchanges, to protect industries that e.g. require 24-hour operation.	• In that regard, The Hunter Strategic Infrastructure Plan (2013) set out the strategy for additional complementary transport infrastructure. • Related to this, policy should promote public transport between centres and also to the rail network in Maitland corridor. The latter to encourage alternatives to using the HEX.	affected by congestion created by GN growth.
HEX Planning Principles – Other General		
• Topography - Reserve relatively flat land with good access to services and infrastructure to enable viable subdivision and building development. • No direct access to corridor - Direct vehicle access to the HEX is not to be allowed to ensure that the function, safety and efficiency of the road corridor is not diminished or undermined. • Environmental - Development needs to take account of environmental, cultural and other non-economic aspects, such protecting biodiversity, heritage sensitive land sites. These are outlined in the Roads and Maritime Services policy: http://www.rms.nsw.gov.au/about/environment/index.html		

Figure 8. Hunter Expressway



6.4 Targeted Economic Development Strategies

This section looks at the major strategic priorities that could be adopted and taken forward by relevant local stakeholders. Overall, these options seek to highlight areas where policymakers could focus attention to capitalise on emerging opportunities, accommodate future growth, enhance resilience, and drive a dynamic and liveable economic region.

Industry	Strengths/Demand Drivers	Threats/Constraints	Opportunities	Policy	Monitoring Indicators
Defence at Williamtown	Additional squadrons of Joint Strike Fighters Servicing/ support requirements	Long-term government commitment means no immediate threat.	Cluster of aerospace and defence service businesses around the airport. Demand for skills by these firms. Potential research opportunities	LGs flexibility on land use. UoN/other tertiary institutions address demand, and exploit opportunity for research.	Growth in Employment in Tomago/Williamtown. Local graduates with the right skills. University/industry research output.
Williamtown Airport	Domestic and International Tourism and Business	Development of a second Sydney Airport may absorb some of the central coast market.	Develop International Routes (NAL) Potential for Air Freight (NAL)	Connectivity to Inner Newcastle, GN destinations	Growth in Air Traffic
Advanced Manufacturing	Spin-off from Aerospace/ Defence Cluster. Demand from Mining Niche High Value Opportunities.	A global market – competitive. Long-term future of mining (but well beyond 2036)	Skills utilized by Aerospace Cluster will reinforce Existing Engineering Skills. UoN potential STEM cluster at Callaghan/Warabrook.	Air freight access to major markets for high value/low volume products. As above, for UoN/other tertiary institutions.	Growth in Exports. Local graduates with the right skills. University/industry research
Metals processing	World demand. Deepwater Port for volume exports.	Rising cost of domestic electricity specific threat to aluminium.	Limited opportunities.	Certainty on energy policy needed.	Growth in Exports
Food and Beverage Manufacturing	Hunter Valley Agriculture/Viticulture	A global market – competitive.	Hunter Valley reputation for quality. Potential for increased intensity of rural output.	Sea and Air Freight access to major markets.	Growth in Exports

Health	Population growth and ageing. GN is hub for the wider Hunter Region	Ensuring the availability of qualified medical personnel, and hospital and aged care facilities	Develop Research Base to lift prospect for Centre of Excellence. Potential for medical training for foreign students.	Encourage/allow clusters, including increased amenity. New Maitland Hospital strategy to be aligned with John Hunter	Employment in Research and Value of Medical Research Grants. Centre of Excellence in Health and Education established.
Education	Significant regional providers of tertiary education services Strong demand for education services from Asian markets	Ability to capitalise on potential growth from Asian markets	Need to identify foreign demand other than 'business' studies. Potential to expand medical training for foreign students.	Encourage other tertiary institutions to increase competition. Tertiary Institutions responsive to, and supporting, changing industry strengths	Graduates with skills meeting demand. Employment in Research and Value of Research Grants. Centre of Excellence in Health and Education established.
Retail	A competitive market	On-line retail	Higher level retailing for GN and wider Hunter Region. Home delivery for Aging Population	Flexibility to allow out of centre development.	Increased presence of higher level retailing.
Tourism	Pristine coastal and tourism offerings. Growth of domestic tourism. Demand from the expanding Asian middle class.	Capacity to improve event offerings and coordination Lack of premium hotel accommodation	Continuation of renewal of Inner Newcastle to support entertainment and accommodation precinct	Flexible mixed-use development. Convention Centre to support Renewal. Support development proposals for other potential tourist 'drawcards'	Growth in day-trippers Growth in overnight stayers. Growth in business tourism
Port of Newcastle	Increased trade. Need for deep water berthing capacity on east coast. Growth of cruise market.	Better freight transport links to Sydney. Managing pressures of a shared port facility.	Develop Container Capacity Expand cruise ship services	Investment in Better freight transport links to Sydney	Growth in volume and diversity of trade. Growth in cruise ship visits

7 CONCLUSION

If Greater Newcastle is to achieve its full growth potential, there is a need to ensure that its economy is well positioned to provide not only the additional jobs required to support the increased population, but that those jobs are in industry sectors that are likely to grow, are higher value and are able to leverage the range of inherent advantages in the GN region. This will require better transport connectivity for equitable access to the new economy jobs which will tend to be more centralised in inner Newcastle, its strategic centres and potentially along the Newcastle-HEX road corridor.

Measures to embed underperforming parts of the region more deeply into these higher productivity and higher participation centres will yield economic dividends as well as improving social inclusion. It would allow individuals to capture the benefits through improved connectivity and better access to services.

At a broader level, there have been some positive developments in leveraging GN's advantages in energy production and related activities, and in health services. This includes the establishment of:

1. Australian Solar Institute and Clean Energy Innovation Centre, headquartered in Newcastle
2. Newcastle Institute for Energy and Resources
3. Hunter Medical Research Institute.

Much of this institutional development has the potential to be further consolidated and built on over the short to medium term. In particular, linkages between the University, CSIRO, the John Hunter Hospital, and relevant industries can be deepened to improve agglomeration benefits. Also, these institutions need to work together if the platform is going to be established for a Centre of Excellence in GN, which would a major achievement and signal of success,

Greater Newcastle is leading all other regional cities in Australia in new economy industry growth such as education, health, finance, and professional services and has been successful in transforming from its historical dependence on manufacturing and mining. But this transformation needs to be sustained to meet new population and prosperity targets.

Traditional industries are still vital to the GN economy, but the same trends shaping the economies of capital cities, namely the rise of the knowledge economy and the importance of digital skills, are very much present in the GN economy.

Maximising GN's economic prospects over the long term will require building on its natural and acquired advantages and enhancing its industry diversification. While this will necessarily have an element of the existing economic strengths in resources, energy generation and heavy industries, a new focus on higher value-added industries as well as growth in the services sector will be required.

A considerable proportion of new residents are expected to be older, including retirees and those towards the end of their working careers. These residents will inevitably increase the demands and opportunities for service providers in health, retail and lifestyle industries and other sectors such as construction, but they will need to be complemented by an influx of new younger and skilled workers.

The services sector, which is a large and expanding part of the economy, will generate a range of new opportunities. In particular, there will be greater prospects in areas such as high value tourism and education, and new initiatives to reinvigorate these areas would drive significant benefits.

Health and social assistance is one of the strongest growth sectors of the economy. The ageing population, together with ageing-in-place and people living longer and more wealthy retirees will put larger demands on this service sector.

Greater Newcastle needs to position itself as a vibrant and desirable alternative city of choice in its own right. One which can nurture innovative small businesses and creative industries, and deliver a blend of 'metro-level' entertainment and dining options. The growing arts culture is not only important for current employment growth, but for re-imagining the region from its industrial heritage to one that will attract and retain the higher skilled workforce that is needed to generate future prosperity and jobs for the longer-term success of GN. A dynamic events culture makes a place more liveable and cohesive.

Much of this centres on initiatives to improve the planning and connectivity of GN, especially good transport links and opportunities to locate more centrally, where possible, new business, health and education services sector. That can be complemented by a vibrant health, community support services, and tourism sectors that can drive higher work force participation of lower skilled parts of GN. In that way, Greater Newcastle can provide career pathways for all of its growing population well into the future.

8 Appendix A – Glossary, Reports and Consultation

Glossary of Terms and Definitions

ABS – Australian Bureau of Statistics

GN - Greater Newcastle

Greater Newcastle comprises the five LGAs of Cessnock, Lake Macquarie, Maitland, Newcastle and Port Stephens

GRP – Gross Regional Product

Estimates of Gross Domestic Product (output/income) for a region.

IVA – Industry Value Added

Measure of the aggregate value-added by labour and capital of individual industries. GRP includes IVA, plus the value of ownership of dwellings and (less significantly) taxes less subsidies.

HMRI - Hunter Medical Research Institute

Inner Newcastle

For statistical purposes, Inner Newcastle defined by the ABS Cooks Hill-Newcastle SA2 area.

(Expanded) Inner Newcastle

Inner Newcastle is sometimes used to describe a larger geographic area. For statistical purposes, this Expanded Inner Newcastle is defined by three ABS SA2 areas: Cooks Hill-Newcastle; Wickham; and Broadmeadow.

LGA – Local Government Area

NCC - Newcastle City Centre

The Newcastle City Centre is the major part of Inner Newcastle

STEM – Science Technology Engineering and Mathematics

Refers to University concentration in these science-related fields

TOD – Transit-Oriented Development

Refers to development which maximises the use of transport infrastructure by allowing concentrations of housing and commercial activity around transport hubs.

Reports

Deloitte-Access Economics (2013) Prospects and Challenges for the Hunter Region

Hunter Development Corporation (2013) Hunter Strategic Infrastructure Plan

NSW Department of Planning and Environment (2016) Hunter Regional Plan 2036

NSW Department of Planning and Environment (2016) Hunter Regional Plan 2036 Implementation Plan 2016-2018

Newcastle Local Planning Strategy 2015

Newcastle CBD Masterplan (2015)

Newcastle CBD Visitor Economy Masterplan Final Report (2015)

Regional Development Australia (2016) Smart Specialisation Strategy [S3] for the Hunter Region

A large number of other reports, including Local Government strategies and plans for strategic centres, were also reviewed in researching the report.

Consultation

MacroPlan consulted at the following workshops attended by local government and other Greater Newcastle organisations, and in addition consulted directly organisations in the course of preparing this report:

Workshop at Fort Scratchely, Newcastle 28th February 2017
Workshop in Newcastle 27th and 28th April 2017
Workshop at McDonald Stadium, Newcastle July 2017

Hunter Business Chamber
Hunter Research Foundation Centre
Newcastle NOW
Renew Newcastle
University of Newcastle

9 Appendix B – Economic Notes

Note 1: Economic Data, Growth and Greater Newcastle

The Australian Bureau of Statistics (ABS) constructs estimates of industry value-added (IVA) and gross regional product (GRP) for each of the States, but not at a regional or Local Government Area (LGA) level. There is insufficient data at the regional or LGA level for the ABS to put a degree of confidence around IVA/GRP estimates, and this indicates that estimates of IVA/GRP at the LGA/regional level needed to be treated with some caution.

With that qualification, the Office of the Chief Economist of Department of Industry, Innovation and Science (OCE) has published provisional estimates of regional GRP for 2014/15.[43] In respect of GN, the OCE has estimated GRP for Lake Macquarie-Newcastle (LM-N) of $64,000 per capita, and an estimate of $67,000 for the Hunter Valley Region ex LM-N. The latter includes the other three LGAs in GN, and LGAs in the upper Hunter where GRP is significantly boosted by the presence of mining. ABS estimates of mean employee compensation for LM-N in 2014/15 was $59,000, and for the other three LGAs it was $58,000. Lake Macquarie-Newcastle account for two-thirds of Greater Newcastle's workforce, GRP would be expected to be only marginally lower than $64,000. Allowing for estimation error, we use the $64,000 figure.

The methodology used by the OCE is set out broad terms in its 2016 Report. It uses partial data, relative employee compensation (vs labour value-added and capital value-added for State industries) in most instances, to determine ratios and a region's share of State industry value-added. The methodology is reasonable and defensible but (as the OCE would agree) the results need to be treated with some caution.

For 2016, we factor up the $64,000 up by 3% to $66,000, broadly in line with the 3.4% growth in nominal NSW GRP per capita. With a population of 575,000, this gives an indicative figure of $37.6bn for GRP for 2015/16. Allowing for gross rental surplus for ownership of dwellings and taxes less subsidies accounting about 20% of GRP (the figure for NSW in 2015/16), that would give IVA of $30bn in 2015/16. Taking the OCE-based estimate of IVA for 2015/16 of $30bn and nominal growth of about 20% over 2010/11-2015/16 generates an indicative $25bn in 2010/11. This appears to be marginally higher than the Deloitte-Access (2013) figures, although their report was for 2012 and did not directly cite a figure for GN.

For the exercise in Table 9, the estimated value of IVA matters less than the industry shares of value-added. To estimate industry shares, MacroPlan used similar methodology to the OCE, that is we took the industry ratios of labour valued per employee for each industry and applied that to industry of employment (by place of work) in GN. Then, the same ratio of capital to labour for each industry was applied to generate capital value-added, and by addition total value-added. In each case except mining, where the coal industry figure was used, broad industry sectors were used.

For projected growth in GRP, MacroPlan has used the NSW Intergenerational Report 2016 projections for labour productivity growth of 1.5% per annum (pa) from 2015-2035 as its benchmark.[44] IMF research which looked at the impact of higher immigration on productivity and income for high income

[43] Australian Industry Report 2016 https://industry.gov.au/Office-of-the-Chief-Economist/Publications/AustralianIndustryReport/industry-map.html

[44] 2016 NSW Intergenerational Report Appendix Projections Summary page 95 https://www.treasury.nsw.gov.au/sites/default/files/2017-02/2.%20The%20Shape%20of%20our%20Future%20Economy.pdf

developed economies, found a 1 percentage point increase in the share of migrants in the adult population can raise GDP per capita by up to 2 percent in the long run.[45] It is perhaps problematic to apply those results to migration into a region, although the principles should be the same and urban economic research is consistent with larger, growing cities being more productive and generating higher incomes. That suggests that Greater Sydney's immigration-driven, higher growth would be expected to lift productivity faster than the rest of NSW, including GN. It follows that a higher growth scenario for GN could be expected to generate higher productivity and output per capita growth. For the 0.9% population growth scenario, the assumption is for 1.3% pa productivity growth, and for the 1.3% population growth scenario, applying the IMF analysis indicates that 1.4% productivity growth is a reasonable estimate. Estimation is dependent on the proportions of the higher population growth coming from retirees or from young workers, with the working assumption in the model that a higher proportion of the extra people attracted into GN in the high growth scenario are young workers.

Growth in household incomes in the period 1996-2016 of 2.0% per annum in real terms reflected factors other than productivity, with higher workforce participation rates and lower unemployment both lifting incomes in this period. In the absence of those factors, real incomes would normally be expected to be broadly in line with growth in productivity. That is, productivity growth of the order of 1.3-1.4% per capita (with household size unchanged) would be expected to lift real incomes by a similar amount.

Note 2: Mining Sector' s Contribution to Greater Newcastle Economy

The analysis summarised in Table 6 is based on the work by Rayner and Bishop (2013)[46] from the Reserve Bank of Australia, with specific application of that methodology to GN by MacroPlan. The estimates of industry value-added for Upper and Lower Hunter are keyed off the employment in those industries and are comparable with estimates published in Deloitte-Access (2013). The Rayner and Bishop analysis used ABS Input-Output data (ABS 5209.0.55.001) to estimate the contribution by sectors into mining for Australia. The complications for applying that analysis to GN are that much of the mining activity occurs in the Upper Hunter LGAs adjacent to GN, and some of the manufacturing and service inputs are supplied by firms in the Upper Hunter or outside the Hunter. The MacroPlan analysis necessarily incorporates assumptions about the proportions of intermediary inputs supplied from firms in the GN economy, and from outside the GN economy. For example, the assumed proportion is high for transport-related activity but low for financial services much of which would be provided by firms located in Sydney, while the contribution from manufacturing reflects knowledge of specific firms operating in GN which supply the mining industry. The other complication is that the value of mining value-added can be volatile. Different assumptions and different years would make the contribution to the GN economy higher or lower but on any "reasonable" set of assumptions, the magnitude of the contribution is expected to be significant.

[45] Jaumotte, F., Koloskova, K. and S. Saxena (2016) 'Impact of Migration on Income Levels in Advanced Economies' IMF Publications, 24 October, 2016

[46] Rayner, V and J. Bishop (2013) Industry Dimensions of the Resources Boom: An Input-Output Analysis Research Discussion Paper 2013-02. See brief discussion in Appendix: Economic Estimate