



## BACKGROUND PAPER 8: Infrastructure

### *What was said during Time to Talk Canberra 2030*

Canberrans showed a clear understanding of the planning challenges facing the community during the 2010 Time to Talk Canberra 2030 community engagement. They identified key challenges around:

- future infrastructure and planning to deal with population growth
- improvements to roads and traffic flow
- maintaining the city's environment.<sup>1</sup>

### *Definition of issue*

Infrastructure comprises the basic physical, social and green structures and facilities that are fundamental to supporting our way of life.

In relation to a planning strategy, infrastructure is defined as:

'The basic facilities, services and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices and prisons.'<sup>2</sup>

However, this definition does not recognise the emerging concept of green infrastructure, which is defined by the US Environmental Protection Agency as 'An adaptable term used to describe an array of products, technologies, and practices that use natural systems – or engineered systems that mimic natural processes – to enhance overall environmental quality and provide utility services.'<sup>3</sup>

Social infrastructure refers to the community facilities, services and networks that help individuals, families, groups and communities meet their social needs, maximise their potential for development and enhance community wellbeing.<sup>4</sup> Social infrastructure would include both public and privately provided facilities and services, for example swimming pools, childcare centres and churches.

### *Role of strategic land use planning*

In terms of strategic land use planning, we need a more integrated way of thinking about infrastructure. Integrating physical, social and green infrastructure suggests we should change how we conceptualise, design, finance, deliver and evaluate infrastructure. This has important ramifications for a planning strategy.

At its simplest, planning needs to allow space for infrastructure implementation. However, urban form decisions can affect the viability or feasibility of infrastructure, for example allowing enough space for separated bike lanes. Conversely, infrastructure decisions can affect the viability and desirability of certain land uses and the ability for change. For example, alternative power sources are less viable in lower density areas, and are also affected by regulatory frameworks.

To meet the objectives from Canberra 2030, strategic and statutory planning needs to:

- be founded on a firm understanding of demographic change in the region, in Canberra and within districts and suburbs, and its implications for infrastructure needs
- contribute to a lowering of natural resource use
- provide Canberra's housing with innovative and well integrated infrastructure systems
- co-locate and integrate social, physical and green infrastructure with active travel (such as walking and cycling) and public transport
- showcase well integrated social, physical and green infrastructure in strategic locations such as town centres
- address cross border infrastructure provision creatively and collaboratively.

### *What issues does the ACT Planning Strategy need to consider?*

The ACT Government Infrastructure Plan 2011-2021 comprises a broad program of work to ensure Canberra is globally competitive, productive, sustainable, socially inclusive and well placed to respond to growth and meet future challenges.<sup>5</sup> The plan identifies infrastructure demand will be driven by the following issues over the next ten years:

- changing demographic profile of the ACT
- geographic location of services





- role of the ACT in a growing region
- capacity to maintain vital infrastructure as it ages
- economic structure and strategy adopted by the Territory in relation to capital investment
- effects of climate change.<sup>6</sup>

### Planning for social infrastructure

Social infrastructure planning considers many uses, including education and schools, health, community, aged care, child care, cultural, arts, libraries, religious, correctional, emergency and recreational facilities and services. These facilities and services are both publicly and privately provided.

Planning for social infrastructure needs to have an understanding of the likely future demand, the location and the capacity of existing facilities, and the future requirements for facilities. This ensures the present and future population has adequate access to the necessary range of community facilities and services.

The changing age structure and demand for facilities and services could trigger a review of the use of existing sites and the most appropriate levels of infrastructure. A current concern is the availability of land for social infrastructure, with recent trends suggesting demand for land for community facilities may be outstripping supply. This situation is exacerbated by the potential under-utilisation of land by some existing community facility sites.

More integrated models for providing new facilities will need to be investigated, particularly in emerging areas such as Molonglo Valley. A coordinated approach to the delivery of social infrastructure, particularly by key ACT Government agencies, will facilitate more integrated infrastructure and enable innovation and co-location.

A feature of Canberra's urban area is the amount of open space. Playgrounds and playing fields are close to homes. Planning will ensure adequate open space for community needs in newly developing areas. Providing this level of open space incurs considerable maintenance costs, so some review could be warranted. Such a review could identify some spaces that could be upgraded to facilitate more intensive use, while others could be considered for other uses.

### Ageing population

Planning needs to recognise that the ACT has one of the fastest growing populations of people aged 65 years and over in Australia. It is expected this segment of the population will grow from 15.8% in 2010 to 19.6% in 2020 and 22% in 2030.<sup>7</sup>

The general ageing of the population has widespread implications for the design of infrastructure. The United Nations has identified increasing numbers of people experiencing mobility problems as a key challenge for cities.<sup>8</sup> Addressing this challenge also forms part of the ACT's commitment to the World Health Organisation Age-friendly Cities Network.

ACT Government planning of new suburbs and urban renewal focuses on neighbourhoods that invite growing up and ageing in place – a range of housing types, walkable neighbourhoods with easy access to services and infrastructure, and community spaces that enhance access, inclusion and participation. Importantly, a liveable community places the highest priority on the principles of access, equity and participation.<sup>9</sup>

### Current physical infrastructure

Since 2005 Engineers Australia has been conducting assessments of physical infrastructure including road, rail, potable water, waste and stormwater, electricity, gas and communications. Table 1 summarises the results and compares them to previous years and national benchmarks.

**Table 1: ACT infrastructure report card**

	ACT 2010	ACT 2005	National 2006	National 2001
Roads	B	B	C	Not rated
Rail	F	Not rated	C-	D-
Airports	B-	B	B	B
Potable water	B-	C	B-	C
Wastewater	C+	C	B-	C
Stormwater	C+	C	C-	D
Electricity	B+	B	C+	B-
Gas	A-	A-	C+	C
Telecommunications	B-	Not rated	Not rated	B

Source: Australian Capital Territory Infrastructure Report Card, 2010. Available from [www.engineersaustralia.org.au/irc](http://www.engineersaustralia.org.au/irc)

Gas infrastructure is rated the best, primarily because it is newer. The report noted that even with improvements, overall wastewater performance has declined. Future investment in infrastructure, both physical and social, will be guided by these ongoing annual audits. Future audits must take into consideration threats posed by climate change.

### Climate change

Infrastructure reflects the values, assumptions and available technology of the era in which it was built. In Canberra, the conversion of the first power station at Kingston to an arts facility is indicative of these kinds of changes. The power station's location was determined by the need to access cooling water for the boilers, and its work was partially supplanted by hydro-electric power from Burrinjuck Dam from 1929.<sup>10</sup> Whereas Canberra was once self-sufficient in power supply, it is now almost entirely dependent on infrastructure outside its jurisdiction.



Almost all Canberra's key physical infrastructure was designed and built before climate change became an issue. While it reflected the best practices of the time, and met community needs and aspirations, much infrastructure has not been designed for the expected hotter, drier and possibly stormier climate. Consideration of climate change will play a key role in the provision of future infrastructure.

Some adaptation to existing infrastructure has begun. For example, the augmentation of the Cotter Dam to store more water responded to the prolonged drought. Its success will depend on future changes in rainfall patterns and in evaporation rates in the catchment.

The principle of sustainability underpins social infrastructure planning; that is, meeting the needs of the present without compromising the ability of future generations to meet their needs. For example, green infrastructure takes our urban planning and management beyond resource use to encompass the restoration and regeneration of Canberra's natural and community assets.<sup>11</sup>

### *Natural disasters*

Natural disasters are a significant threat to infrastructure. Queensland's recent floods and cyclone is a testament to the vulnerability of infrastructure to the forces of nature. Globally, similar disasters, for example the blizzard that struck North America on 5-6 February 2010, have caused buildings to collapse, power supplies to be disrupted and most public transport to be cancelled.

Climate change science predicts the frequency of extreme weather conditions will increase.<sup>12</sup> Such changes have implications for Canberra, with the most likely issues being increased risks of heatwave, storm events, flash flooding and bushfire.<sup>13</sup> New infrastructure will need to cope with a range of different climatic conditions and extreme weather events.<sup>14</sup> Longer, hotter summers are likely to increase air conditioning use, increasing demand on the electricity grid and prompting a greater emphasis on thermally efficient buildings. Increased intensity of storm events will place pressure on the stormwater network.

### *Infrastructure for redevelopment areas*

From a strategic planning perspective, the relationship between urban redevelopment and infrastructure is complex. Infrastructure capacity assessments are a routine part of planning processes, and guide decision makers on the relative costs. On one hand, low density development can be inefficient and expensive to service with infrastructure. On the other hand, increasing densities in the inner city can place pressure on infrastructure.

Water, sewer, gas and electricity infrastructure not originally constructed for additional density will need to be upgraded in many areas. For example, as the inner city grows, rainwater runoff will increase if care is not taken to maximise the amount of pervious surfaces. This runoff will place pressure on stormwater infrastructure.

However, higher density can make some forms of newer and more sustainable infrastructure more feasible. Recent research for Canberra suggests that intensification of town and group centres offers the greatest opportunity for lowering consumption of energy and water through the supply of new and more efficient infrastructure.<sup>15</sup> This study was based on an assumed two degree average rise in temperature by approximately 2050 using 2010 energy and water consumption as a benchmark. It assumed high density mid-rise development (of apartments between three and six storeys with an average of four storeys, with a high proportion of two and three storey townhouse and row houses mixed in) which is widely considered to be the most efficient.<sup>16</sup> Overseas examples of district scale power generation are an example. While such responses are technically feasible in Canberra, a major barrier to their economic viability is the national regulations which allow consumers a choice of supplier. Consumers in Canberra would not therefore be compelled to choose a local district scale supplier, and this would impact viability.

Costs of supplying community and social infrastructure are escalating. In particular, the proportion of the budget allocated to health care will escalate in line with population ageing.

### *Jurisdictional boundaries – regional infrastructure*

Canberra's role as a regional centre for health, education, employment and business is shaping a longer-term regional approach to the planning of infrastructure and service delivery.<sup>17</sup>

Jurisdictional boundaries act as a barrier to efficient infrastructure implementation. The Australian Capital Territory Infrastructure Report Card for 2010 noted that 'integration between the ACT and the Australian Government, and between the ACT and the Queanbeyan region needs considerable improvement'.

### *Integrated approach to infrastructure provision*

An holistic approach to infrastructure is beneficial. This could include green infrastructure and the role it plays in maintaining ecosystem functioning and diversity. Choosing among alternative green infrastructure options can be difficult. For example, roofs can be designed to be a water catching device ('blue roof'), a heat mitigating roof ('white roof'), an energy generating roof ('solar roof') or a habitat roof ('green roof').<sup>18</sup> Each of these has economic and environmental costs and benefits, and must be determined on a case by case basis.

More broadly, the ACT Government Infrastructure Plan 2011-2021 speaks of taking a holistic view of infrastructure prioritisation, but does not currently go into detail about what this means. The plan is only in its second year, and has been a valuable first step along the path of approaching infrastructure provision in a systematic and holistic manner.



## Things to think about

To ensure Canberra remains a liveable, vibrant and inclusive city that is responsive to community needs, the improved co-ordination and planning of infrastructure and services (through the ACT Infrastructure Plan and Strategic Asset Management Plans) will meet the diverse needs of Canberrans and maximise the liveability and sustainability of our city<sup>19</sup>

- investing in community infrastructure that promotes connection and allows for diverse activities; for example, new regional community centres are providing long term tenancies for over 40 community organisations across Canberra and new neighbourhood halls are providing meeting and recreational space for the benefit of local communities
- more flexible use of schools, libraries and civic places through co-location and provision of common facilities for art, sport, recreation and gardening, bringing together communities of interest and everyday social interaction
- supporting collaborations between industry, employers and education stakeholders to drive initiatives and research, building the knowledge capital of the Territory and promoting the economic development of the region
- creating sustainably designed and built libraries and schools that provide 21st century learning and teaching environments and ensuring these sites are genuine community use facilities, in some cases incorporating child and family services, creative and performing arts facilities and sporting and recreational facilities
- Ensure that hard infrastructure, such as roads and water distribution networks, are fit for purpose, are constructed to minimise their resource impacts, and are designed to take into consideration the future impacts of climate change. This could include considerations of energy efficiency, water efficiency, materials sourced for construction, lifetime operating costs, capacity to expand, or being able to perform multiple purposes
- concept of green infrastructure in planning and development decision making in order to enhance urban ecosystem functionality, to improve landscape connectivity and contribute to social amenity through improved landscape quality.

## Further reading

- Engineers Australia, Infrastructure Report Card, 2010.  
[www.engineersaustralia.org.au/irc](http://www.engineersaustralia.org.au/irc)
- ACT Infrastructure Plan  
<http://www.cmd.act.gov.au/policystrategic/infrastructure>
- Infrastructure Australia has a number of publications/ links including...  
<http://infrastructure.gov.au/infrastructure/mcu/soac.aspx>  
[www.nationbuildingprogram.gov.au/funding/projects/index.aspx](http://www.nationbuildingprogram.gov.au/funding/projects/index.aspx)
- Other States have their plans including...  
[www.treasury.nsw.gov.au/sis/state\\_infrastructure\\_strategy](http://www.treasury.nsw.gov.au/sis/state_infrastructure_strategy)  
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- Australian Institute of Landscape Architects (AILA), Adapting to Climate Change: Green Infrastructure Position Paper,  
<http://www.aila.org.au/greeninfrastructure/default.htm>
- Foster, Josh, Lowe, Ashley and Winkelman, Steve, The Value of Green Infrastructure for Urban Climate Adaptation, Centre for Clean Air Policy, Feb 2011.  
[www.ccap.org](http://www.ccap.org)
- Hallegatte, Ste' phane (2008) 'Strategies to adapt to an uncertain climate change'. Global Environmental Change 19 (2009) 240–247.  
[www.elsevier.com/locate/gloenvcha](http://www.elsevier.com/locate/gloenvcha)
- ## Endnotes
- 1 Time to Talk Outcomes Report p40 – Random Telephone survey
  - 2 <http://www.thefreedictionary.com/infrastructure> accessed 25 July, 2011
  - 3 <http://cfpub.epa.gov/npdes/greeninfrastructure/information.cfm>  
US Environmental Protection Agency
  - 4 Healthy Spaces and Places: A national guide to designing places for healthy living [www.healthyplaces.org.au/site/glossary.php](http://www.healthyplaces.org.au/site/glossary.php) accessed 29 August 2011.
  - 5 ACT Government Infrastructure Plan 2011-2021 p5
  - 6 ACT Government Infrastructure Plan 2011-2021
  - 7 Strategic Plan for Positive Ageing 2010-14 – Towards an Age Friendly City
  - 8 World Health Organisation, Age Friendly Cities Checklist.
  - 9 ACT Social Plan 2011 p18
  - 10 [http://www.engineer.org.au/kingston\\_power\\_station.html](http://www.engineer.org.au/kingston_power_station.html)  
accessed 26 July 2011.
  - 11 ACT Social Plan 2011 [www.cmd.act.gov.au](http://www.cmd.act.gov.au) accessed 30 August 2011 p19
  - 12 <http://www.un.org/wcm/content/site/climatechange/pages/gateway/the-science/consequences-for-the-future>
  - 13 AECOM, Human settlement vulnerability and adaptive capacity assessment: Spatial Plan evaluation, report for the ACT Planning and Land Authority, Canberra, 2010. CSIRO, Climate futures for Canberra, a consultancy report for AECOM, June 2010.
  - 14 Hallegatte 2008, p.1
  - 15 SGS Economics and Planning,
  - 16 Jago Dodson, In the Wrong Place at the Wrong Time? Assessing some Planning, Transport and Housing Market Limits to Urban Consolidation Policies', Urban Policy and Research, 28: 4,2010, 487 – 504
  - 17 ACT Social Plan 2011 [www.cmd.act.gov.au](http://www.cmd.act.gov.au) accessed 30 August 2011 p12
  - 18 Foster, Josh, Lowe, Ashley and Winkelman, Steve, The Value of Green Infrastructure for Urban Climate Adaptation, Centre for Clean Air Policy, Feb 2011, p5-13.
  - 19 ACT Social Plan, 2011, p18.