



ENGINEERS
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Greater Newcastle Metropolitan Plan

Engineers Australia submission

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Engineers Australia
11 National Circuit, Barton ACT 2600
Tel: 02 6270 6555
Email: publicaffairs@engineersaustralia.org.au

www.engineersaustralia.org.au

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Executive summary

Newcastle, as NSW's largest regional centre, will play a critical role in the future of NSW as the economy moves from primary to tertiary industries.

The Greater Newcastle Metropolitan plan is a welcome beginning to what will be a long term conversation on how Newcastle and the regions surrounding Newcastle will transition into an international Global Gateway City, embarking on a journey of global investment, national prominence and economic growth.

Providing the infrastructure for this journey starts with decades-long planning that is both fit for purpose and adaptable to change. At the centre of this infrastructure will be the engineer. Nearly every good and service provided to the people of Greater Newcastle is, in some way, enhanced by engineering and engineers.

Ensuring that the city and the region grow will require that, not only is there a pipeline of development, but that there is a pipeline of qualified people to undertake the work. With so much of the future of Newcastle resting on engineering capability, having qualified local engineers ready should be seen as part of the plan.

Planning the future also includes ensuring that the city performs to its capacity.

The built environment is a major contributor to emissions and the better planned the city is the lesser the risk of higher emissions. This does not mean simply building more modern buildings, it means ensuring that existing buildings are performing at their best. It means providing transport options that limit damage to the environment and providing options beyond the status quo. It also means continual work on existing infrastructures under the ground so that the amenity of the city is not inhibited by aging infrastructure.

Engineers Australia welcomes the start of this conversation on the development of Newcastle over the next two decades.

This submission will look at the ways that engineers will underpin the transition of Newcastle into an international city through Newcastle's future workforce, its environmental impact and the connectivity and amenity through effective infrastructure planning.

A list of recommendations is provided in the "Conclusion" section of the submission.

Introduction

About Engineers Australia

The Institution of Engineers Australia (Engineers Australia) is the not-for-profit professional association for engineers. Established in 1919, Engineers Australia is constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community.

Engineers Australia is the trusted voice of the profession. We are the global home for engineering professionals renowned as leaders in shaping a sustainable world.

Submission context

Newcastle has a long and proud history as one of NSW's most productive cities.

Coal from Stockton, Cessnock, Tighes Hill and Kurri Kurri, soap from Port Waratah, copper from Merewether, steel from Mayfield, and wine from the Hunter Valley have all employed hundreds of thousands of people in NSW, helped to forge the NSW economy and propelled Australian industries internationally. Throughout the 19th and 20th centuries, Greater Newcastle grew off the back of these primary industries.

The 21st century will bring greater challenges as populations of both NSW and the Hunter grow and we transition from a resource-based economy. New industries in the tertiary sector will dominate the future economy of Australia, NSW and the Hunter.

For policy makers and decision makers, these changes bring the challenges of preparing cities and regions for the future through workforces that are skilled and ready for this knowledge-based economy, and for businesses to connect with suppliers and customers both within and outside of the Hunter, and Greater Newcastle in particular.

As Greater Newcastle expands, it will require long-term infrastructure to ensure it remains a well-functioning city, and connect it to the towns and regions beyond its borders. To secure the long term viability of the Newcastle economy will mean ensuring that the pipelines of these developments should be planned over the longer term rather than in a series of short term cycles which would induce boom/bust cycles and hamper economic productivity and investment.

Achieving the proposed planning outcomes, developing connections and building the infrastructure of the future, will rely on a skilled engineering workforce.

This submission will address three of the proposed Outcomes for Greater Newcastle:

- Outcome 1, Create a workforce skilled and ready for the new economy,
- Outcome 2, Enhance environment, amenity and resilience for quality of life and
- Outcome 4, Improve connections to jobs, services and recreation.

As a key industry stakeholder, Engineers Australia would welcome the opportunity to discuss the information provided in this submission and become part of the proposed Committee for Greater Newcastle.

Outcome 1: Create a workforce skilled and ready for the new economy

The majority of the proposed Plan will see a requirement for a greater number of engineers for the short term projects and over the longer term pipeline of development. It is therefore important that the Government has an understanding of the associated skills development needs of the region. It is an example of the high priority that should be given to inter-departmental cooperation so that cross-portfolio factors can be included in the Plan.

Engineering skills

Engineering underpins virtually every aspect of our modern lives and is embodied in practically every good or service used by Australians. Policy and plans for future economic growth must recognise the role of engineering in the new economy and ensure that there are enough competent practicing engineers to achieve our ambitions.

The draft Plan should recognise the existing engineering expertise in Greater Newcastle, and the advantages this expertise presents in terms of knowledge-based industries.

Against these factors, and the vision put forward in the draft Plan, it should be noted that NSW has seen a decrease in the percentage of engineers employed in engineering specific roles from 58.5 per cent of the national engineering labour force in 2011 down to 55.7 per cent in 2016. That is a decrease of almost 3 percentage points¹ and an indication that engineering work has tapered off in recent years. It is an example of how, if a long and steady pipeline of work is not maintained, skilled workers like engineers will seek employment in other sectors and cease to contribute to the engineering capacity of the region and state.

That can in turn lead to an over-reliance on skilled migration in short periods of high demand. This boom-bust cycle and reliance on skilled migration has been the 'fall-back' position for NSW for many years. With better long term planning and domestic skills development this need not be the case. A more sustainable employment market for Greater Newcastle residents can be created.

Developing the next generation of engineers

The region's engineering capability is about much more than the number of people with engineering qualifications. It requires a focus on educating children with the preparatory subjects required for further studies at TAFE and university, the availability of high-quality accredited tertiary engineering education providers, acquiring the skills and competence for engineering practice that are only available through early-career employment, and retaining experienced and competent engineers through long-term local careers.

No discussion about the engineering capacity pipeline is complete without acknowledgement of the need for greater diversity in the profession, especially with regard to increasing the number of women both educated as engineers and active in the engineering labour market.

¹ ABS Population Census, 2016, statistics extracted using TableBuilder Pro

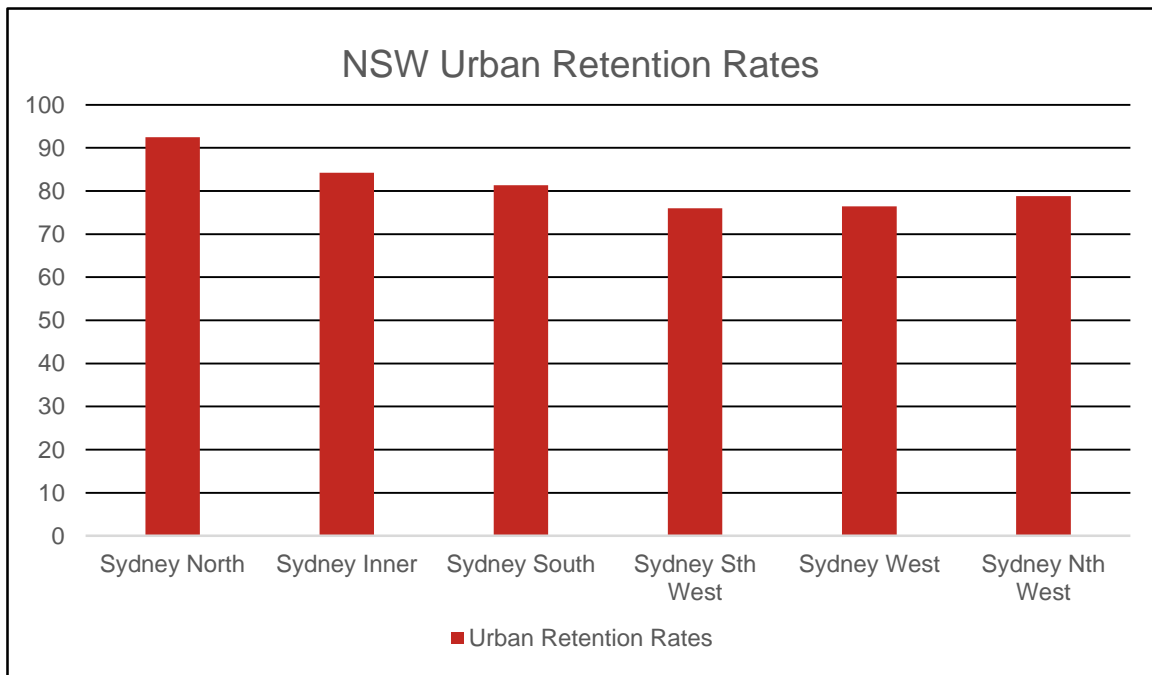
School studies

Australia’s capacity to produce its own engineers begins at school. Unfortunately, building the technical workforce of the future is undermined by entrenched trends in school studies away from vital enabling subjects. Less than 10 per cent of year 12 students study advanced maths, less than 20 per cent study intermediate maths, about 14 per cent study physics and under 18 per cent study chemistry. These figures are serious constraints on Australia’s ability to build its engineering and scientific capacities.²

Engineers Australia is concerned about the development of NSW’s engineering capability and current high school trends in Science, Technology, Engineering and Maths (STEM) subjects. Falling rates of participation in the core subjects of mathematics and physics demonstrate a trend that leads to decreasing numbers of students capable of undertaking engineering courses in NSW universities and TAFEs.

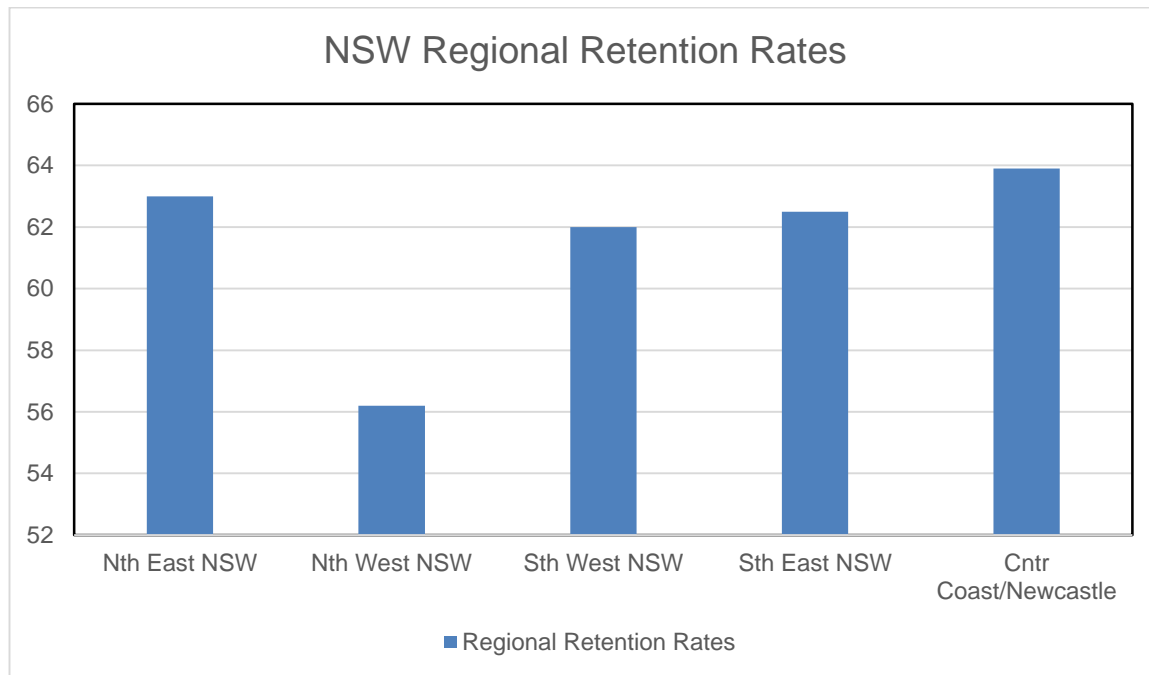
Urban retention rates in NSW for 2016 ran from between 76.4 per cent to 92.5 per cent. Regional retention rates only reached a height of 63.9 per cent in the Central Coast and Newcastle.³ The following two tables illustrate these numbers.

Decision makers need to examine and determine where the long term pipeline of engineers will come from. Given the statistics above in relation to the retention rates of year 12 students in the Newcastle and Central Coast areas, new policy approaches need to be determined to create the local engineering capability that will be required over the long term.



² Engineers Australia, *Engineers Make Things Happen 2017*

³ NSW Department of Education, Centre for Education Statistics and Evaluation, *NSW public school student retention rates by statistical areas*.



The role of TAFE

As alluded to above, the post-school engineering pipeline is not exclusive to the university sector. The Plan should therefore also acknowledge the role played by the vocational education sector in the supply of skilled engineering associates and technologists. Adequate funding for the local vocational education sector will add to the supply of skilled engineers capable of contributing to deliver of the Greater Newcastle Metropolitan Plan.

Outcome 2: Enhance environment, amenity and resilience for quality of life

Moving towards a low carbon economy requires attention to not only new buildings in the built environment but also the existing stock. By 2050 nearly 50 per cent of buildings in Australia will be constructed under improving building and construction codes,⁴ which will provide for improved efficiencies.

However, while new builds may be efficient existing building stock will not meet those standards. Ensuring that existing building stock is working as efficiently as it can will help to improve living quality while also moving towards lower emissions.

Simple measures can be taken to improve existing building stock. This includes measures such as increasing the energy efficiency of mid-tier building stock by incentivising changes through tenants, providing financial incentives to owners for upgrading their existing stock and ensuring that governments provide opportunities within their own stock to improve efficiencies. These are measures currently being undertaken by city councils including Melbourne City Council and Sydney City Council.⁵

Local governments play a pivotal role in assisting in driving amenity of cities. Technology and modern ICT can help to improve the performance of cities. Innovative measures such as the collaboration

⁴ ASBEC, *The bottom line – household impacts of delaying improved energy requirements in the Building Code, 2018*

⁵ ASBEC, *Opportunity knocks. Accelerating energy efficiency for mid-tier buildings, 2018*

between Newcastle City Council and the University of Newcastle in developing smart technologies for Newcastle are examples of how this type of collaboration can improve the amenity of a city while at the same time provide adaptability for future changes.

Current policy positions of local councils and the NSW Government on greenhouse gas emissions reduction are relatively mature. What is required, however, is coordinated action at all levels of government to realise a low carbon economy. This action includes higher standards of development control and incentives to support greener development, delivery of infrastructure to support decentralised energy generation and storage, and skills development and investment in low carbon technologies.

To improve the life cycle performance of buildings lifting the minimum building design standards required by BASIX and supporting changes to the Building Code of Australia, Section J for energy efficiency, would support improved building performance in terms of both resource efficiency and resilience.

Changes to the Building Code of Australia to ensure that design standards are commensurate with the natural hazards likely to be experienced over the life of an asset are fundamental to a growing city such as Newcastle. Currently, the Building Code assumes climatic conditions of the future will be the same as the historical average. Climate science indicates that this will not be the case, with more extreme weather projected to be experienced in Greater Newcastle in the future. This is fundamental to ensuring that the infrastructure that will power the growth of Newcastle is not only fit for purpose during its construction but that it is maintained in such a way as to make it adaptable to any future climatic challenges.

Engineers have significant expertise in the design, construction and maintenance of infrastructure to protect communities from current and future natural hazards.

As the peak body Engineers Australia is well placed to bring together the expertise from all disciplines in engineering to provide guidance to government on issues that could have a dramatic effect on Newcastle's infrastructure. A prime example of how Engineers Australia can contribute to the long term standards in building can be seen in the review of the Australian Rainfall and Runoff, which is used by practitioners throughout Australia, and contributions to the Standards Australia standards development process.

Outcome 4: Improve connections to jobs, services and recreation

Infrastructure principles

As populations grow, improved connectivity will be required if productivity is to be maintained. Engineers Australia advocates driving productivity growth through infrastructure development. Unfortunately, many parts of Australia suffer from an infrastructure deficit and a key contributing factor is that typically infrastructure planning lags land use development. In these circumstances the lack of infrastructure is a drag on productivity. To contribute to productivity growth, infrastructure provision should occur simultaneously with land use development. This infrastructure must be virtual as well as physical, supporting enhanced digital communication as well as active and public transport.

Infrastructure planning and the institutional frameworks in which it occurs are especially

important. For too long these institutions have been fragmented; planning has lagged behind urban and regional land use and has been conducted within poor silos with little community engagement.

Political involvement with technical aspects of infrastructure planning has led to sub-optimal outcomes. Greater use of infrastructure advisory bodies and developing engineering expertise within relevant government departments can help provide more balance to decision-making processes.

Modern infrastructure should not be seen as a cost, rather as a positive investment in the future; connecting businesses and communities increases economic growth and provides for higher living standards for the community.

Modern business models rely on efficient connectivity between in-house business elements and specialist services provided by other enterprises. Connectivity for this purpose involves the application of modern digital communications as well as personal face to face contact. Connectivity is also essential to take an enterprise's products and/or services to market in either a national or international supply chain. Although much has been achieved to improve connectivity between cities, capitals and international destinations, progress has been slow and insufficient to sustain the degree of competitiveness necessary for growing economies.

Connectivity is critical in cities that are being encouraged to grow. When connectivity between locations, whether it is between different locations in a large city or between a regional city and its capital and/or ports, is well developed, it becomes feasible to develop new enterprises and encourage the growth of existing ones.

Infrastructure for Greater Newcastle

To succeed in growing and transitioning Greater Newcastle, integrated land use and infrastructure planning ahead of population growth is essential. Unless this occurs, we will simply repeat the mistakes of the past and not achieve effective decentralisation.

Cities are the economic generators of states because they are the focus of financial, technological and service industries. Greater Newcastle is a recognised Global Gateway for trade and investment, and the largest regional economy in Australia.

Connectivity within Greater Newcastle and beyond is central to achieving the NSW Government's planning vision for the area. Greater Newcastle is fortunate to have a well-developed road network that connects its employment, training, service and recreation centres with its residential populations. These networks, combined with relatively poor public and active transport networks, have led to an over-reliance on private vehicular transport.

Moving people throughout the Greater Newcastle region with a multitude of varying transport modes will need to have co-ordinated approaches and integrated networks. That will rely on engineering capacity and knowledge.

Delivery of infrastructure to support anticipated population growth will be critical. It would be useful if the Department of Planning and Environment worked with the Australian Government and councils across the Hunter to develop an integrated Infrastructure Plan, which identified priority infrastructure to deliver regional outcomes across all three levels of Government.

It is noted that the draft Plan does not address renewal of ageing infrastructure, particularly in Newcastle and Maitland, that will be required within the life of the draft Plan. Many of the underground assets that support urban communities are over 100 years old, with little known of their condition or remaining asset life, nor detailed understanding of the asset renewal standards required to make these assets fit for the next 100 years.

Connectivity also involves physical transport of people for face to face interaction and the transport of products and services to their intended market. In the 2017 federal budget, the Government announced its support for the construction of the Inland Railway. Engineers Australia supports the actions in the draft Plan to protect major freight corridors, and welcomes Australian Government funding to investigate the Fassifern to Hexham freight bypass. We note and agree with the reference in the proposal to construct connecting lines between the Inland Railway and off-line locations such as Newcastle, and suggest inclusion of an additional action to that effect.

Over the past decade, freight railways have been steadily upgraded, contributing to easing freight congestion on main roads and on entry roads into cities. All forecasts see the volume of freight transport increasing exponentially and it is our view that investment in freight transport infrastructure, particularly rail, is not keeping up.

Conclusion

Developing the Greater Newcastle area will require coordinated planning between departments and all levels of government, which will in turn produce complimentary long term plans to develop other aspects of the region. The focus of these plans should revolve around integrated infrastructure planning that connects Greater Newcastle, develops improved connectivity between Newcastle and Sydney, and drives productivity growth.

As the population of the region grows it must be supported with a commensurate expansion of infrastructure, but much of the infrastructure is old and under strain. New infrastructure is needed and engineers can ensure that the new technologies embedded in it can serve the region productively well into the future.

To achieve this means sourcing engineers from through the Australian education system and from skilled migration. However, skilled migration cannot continue to be the dominant source of engineers.

Preserving corridors and precincts will ensure that the pipeline of transport infrastructure that is needed is continuous and not haphazard. Without such forward thinking, we will see more boom and bust cycles that hamper investment and productivity which have negative consequences for stable engineering skills supply.

Developing a stronger cohort of engineers requires attention to the foundation subjects for engineering and stronger retention rates in high schools. Strengthening the offerings in engineering in university and TAFE and providing the employment opportunities after graduation by having long term, well planned developments will help ensure a stable and skilled workforce for the Greater Newcastle region.

Recommendations

Engineers Australia recommends:

- That the NSW Government recognise the role of engineering and engineering education in the development of knowledge-based industries in Greater Newcastle now and in the future.

- That the Department of Planning and Environment work to lift the minimum design standards of buildings to improve environmental performance in the built environment of Newcastle, through adoption of changes to the Building Code of Australia.
- The Department of Planning and Environment develop an integrated infrastructure plan for the Greater Newcastle region by working with both local governments throughout the Hunter region and with the federal Government.
- That the NSW Government assist councils in Greater Newcastle to assess and prioritise renewal of infrastructure (particularly drains) to support planned urban renewal targets and future climatic conditions.
- The NSW Government investigate the expansion of the light rail to the Newcastle airport, Callaghan campus of the University of Newcastle, John Hunter Hospital and Glendale.
- The NSW Government investigate opportunities to connect the Hunter rail line with the planned Inland Rail.

Contact details

To discuss this submission further please contact the Engineers Australia manager for the Newcastle region, Helen Link, on (02) 4911 7318 or Hlink@engineersaustralia.org.au.



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