



ACT INFRASTRUCTURE

**FIVE-YEARLY REPORT TO THE COUNCIL OF
AUSTRALIAN GOVERNMENTS (COAG)**

ACT Chief Minister's Department

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1. INTRODUCTION

1.1. Background

The ACT occupies a unique position as the site of the National Capital, the Seat of Government and a major regional city. Being the national capital has a major influence on how the city operates, and on the local economy, particularly in terms of property and infrastructure investment.

Since self-government, responsibility for the planning of the ACT has been shared between the Commonwealth and the ACT Governments. The Commonwealth's interest relates to those functions of significance to Canberra as the national capital. The Territory's Government's responsibilities relate to Canberra as a growing metropolitan city and its Territory hinterland.

1.2. ACT Population

1.2.2. Population Growth

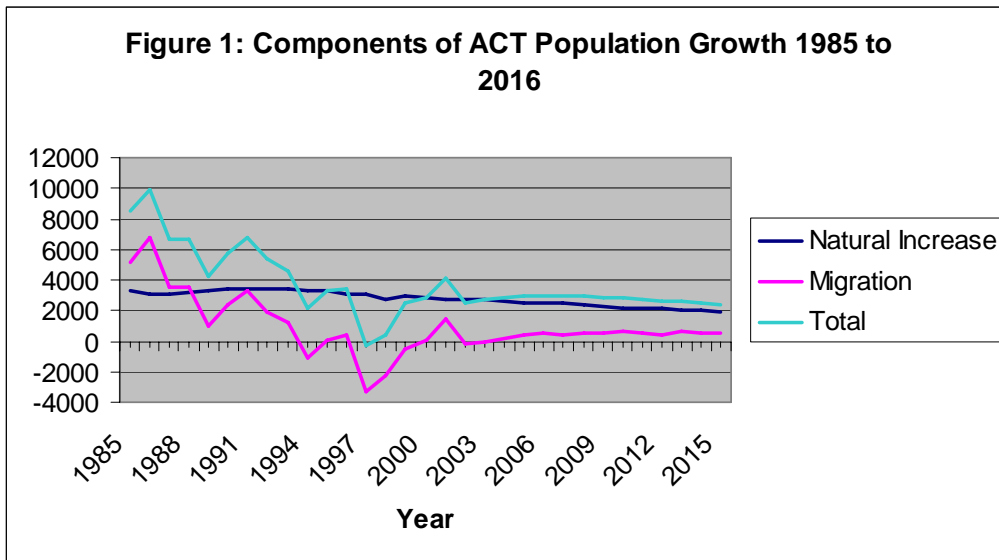
The rate of growth in the ACT's population is forecast to strengthen to $\frac{3}{4}$ of one per cent in 2006-07, a growth rate considerably higher than the growth rates recorded in recent years. This will translate into a $\frac{1}{2}$ of one per cent increase in the size of the ACT's labour market.

Since 2004, the ACT has experienced an upwards trend in net interstate migration, reversing an earlier trend in which outflows had offset natural increases (births less deaths). Net interstate migration is expected to improve, resulting in higher population growth overall.

1.2.3. Population Parameters

The population of the ACT at March 2006 was estimated by the ABS to be 328,146. The ACT is anticipated to experience low to moderate growth over the next decade. The ABS Series B (medium) projection indicates a 2016 Territory population of 353,000, while the ACT Population Projections (CMD, 2003) indicate a June 2016 population of 360,000.

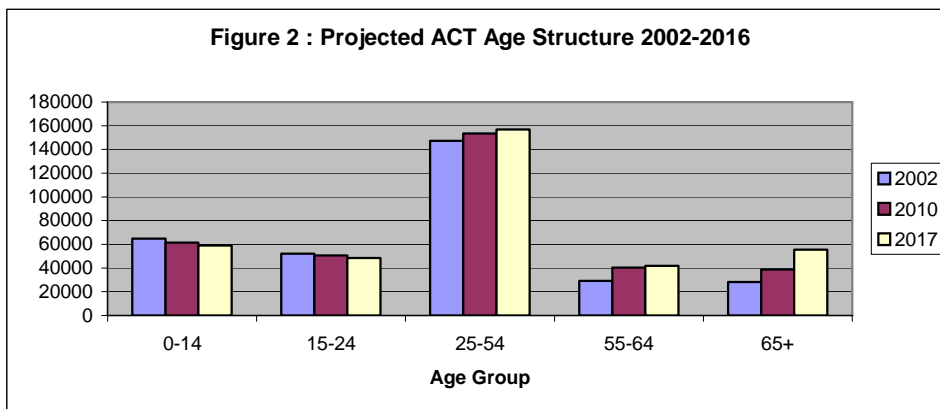
Under the CMD projection the growth between 2005 and 2016 is projected to be 2,650 per year with net migration in the order 500 per year. **Figure 1** shows various components of ACT population growth, from 1985 to 2016.



Source: ABS and CMD: ACT Population and Labour Force Projections 2002 to 2032 and Beyond.

1.2.4. Age Structure

As identified in **Figure 2**, between 2002 and 2016 the number of people aged under 15 years is projected to fall from 64,900 to 59,300 and the number aged between 15 and 24 years is projected to fall by 3,100 to 49,000. It is projected that the number aged between 55 and 64 years will increase from 29,200 to 41,500 and that people aged 65 years and over will increase from 28,200 to 53200.



Source: CMD: ACT Population and Labour Force Projections 2002 to 2032 and Beyond.

1.2.5. Population Distribution

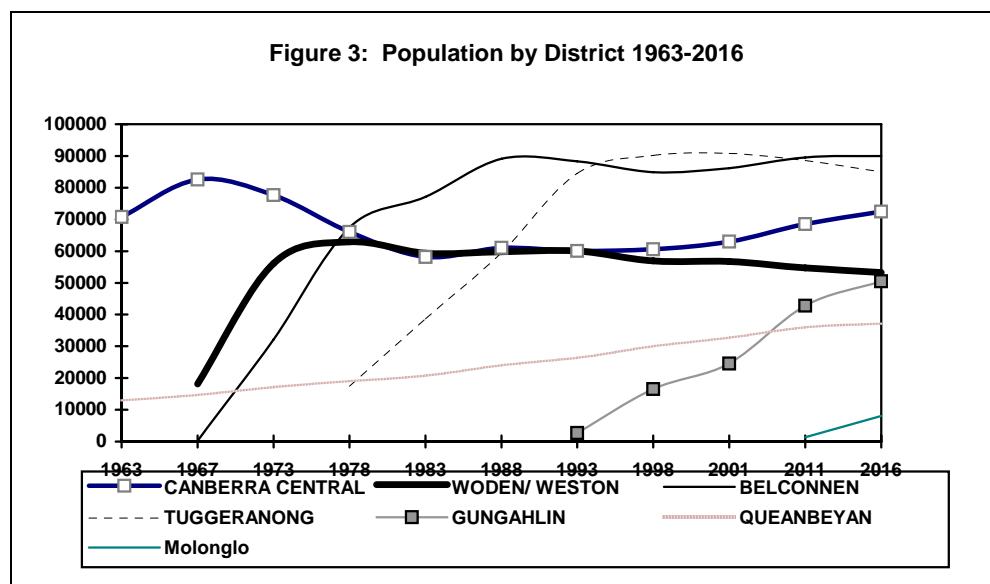
The demographic characteristics of each of the towns are related to when and how quickly they were initially settled. **Figure 3** outlines the population trends by District.

The main development areas over the next decade will be Gungahlin and Molonglo. The population of Gungahlin is projected to grow from 32,000 in

2004 to 50,500 by 2016. The population of Molonglo, where settlement is anticipated to commence in 2009, is estimated to reach 8,000 by 2014.

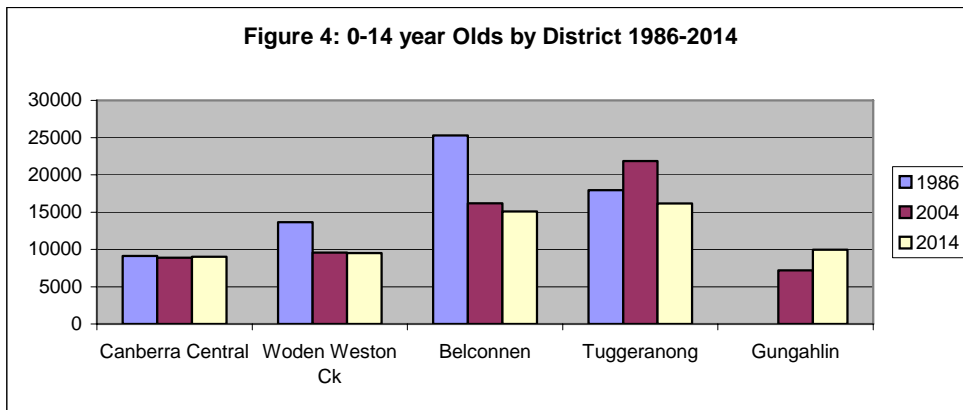
The rapid settlement of areas such as Woden-Weston Creek, south Belconnen and north Tuggeranong in the 1960s and 1970s, predominantly by households in child bearing ages, led to successive peaking in the demands for age related services and facilities such as schools and playing fields. The substantial decline in population in these areas since then reflects the concentration of households with similar demographic characteristics.

The peak populations reached following the initial settlement of the suburbs are extremely unlikely to be reached again as a result of lower fertility and the different demographic profile of people moving into suburbs. The "re-generation" taking place will not result in the same level of utilisation of facilities that had occurred when the suburbs had first been settled.



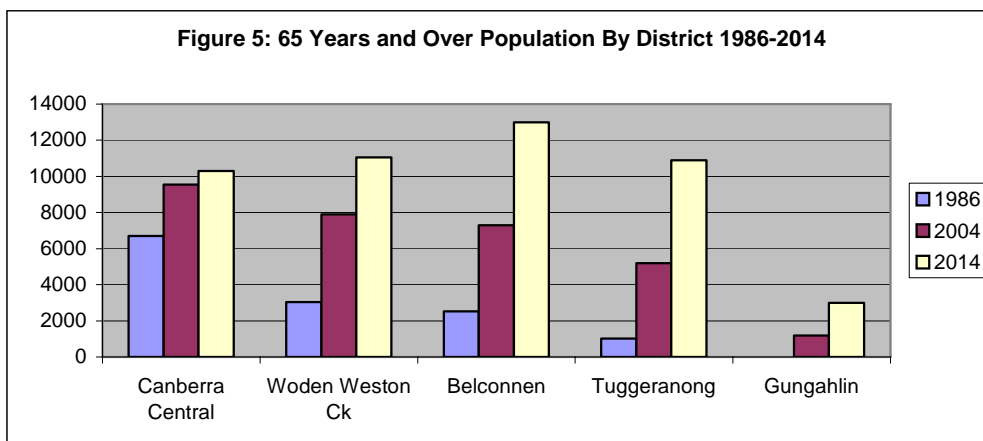
Source: ABS, CMD, ACTPLA

Figure 4 indicates the trend in 0-14 year olds by District from 1986 and projected to 2014. The most notable feature is the decline in 0 to 14 year old population in Belconnen, a decline that will be replicated in Tuggeranong as that district ages. It also shows that in newly developing areas, such as Tuggeranong in 1986 and now in Gungahlin there is an increasing number of 0 to 14 year olds for which the provision of facilities is required. In all of the established towns there is an overall decline in the 0 to 14 year old population by 2014, with the decline most marked in Tuggeranong.



Source: ABS (Various Census Data) and CMD ACT Population and Labour force Projections 2002 to 2032 and Beyond.

The ageing of the population will also create demands for aged related facilities. All districts will have an increase in the 65 years and over population with the increase most marked in Tuggeranong and Belconnen (see **Figure 5**). In Belconnen the 65 years and over population is forecast to increase from 7,300 to 13,000 between 2004 and 2014, while in Tuggeranong the 65 years and over population increases by 5,700 to 10,900.



Source: ABS (Various Census Data) and CMD (2004).

1.3. The ACT Economy

1.3.1. Unique Features

Australian Government spending plays a central role in the ACT economy with over a third of the ACT's workforce employed by the Commonwealth Government. The private sector is generally involved in servicing Australian and ACT Government employees and their departments. Unlike other Australian jurisdictions, the ACT exports virtually no goods, and instead exports (largely government) services.

The ACT is governed as a city-state, with the ACT Government responsible for all jurisdictional functions of both a local and state government.

The ACT is landlocked, relying largely on highway connections and the Canberra International Airport for transportation, with some limited railway usage. All land in the ACT is leased according to current ACT Government policy. Such policies apply to virtual perpetual leases in urban residential areas to short term leases in rural areas. The Commonwealth Government plays a significant role in ACT planning.

1.3.2. Economic Outlook

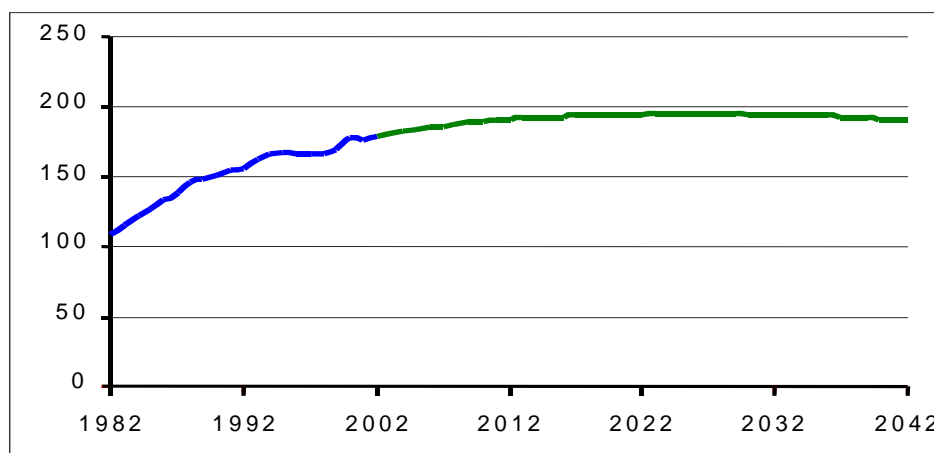
The ACT economy continues to be supported by strong employment, strong business profitability and sustained wages growth. However, growth is currently constrained by the limited availability of labour. Labour constraints are more prevalent in the ACT than elsewhere in Australia, and therefore while economic growth in the ACT is expected to remain strong, growth expected to remain below the national average. The strength of the national economy has made it more difficult for the ACT to attract labour from other states. Unlike some other states, the ACT is also not benefiting from the recent very large increase in the export price of minerals, particularly for coal and iron ore, and subsequent increases in export volumes.

One of the main limiters of economic growth in the ACT concerns constraints on supply labour. **Figure 6** below shows forecasts and projections for the ACT labour force.

1.3.3. Labour Force Projections

The ACT Population and Labour Force Projections 2002 to 2032 and Beyond (CMD 2003) shows that between 2002 and 2014 the labour force of the ACT will increase by 13,100. Between 2014 and 2024 the labour force is projected to increase by only 2700 as a result of lower population growth and an increasing proportion of older people in the labour force.

Figure 6: Labour Force



Source: CMD: ACT Population and Labour Force Projections 2002 to 2032 and Beyond.

The projected level of increase is substantially less than has been experienced in the last 50 years. The national labour force is also forecast to grow at a slower rate than has occurred in recent decades. There will be increased competition between locations to attract skilled workers. Policies that encourage older people to remain in the workforce can be expected to alleviate some shortages but this is unlikely to meet the potential labour shortfalls.

1.3.3. Employment

Canberra's employment growth has been underpinned by the expansion of the Commonwealth Government. Commonwealth activity has had multiplier effects in other sectors including retailing, community services, finance and business and construction sectors.

Between June 1990 and June 2005 ACT employment grew by 36,200 to 180,200. It is estimated that there was a net daily inflow to Canberra from the region (including Queanbeyan) of 10,500 workers.

The Economic White Paper (2003) outlined an economic and industry policy framework to achieve sustainable growth and development in the Territory. Included in the strategy was the development of industry networks and clusters including information and technology, space sciences, biotechnology, public administration, the environment, creative industries, sports science and administration, education and defence.

1.4. Planning and Land Management in the ACT

Planning and Land Management in the ACT is governed by the *Australian Capital Territory (Planning and Land Management) Act 1988* (the ACTPLM Act), which provides for Canberra as the National Capital and the ACT's *Land (Planning and Environment) Act 1991*.

The ACTPLM Act establishes the National Capital Authority (NCA) as a Commonwealth Government agency to prepare and administer a National Capital Plan (NCP). The NCP is binding on both the Commonwealth and the ACT.

1.4.1. ACT Government Planning Strategies

The Canberra Plan and its three component plans, the Canberra Spatial Plan, the Economic White Paper and the Canberra Social Plan, identify the strategic directions for the growth of the ACT. These plans address the need for a more equitable and sustainable city, to be achieved through encouraging the development of a more compact city form; focusing development in City and the town centers; providing housing choice; promoting housing affordability; and responding to the housing needs of an ageing population.

Government infrastructure is provided through the capital works program, with the level of infrastructure required being determined by the expected demographic and economic parameters, and considerations of where growth is occurring. Infrastructure costs are a major consideration in decisions of where growth should be encouraged and directed. The provision of

infrastructure frequently has lead times of several years. Infrastructure is required to facilitate the release of land, is generated by demand in newly developing areas or required to upgrade/refurbish ageing infrastructure in established areas.

1.4.2. The National Capital Plan (NCP)

The National Capital Plan (NCP) provides a framework that sets out principles and policies affecting land use within the Territory. In 'Designated Areas' and in areas affected by special requirements the NCP is quite specific in its requirements. Development proposals in Designated Areas are entirely administered by the NCA. Designated Areas include the Parliamentary Triangle; Lake Burley Griffin and foreshores; the Canberra Airport; the main avenues and approach routes from the ACT border to the central national area; and the inner hills and ridges. Approximately 12% of the total urban area of the ACT is deemed a Designated Area, including 38% of Central Canberra. All of this area lies within the urban area of the ACT and has implications for costs due to the increased dispersion of the urban area.

Major national capital influences include the capital costs imposed as a result of siting and building requirements of the NCP and additional requirements in relation to infrastructure provisions including stipulations by the NCA in respect of road works in and around National Land and Designated Areas.

1.5. Key Issues

1.5.1. Skills Shortages

Skill shortages have been reported across a number of sectors in the ACT including construction trades, motor vehicle trades, accounting, childcare, and government administration. The skills shortages currently being experienced in the ACT reflect both short-term and long-term influences.

1.5.2. Short-term influences

To a large extent, the current skill shortages reflect the current strength of the economy. The Australian economy is currently experiencing its longest expansion on record (15 years). The demand for labour associated with such a lengthy economic expansion has reduced the national trend unemployment rate to 4.8 %, its lowest level in 30 years. The ACT's trend unemployment rate (2.7 %) is the lowest ever recorded by any State or Territory.

National demand for labour has not only lowered unemployment rates across the country, it is also creating increased national competition for labour. Consequently, some workers who would have been employed in the ACT have been attracted by job opportunities interstate, contributing to a lack of appropriately skilled labour in the ACT. Also, the cost of living in some other states is more competitively placed than the ACT, partly hindering the ability to attract labour.

The ACT's labour force is highly mobile and therefore sensitive to cyclical influences. In the year to 30 June 2005, the ACT's gross interstate migration flows were equivalent to 11.4 per cent of the ACT's population, second behind

the Northern Territory (15.9 per cent). By comparison, the national average for gross migration flow as a proportion of population was 1.8 %.

1.5.3. Long-term influences

Skills shortages in the ACT also reflect long-term structural demographic factors. In particular, as the population ages, workforce participation is expected to fall. In 1971, 4.4 % of the ACT's population was aged 65 years and over. By 2001, this proportion had risen to 13.3 % and, using medium growth ABS projections, 22.8 % of the ACT's population will be aged 65 years and over by 2051. The ACT's labour force is currently projected to peak in 2026, and gradually decline thereafter. Therefore, the ACT's labour supply is constrained by movements of the population into retirement.

However, there are signs that ACT labour force participation amongst some older age cohorts is increasing. For example, the labour force participation rate for ACT males aged 60 to 64 years rose from 51.5 % in August 2004 to 62.4 % in August 2006, its highest level since August 1982. There has been a significant upward shift in labour force participation by ACT females aged 60 to 64, with the participation rate rising from 27.4 % in June 2002 to 40.4 % in August 2006, the highest rate on record.

The increase in the participation rate amongst older age groups reflects two factors. The cohorts of people moving through into older age groups have higher levels of education and stronger attachments to the labour force than previous generations. This means that the current generation of older aged persons are more inclined to participate in the labour market than previous generations. The second factor is that the prolonged period of high employment growth and low unemployment means that older workers are less inclined to leave the labour force than they have been in the past.

Table 1: Economic Forecasts, Year-average percentage change

	Actual		Forecast	Projections		
	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
ACT						
State Final Demand	3.2	4.9	3¾	4	4¾	4¾
Employment Growth	1.7	1.6	1¼	1½	1½	1½
Population	0.3	n.a.	1	1¼	¾	¾
Consumer Price Index	2.3	3.6	3½	2¾	2½	2½
Memorandum item^(c)						
ACT Gross State Product	3	n.a.	2½	2½	2½	2½

Source: ACT 2006-07 Budget Mid-Year Review

Notes

- (a) Forecasts and projections are rounded to a ¼ of a percentage point to reflect the relative level of accuracy used in forecasting economic parameters. This is standard forecasting practice used by governments throughout Australia.
- (b) Projections are based on long-run averages and are provided for planning purposes only. They do not reflect an expectation (forecast) of actual outcomes.
- (c) The measure of production in the ACT economy, Gross State Product (GSP), is presented as a memorandum item, consistent with advice from the Australian Bureau of Statistics (ABS) that users should exercise caution when using estimates of real growth in the GSP measure for economic analysis, and consistent with the ABS labelling the real estimates of GSP as 'experimental'. The ABS estimates of real growth in GSP are derived indirectly. The method involves deriving a price deflator from the best possible nominal and real estimates of expenditure (SFD) that encompass as much as possible of GSP. This deflator is then applied to current price income estimates of GSP. Given these measurement issues, the ABS is currently developing estimates of GSP using the production approach. The ABS believes that better quality real estimates of GSP can be produced using this approach. Experimental estimates using the new approach are expected to be released during 2006.

Source: 2006-07 Budget Paper No.3.

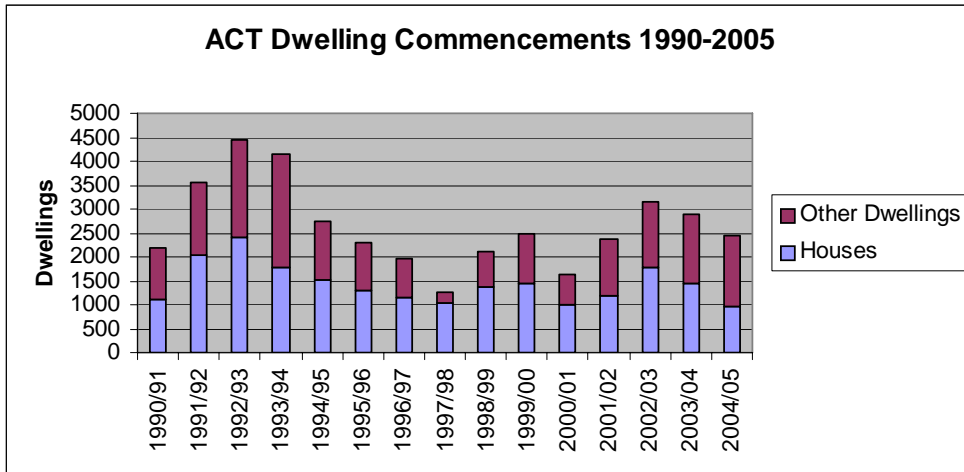
1.5.4. Infrastructure Demand – Key Drivers

Future demand for infrastructure will hinge on population growth, housing composition, housing density, and household incomes. Current investment in new infrastructure is required in newly developing suburbs in Canberra's north, where Greenfield sites are being rolled out.

1.5.5. Residential Settlement

The ACT Population Projections suggest an underlying demand over the next decade for 1800-1900 new dwellings per year in the ACT. The underlying demand in Canberra/Queanbeyan is estimated to be 2000 dwellings a year. **Figure 7** below shows dwelling unit commencements over a fifteen year timeframe.

Figure 7: Dwelling Commencements 1990-91 to 2004/05



Source: ABS, 2003. *Dwelling Unit Commencements, Australia*, Cat No. 8750.0

The expansion of the Commonwealth employment associated with the initiatives in the 2006 Federal Budget, is likely to increase demand in the short term for housing in the ACT. Some 11,000 – 14,000 dwellings could be

demanded over the next five years of which some 60% could be in Greenfield areas.

Within the ACT, Greenfield releases over the next decade are likely to primarily occur in Gungahlin and Molonglo, the latter being subject to the outcome of environmental and planning studies and amendment to the National Capital Plan and Variation to Territory Plan. It is possible that over the decade substantial supply could become available in regional NSW, which could result in a proportion of Greenfield demand being accommodated in surrounding regional NSW. Some possible areas for expansion are inconsistent with the principles and directions in the Spatial Plan, which argues strongly for a more compact settlement structure, and one that is more socially, environmentally and economically sustainable. Residents in such areas would predominately be working in the ACT, and as result, the developments will generate greater travel (and associated greater energy use and greenhouse emissions) than if the growth were accommodated in areas in the ACT such as Gungahlin and Molonglo.

Consistent with strategies in the Spatial Plan, the Canberra Central Initiative, the Economic White Paper and the NCA's Griffin Legacy Plan, urban consolidation priorities for government land over the next decade are the City, the town centres and at Kingston Foreshore. Further urban consolidation opportunities in the medium term exist along Constitution Avenue, at East Lake and along Canberra Avenue. Opportunities for privately initiated redevelopment opportunities are predominately available along the Northbourne Avenue Corridor and in the core areas surrounding commercial centres identified in the Territory Plan.

1.5.6. National Capital Influences on Development

The unconstrained commercial development at the development at the Canberra International Airport (which lies outside the planning controls of the ACT Government) could result in increased road infrastructure costs, to enable the integration of the Airport with the rest of the metropolitan area. The ACT Government is supportive of the Airport's role as an economic gateway, attracting employment that would have not otherwise occurred in the ACT. However, the growth of offices and retailing activity at the Airport to date has been at the expense of employment nodes elsewhere in the ACT, nodes better served by existing infrastructure.

With the likely exception of the Airport, major retail developments over the next decade will take place within the existing towns and in Fyshwick. Some minor supplementation of infrastructure may be required to facilitate development. Industrial land demands can be accommodated at the existing industrial estates at Fyshwick, Hume and Mitchell, with relatively small increases in roads and hydraulics infrastructure.

1.5.7. Employment Location

Where commercial activities locate has a major bearing on the functioning of the city. Business location has ramifications for the level of infrastructure investment required, the length and cost of the journey to work and other

activities (including environmental and social costs) and the strength and vitality of centres.

In particular, the location of offices is a major influence on the city's functioning. The Spatial Plan identifies the City and the town centres as priority locations for office development. Office employment at these locations contributes to a more sustainable urban settlement pattern by co-locating numerous facilities and services close to one another, including public transport (thereby reducing car use), both on the journey to work and for shopping and other trips. The concentration of activities in specific nodes also achieves efficiency in the provision of government infrastructure, provides support for businesses and encourages vitality at the centres. The role of Civic as the main metropolitan centre of Canberra is being consolidated by the release of sites for office, residential, entertainment and tourism developments and improvements to public infrastructure.

1.5.8. Access to Essential Services for Low Income Canberrans

The ACT Government, through the ACT Concessions Program, provides concessions on the cost of essential services for members of the community who are experiencing disadvantage. In 2005-06, the ACT contributed \$10.92m to energy, water and sewerage utilities in the form of concessions and rebates and \$2.39m in concessions on motor vehicle licences and registration. The table below identifies the cost by utility type.

Electricity and Gas	Water and Sanitation	Motor Vehicles
\$4,430,950.30	\$6,493,744.20	\$2,392,668

As a demand driven program, the number of ACT residents eligible for concessions dictates the total cost of the ACT Concessions Program. While energy concessions have a maximum rebate cap, water and sewerage rebates are currently set at 65% of supply charge.

It is important to recognise that while these concessions assist in maintaining quality of life for Canberrans on low incomes, they also contribute to creating differential markets. For example, use-reduction price signals by governments or suppliers in the non-concession market are likely to have positive effects on consumer behaviour, whereas in the concession market, the effect of price changes is dampened and may not be as influential.

2. ROADS

2.1. Introduction/ Overview

2.1.1. Roles and Responsibilities

The planning for future road infrastructure requirements as well as the maintenance of the existing infrastructure in the ACT is co-ordinated between the ACT Department of Territory and Municipal Services (TAMS) and the ACT Planning and Land Authority ('the Authority'). Within TAMS, Roads ACT has responsibility for managing all roads in the ACT, including in 'Designated Areas' (see introduction for an explanation of 'Designated Areas'). This is despite the fact that planning responsibility for Canberra is shared between the ACT and Commonwealth Governments.

In addition to owning and having responsibility for all road-related infrastructure in the ACT, Roads ACT also owns and has management responsibility for ACT's extensive stormwater infrastructure. Stormwater Infrastructure is covered separately in the following chapter.

2.1.2. Government Strategies

The Canberra Plan (March 2004) comprises three sub-plans, the Social Plan, the Spatial Plan, and the Economic White Paper and sets out the strategic framework for future development in the ACT over a 30-year time frame. In particular, the Spatial Plan provides the broad strategic guidance to planning in the ACT and, in conjunction with the National Capital Plan, regulates to a greater extent how new areas are developed or existing areas are modified.

The Spatial Plan seeks to contain growth within 15 km of the city – in part to reduce the cost of providing new infrastructure - while increasing the number of homes within a 7.5km radius of the city. It also seeks to locate new residential areas close to town centres and transport; to locate employment close to residential areas; and to provide good travel connections, to minimise journey times and trip length. The Spatial Plan seeks to reduce reliance on the use of private motor vehicles to achieve lower green house gas emissions; to lower pollution, and reduce accidents, while encouraging greater use of walking, cycling and public transport.

The Sustainable Transport Plan (April 2004) is closely integrated with the Spatial Plan and helps deliver on the nationally adopted Charter for Integrated Transport and Land Use Planning. The Canberra Spatial Plan incorporates goals, initiatives and actions relating to transport that are directed at achieving a more sustainable transport system for Canberra, consistent with the goals of the Sustainable Transport Plan.

The Sustainable Transport Plan provides a comprehensive framework for a sustainable transport system for Canberra, and contains strategies concerning integrated transport and land use (to reduce travel distances and encourage greater use of transport modes such as cycling and public transport); infrastructure; transport technology; and road safety planning. It is expected

that the plan will be reviewed once every five years, consistent with the sequence of review for the Spatial Plan.

Roads ACT has developed strategies to manage provision and upgrading of ACT roads infrastructure, in response to a number of other key ACT Government and national initiatives, including:

- Sustainability Policy for the ACT: A compact and connected city will strengthen social cohesion, and constitutes a more efficient use of land, with houses, services and employment in close proximity. This affects Resource Efficiency, Air Quality and Greenhouse Gas Emissions and comprises another dimension of Sustainability that influences Roads ACT, particularly with regard to reducing electricity consumption through more efficient street lighting and reduced congestion resulting in improved air quality.
- Development in NSW, adjacent to ACT border: Cross-border development influences the ACT road network development by requiring improved connectivity.
- National Heavy Vehicle Reforms and AUSLINK: influences the connectivity with the surrounding region as increased heavy vehicle load limits, proposed by the National Transport Commission (NTC), affect ACT bridge and pavement assets.

TAMS has developed asset management plans to cover the creation, management, maintenance and disposal of road related infrastructure, and to use these as a framework for the various programs it manages.

The main requirement in relation to roads assets is that Roads ACT business units have a sound knowledge of the extent and condition of their assets, whole of life costs, Government policy objectives and how they are performing to stakeholder demand and to use maintenance funds effectively.

2.2. Supply/Demand

2.2.1. Assets

Assets owned and managed by Roads ACT on behalf of the ACT Government include road pavements, bridges, streetlights, driveways, car parks, community paths, traffic signals, signs and lines. Roads ACT also has responsibility for managing roads in 'Designated Areas'. (See Introduction, under 2.2. 'The National Capital Plan' for an explanation of 'Designated Areas'.)

Tables A and B (below) show the extent of sealed and unsealed roads in the ACT; and the asset design life, respectively.

Table A: Roads in the ACT – Lane/ Road Length

Road Type length (Km)	Lane length (Km)	Road length (Km)
Municipal Road – Rural (Sealed)	42.135	21.61
Municipal Road – Rural (Unsealed)	3.61	2.19
Municipal Road – Urban	3,645.103	1,803.603

(Sealed)		
Municipal Road – Urban (Unsealed)	17.256	9.808
Territorial Road – Rural (Sealed)	367.317	185.257
Territorial Road – Rural (Unsealed)	188.965	103.370
Territorial Road – Urban (Sealed)	1,400.101	435.65
Territorial Road – Urban (Unsealed)	28.14	14.61
National Highway - Rural	18.504	4.62
National Highway - Urban	56.428	14.334
Total Length	5,767.559Km	2,595.052Km

Source: ACTRAMS database; data current to end of 2003.

Table B Asset Extent and Design Life

Asset Type	Extent	Design Life
Road Pavements		
(Territorial and Municipal)	5,625 lane kilometres (sealed) 220 lane kilometres (unsealed)	Sub structure 50 - 100 years Wearing surface 10 – 20 years
Bridges		
General Access Routes	687	30 – 80 years
B Double Route	380	30 – 80 years
Total No.	1,067	
Traffic Signals		
Intersection Signals	178	10 years
Pedestrian Signals	25	10 years
Pedestrian Crossings	7	10 years
Road crossing flood warning sites	4	10 years
Total No.	214	
Lines and Signs		
Line Marking	6,000 kilometres	3 – 4 years
Guide signs	4,000	10 years
Advisory signs	80% of signs	
Total No. Signs	70,000	
Community Paths		
Footpaths	1,860 kilometres	15 – 50 years
Cycle paths	374 kilometres	15 – 50 years
Streetlighting		
Luminaires Category P ¹	45,000	20 years
Luminaires Category V ²	20,000	20 years
Total	65,000 (approx)	
Columns	61,300 (approx)	

Note:

1. Category P is used primarily to provide a safe and comfortable visual environment for pedestrian movement at night.
2. Category V is used in roads on which the visual requirements of the motorists are dominant (e.g. traffic routes)

Road infrastructure planning is broadly divided into two categories; one, which concentrates on the existing road network while the other has a focus on developing areas within Canberra.

2.2.2. Existing Roads

There are over 5,800 lane kilometres of existing roads in the ACT to service the requirements of a population of about 325,000. When all road-related assets are included they have a replacement value of more than \$5.5 billion. Infrastructure assets are straight line depreciated in the 2003/04 Department's territorial accounts at a rate of \$ 58,794,165 for that year.

2.2.3. Roads in Developing Areas

Over the next 10 years the main new road infrastructure required will be to service the newly developing suburbs of Canberra in Gungahlin, the main new settlement area, in Belconnen (West Belconnen, Lawson and Bruce) and Molonglo, anticipated to commence settlement within the next 5 years.

Excluding the inter-town parkways linking Gungahlin (the Gungahlin Drive Extension currently under construction and the proposed Majura Parkway upgrading), the roads infrastructure to service the new developing areas will total some \$82 million.

2.2.4. Future Demand

Key factors that influence demand for roads infrastructure include population growth, changes in land use, modes of transport, and vehicle ownership. These factors require the active intervention of Roads ACT so that the assets are managed effectively to avoid or defer capital expenditure.

2.2.5. Demand: General Issues

Ageing infrastructure: As the Roads ACT assets age they require more maintenance intervention to return them to their safe use. A number of asset classes, particularly roads, are not receiving optimum maintenance so with increased demand these assets deteriorate more rapidly. By only treating 3% of Territorial roads annually with reseals 3%, this means that it would take in excess of 33 years to return to the same asset maintained in Year 1. This is some 10 to 20 years beyond the useful life of the wearing surface of the pavements (wearing surfaces on pavements have a life of between 10 to 20 years). A similar methodology can be used for all Roads ACT assets that do not meet the best practice service standard targets.

Increased Asset Utilisation: The 20 year expenditure projections are based on the assumption that funding will increase in proportion to the growth rate of the number of future households (not taking CPI or inflation into account). They do not take into account the increased asset utilisation that is likely to occur through national and ACT Government initiatives. Urban densification around town centres of Canberra will reduce the requirement for new assets, however the existing assets will have greater demands placed on them.

Increased asset loading due to changes in allowable mass limits: The recent National Heavy Vehicle Transport Reforms requiring an increase in the mass

limits for heavy vehicles will result in an accelerated deterioration of road and bridge assets requiring more frequent pavement maintenance and bridge strengthening to meet the load limits.

2.3. Investment

The focus in the existing areas of Canberra is to maintain an efficient road system with a strong emphasis on asset management planning. This includes both a recurrent maintenance program and the annual capital works programs, which have an emphasis on the rehabilitation of existing assets.

2.3.1. Existing Roads

Roads ACT has allocated funding of \$320 million over the next five years (to 2010/2011) to the following major road-related programs in existing areas:

- Capital Upgrades: Roads ACT plans to invest \$23.25 million over the next five years on capital upgrades to Roads and Bridges; Sustainable Transport; and various Neighbourhood improvements;
- Minor Traffic Improvements: \$3 million, comprising 0.6 million per annum;
- Road Safety improvements: \$5.4 million, with \$3 million being allocated in 2006/7, and 0.6 million per annum thereafter (to 2010/11);
- Road Rehabilitation: \$7.35 million;
- Urban Development: \$24 million, comprising 4 million per annum;
- Routine/ planned road maintenance: \$140 million
- Major projects - capacity augmentation: \$121 million has been allocated, with the majority of this (\$102 million) being allocated in the short-term (for 2006/7 – 2007/8).

2.3.2. Roads in Developing Areas

While the general growth in Canberra is less than 1 %, there are still a number of areas that are undergoing significant growth, with Gungahlin being one of the fastest developing areas in the country. The emphasis on investment in this context is to provide the trunk infrastructure to provide the initial access and enable the developed blocks to be sold.

Roads ACT has allocated an estimated total of \$83 million over the next five years for Roads Infrastructure in developing areas of Canberra. This includes access roads; upgrading and extensions to existing infrastructure; new bridges and intersections; remediation of pedestrian and bicycle paths; and landscaping.

2.3.3. Financial Management and Reporting Requirements

Assets comprise a major component of the financial management undertaken by Roads ACT, requiring an integrated approach for planning and reporting. The Ownership Agreement requires Roads ACT to use financial reporting, in accordance with the *Financial Management Act, 1996*, and the *ACT Accounting Policy Manual*.

The main funding sources for Roads ACT assets are from Commonwealth Government grants ('Black Spot' and the 'Roads to Recovery' Programs); and user pays revenue and the ACT budget through government purchased

outputs (GPO) of \$41 million. Some \$50 million of assets annually are gifted to Roads ACT from private land developers and redevelopment.

The 20 year expenditure forecasts made in this section are based on the assumption that the assets are depreciated in a straight line; estimates are in today's dollars; asset depreciation percentage is applied equally to the entire replacement value, independent of the rate of asset depreciation; all like assets deteriorate at the same rate no matter where they are in their life-cycle; and that the level of future routine and planned maintenance and asset creation is increased in proportion to the number of future households estimated for Canberra.

Table C (below) shows for each key asset type, past budgets have not made any allowance for asset growth. The budget amount allocated to assets in some financial years has decreased as a consequence of government requests to find savings.

Table C: Asset Maintenance Expenditure and Annual Budget Difference in Current and Target Level funding.

Maintenance Expenditure	Financial Year 2002/2003	Financial Year 2003/2004	Financial Year 2004/2005
Road Pavements	\$7.42 M	\$10.5 M	\$12.7 M
Bridges	\$0.77 M	\$1.47 M	\$1.25 M
Traffic Signals	\$0.57 M	\$0.87 M	\$0.87 M
Lines & Signs	\$1.92 M	\$1.76 M	\$1.90 M
Community Paths	\$2.00 M	\$2.26 M	\$2.50 M
Streetlights	\$3.33 M	\$3.45 M	\$3.60 M
Maintenance Levels	Appropriated Budget (2004/2005)		
Road Pavements			
<i>Programmed</i>			
Municipal	\$4,250,000		
Territorial	\$6,282,000		
Routine			
Municipal	\$1,200,000		
Territorial	\$1,000,000		
Bridges			
Programmed	\$1,000,000		
Routine	\$ 250,000		
Traffic Signals			
Programmed	\$ 725,000		
Routine	\$ 46,000		
Lines and Signs			
Programmed			
Lines	\$ 900,000		
Signs	\$ 200,000		
Routine			
Lines			
Signs	\$ 800,000		
Community Paths			
Programmed	\$2,200,000		
Routine	\$ 300,000		

Streetlighting			
Programmed			
Routine	\$3,600,000		
Total Appropriated Budget (key assets only)	\$25,642,000		

Note: (the above \$ figures do not include asset growth, CPI etc)

1. There is a large backlog of programmed work, which has not been costed.
2. There is a \$15 to \$20 million backlog in community path maintenance.
3. Programmed maintenance funds are utilised to meet current traffic signal network equipment standards as sought in the three year average annual Capital Upgrade funding

2.4. Planning, Development and Regulation

2.4.1. Infrastructure Lifecycle Management

'Lifecycle' refers to the cycle of activities that an asset goes through from planning, design, construction, and maintenance to decommissioning and disposal. This section outlines the plan for the management and operation of the major asset groups to meet target levels of service whilst optimising lifecycle costs. These costs do not include the future demands that may be placed on the Roads ACT assets.

2.4.2. Roads

The age of the road network and population growth (especially around the town centres) has placed increased demands on an already ageing road network. Furthermore, current and future demands by the Heavy Vehicle Industry for increased vehicle axle load limits has resulted in an accelerated deterioration of the road pavement.

2.4.3. Bridges

Similar to roads, bridges are continually susceptible to the requirements to support increased heavy vehicle loading. Whilst the general condition of bridges in the ACT has been found to be in a fair to good condition, national initiatives encouraging higher load limits and the subsequent changes to the Bridge Design Code will require bridge-upgrading works. Roads ACT has commenced an annual bridge strengthening program to accommodate these increased load limits on the B Double (62.5 tonnes) and General Access (42.5 tonnes) routes.

2.4.4. Traffic Signals

To support the introduction of additional controls for such things as bus priority or cycle lanterns it will be necessary to replace the existing control panels. Factors relating to the age (obsolescence of component parts); technology (shift to the use of long life, low maintenance, efficient LED lamps); and usage (bus bay and cycleway lanterns) have resulted in a requirement for Roads ACT to upgrade, replace and/or refurbish the current traffic signals through a phased capital upgrade program, to accommodate these environmental factors.

2.4.5. Line-marking

Line-marking needs to be replaced regularly to ensure the contrast, delineation and visibility of the line-marking is in accordance with Australian Standards, which requires line-marking to be replaced once every 5 years, approximately. Trends relating to the urban densification of town centres will result in increased wear and subsequent rapid deterioration of line-marking.

2.4.6. Signs

The condition and age of signs in the ACT is normally correlated with the age of the suburb. In the past the replacement of signs in the ACT have been ad hoc and generally in response to customer complaints to damaged signs. Thus, whilst the condition of signage may be adequate, many signs do not meet the Australian Standards for regulatory signs and these will need to be programmed for replacement.

2.4.7. Community Paths

Canberra's Community Paths consist primarily of footpaths and cycle paths. There has been a rapid deterioration of the community path network as a result of age, increased usage and other environmental factors (i.e., tree root intrusion, etc). The Government has recognised this and has made a commitment to expand the footpath maintenance program particularly in the older suburbs, by \$4.0 million over three years commencing 2005/06.

2.4.8. Street Lighting

Street lighting is required to ensure the safety of motorists, pedestrians and cyclists. Street lighting studies in a number of Canberra's older suburbs have found the existing network to be inadequate and not in accordance with the relevant Australian Standards, with regards to number, condition and luminescence. In addition to this, the NCA and ACT Planning and Land Authority require different standards for all roads forming the boundary to the Parliamentary Triangle, as well as designated areas and all the main avenues and high activity areas such as Town, Group and local centres.

2.5. Performance

2.5.1. Roads Asset Condition

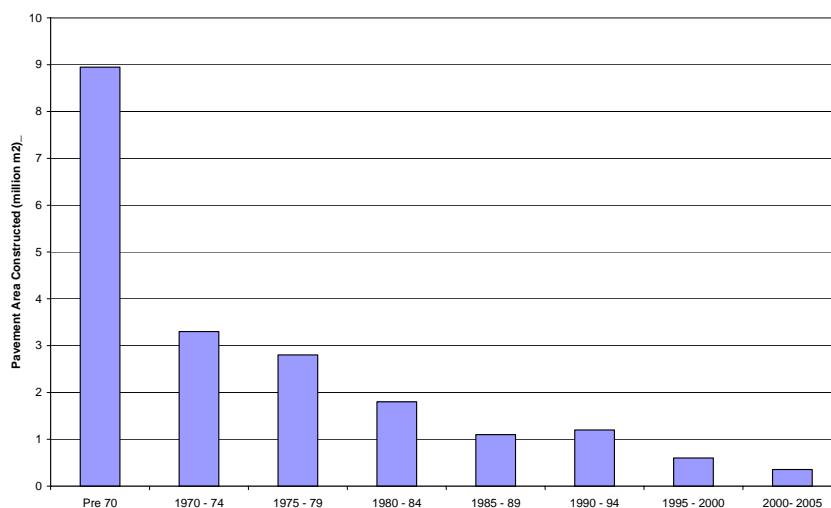
The condition of the road pavement influences the overall performance of the road network. Traditionally the pavements have been designed for a service life of 20 to 25 years but with appropriate maintenance and rehabilitation their life can be significantly extended.

The average age of the arterial (Territorial) road network is around 28 years. Some 70% of territorial roads in the ACT are more than 10 years old and approximately 54% older than 15 years whilst approximately 40% of the Municipal road network is older than 10 years. It has been estimated that more than 60% of municipal roads have surfacing older than 10 years and 33% have surfacing older than 15 years.

Based on a review of sample survey results for roughness, rutting and particularly deflection (ARRB TR, 2001), 31% of territorial roads and 34% of municipal roads were rated to be in poor or very poor condition.

It has been estimated that more than 60% of municipal roads have surfacing older than 10 years and 33% have surfacing older than 15 years. The age distribution of the ACT road assets is shown in Figure 1, below.

Figure 1 - Age Distribution of Roads ACT Assets



The Roads ACT *Asset Management Plan 2004 – 07* provides a high-level overview of the lifecycle plan for each of the key assets, which includes the methodologies used in asset delivery including the procurement, maintenance and disposal of assets (i.e. standards and technical specifications); asset condition; and maintenance expenditure for current and target service levels and the implications of key ACT Government and National Initiatives on infrastructure performance, outlined below.

2.5.2. Existing Levels of Service

The Levels of Service adopted by Roads ACT are constrained and influenced by a number of factors, including:

- Legislative and Common Law requirements, which includes the relevant ACT legislation that influences and affects operations including “duty of care” obligations;
- Customer expectations and demand: Roads ACT conducts various customer satisfaction and performance assessments for each asset class through Artcraft and Austroads’ *Customer Satisfaction Index Surveys*, and from the in-house Roads ACT *Customer Service Requests Database*. Commencing in 2004-05, Roads ACT is participating in the *City Management Customer Satisfaction Surveys*. An analysis of customer complaints received in the past year highlights that, while there has been no decrease in the community’s satisfaction levels with the overall maintenance of road assets, there has been a slight drop in the community perception regarding footpaths, cycle-paths and signs maintenance.

- Corporate strategies contained in the goals and objectives: The ACT Department of Urban Services' vision, mission and key priorities relevant to the Asset Management Plan are documented in the Final Draft *Directions and Priorities 2004-07* and aim to ensure that the following key organisational priorities are achieved:
 - ACT has a sustainable natural environment, evolving in harmony with community expectations;
 - Canberra is renowned for its safe and sustainable built environment;
 - Canberra is a culturally rich vibrant community;
 - Canberra is functional and efficient, open to innovation and change.
- Technical Requirements: As technical advances are made operational, processes and methods are improved. For example, through the use of reflectivity meters for line marking inspections or grinding machines to remove trip hazards.
- Safety and Environmental requirements: Road ACT has a duty of care to the users of its assets to protect the environment from any detrimental impacts from operation or maintenance activities.

2.5.3. Roads Capacity

There is little congestion in Canberra in comparative terms at present although there are isolated areas where traffic conditions are becoming more difficult to manage during the peak periods. Access to and from the developing areas of Gungahlin as well as roads in the vicinity of the airport fall into this category and future development in the City as well as Molonglo will place greater pressure on the east- west arterial road connections and require the construction of the peripheral parkway system including the completion of the Gungahlin Drive Extension as well as proposed Majura Parkway.

While the most recent infrastructure report card by Engineers Australia indicated that the condition of road infrastructure in the ACT was good and fit for purpose it did highlight the issue of an aging asset base and the need to invest in planned maintenance and rehabilitation programs.

2.5.4. Traffic Congestion

One indicator for the capacity and performance of the road network in Canberra is traffic congestion. Whilst traffic congestion data is not directly related to road performance, increases in traffic congestion have a direct impact on road condition. The congestion for Canberra is low but it is predicted to increase.

The performance of the road network in comparison to that with other road authorities has been good as shown in the following figures:

- Figure 1, Average Road Travel Speed Comparison Between Australian Cities is based on Austroads National Performance indicators 1998 for a sample of roads nationally, shows that Canberra has better average road travel speeds than other road authorities.
- Figure 2, Variability of Travel Time (Urban) shows that in the 1998 survey the variability was on the whole better than other road authorities. The variability of travel time is based on a representative sample of arterial roads and freeways in the urban metropolitan area.

- Figure 3, Congestion Indicator (Urban) shows that the congestion is better than NSW and VIC but on par with the other states. Congestion indicator is the difference between the actual and nominal travel time, i.e. the delay from traffic conditions, which do not allow travel at the posted speed limit.

Figure 1 - Average Road Travel Speed Comparison Between Australian Cities¹

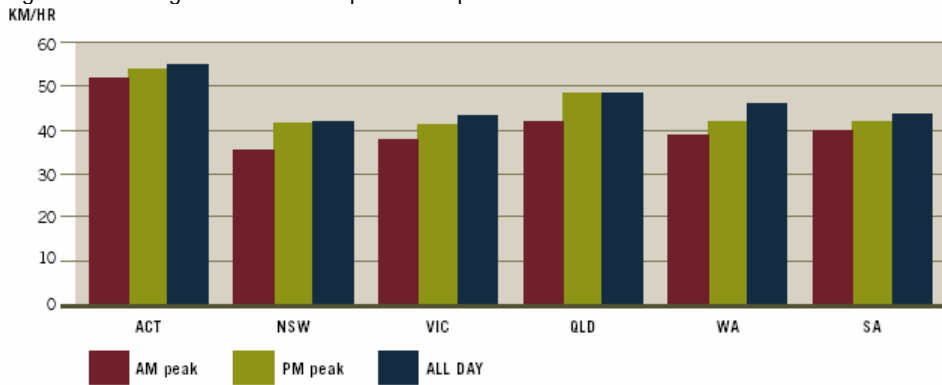
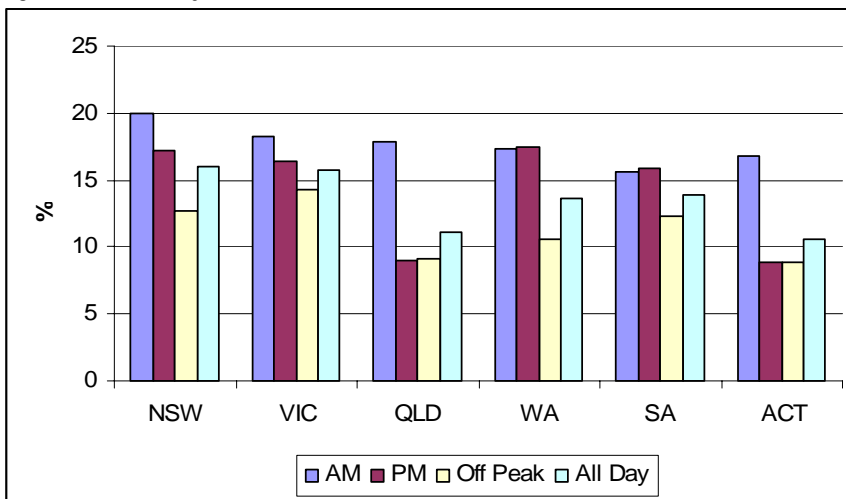


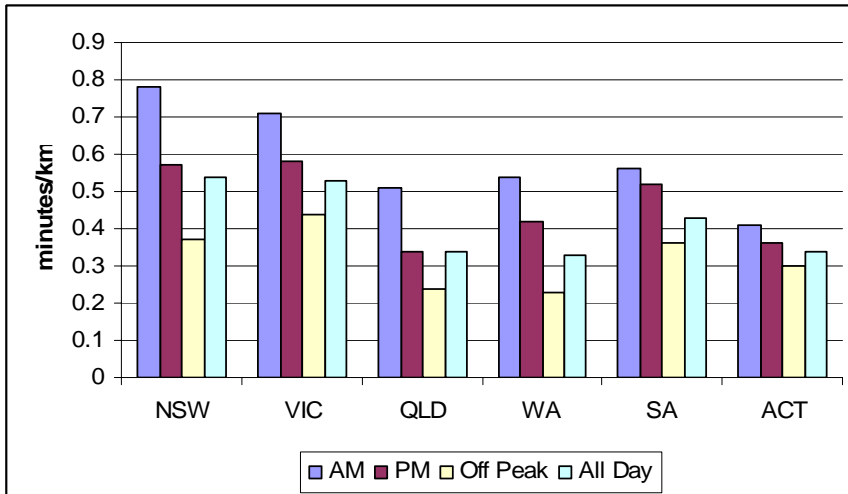
Figure 2 - Variability of travel Time 1998 (urban)²



¹ "THE SUSTAINABLE TRANSPORT PLAN " 2004 ACTPLA

² Austroads National Performance Indicators web site

Figure 3 - Congestion Indicator 1998 (urban)³



2.5.5. Roads Safety/ Austroads Performance Measures

Another measure of performance of the road network is road safety and an application of the Austroad performance measures in terms of use of the road network and safety of the road network indicates that the road network in the ACT performance well in comparison to other jurisdictions. The main reasons attributed to this are a well-defined road hierarchy and the fact that a majority of travel in the ACT is in an urban environment.

Since 1991, the ACT has recorded the lowest rates of the cost of serious casualty crashes per head of population and per vehicle kilometres of travel (mainly because of the low number of serious casualty crashes) amongst all Australian States. These rates have also been lower than the national average.

2.5.6. Summary

The focus in the existing areas of Canberra is to maintain, rehabilitate and augment this existing road infrastructure given that over 70 per cent of this asset is greater than 30 years old. Asset Management plans have been developed to guide this process but there are a still significant between the current service levels and target service levels in line with best asset management practises in Australia and New Zealand.

In the case of developing areas the challenge is to time the provision of the road and stormwater infrastructure so that land can be serviced and blocks sold when required. Failure in this regard can lead to shortages of serviced land and inflated prices for that land that is available.

³ Austroads National Performance Indicators web site

3. STORMWATER

3.1. Supply and Demand

3.1.1. Existing stormwater infrastructure

The existing stormwater infrastructure in the ACT consists of over 3,000 kilometres of stormwater pipes, which together with other associated stormwater assets has a replacement value in excess of \$2.0 billion.

The age of the stormwater asset like roads is in most cases 30-50 years old, consistent with the suburb age it is located in and in many cases it needs major upgrades to cope with the current stormwater standards and increased demand as a consequence of development. While some minor improvements are progressed as part of the Capital Upgrade program there is a significant program of improvements that require major capital investment. Over the next five years it is expected that \$10.0 million will be invested on upgrades to stormwater infrastructure in existing areas.

Some \$10 million has been allocated over the next five years - totalling \$2 million per annum - in existing stormwater infrastructure, to maintain service levels consistent with the current TAMS *Asset Management Plan 2004 - 07*.

3.1.2. Stormwater in Newly Developing Areas

The stormwater drainage infrastructure to service the newly developing areas is estimated to total some \$21m over the next five years.

3.2. Investment

3.2.1. Asset Management Plan 2004 – 07

The Roads ACT *Asset Management Plan 2004 – 07* covers the assets currently owned and managed by Roads ACT on behalf of the ACT Government. In addition to road-related assets, these include stormwater assets both below ground and above ground (i.e. manholes, sumps, pipes, channels, flood-ways, cut-off drains, gross pollutant traps, retarding basins, dams, ponds and weirs).

The main requirement in relation to stormwater assets is that Roads ACT business units have a sound knowledge of the extent and condition of their assets, whole of life costs, Government policy objectives and how they are performing to stakeholder demand and to use maintenance funds effectively.

3.3. Planning Development and Regulation

3.3.1. Infrastructure Lifecycle Management

The Canberra Spatial Plan strategy to maximise safety and perceptions of safety within the community from natural disasters such as flooding is complicated by the need to contain growth of the urban areas by residential intensification to within a 7.5 kilometre radius of the city. Changes in the design standards and rainfall patterns used for stormwater design since 1987 have highlighted the deficiencies identified by the then Land Planning

Authority (National Capital Development Commission) in the older areas of Canberra. One of the effects of this redevelopment has been to increase the amount of impervious area within the suburbs. The effect of an increase in impervious area, where no ameliorating measures are taken, is to reduce the intensity of rainfall which is required for the pipe system to reach capacity which results in overland flow and flooding into leases or possible accidents on the roadway.

Table A: Stormwater Asset Extent and Design Life

Stormwater pipes	3,091 kilometres	50- 80 years
Lined Channels	55.54 kilometres	50 – 80 years
Cut off drains	120 kilometres	
Grassed Floodways	157 kilometres	
Stormwater sumps	60,047	20 – 50 years
Manholes	25,936	20 – 50 years
Dams	2	50 – 80 years
Weir structures	12	50 – 80 years
Gross Pollutant Traps	88	20 – 50 years
Retarding Basins	14	50 – 100 years

The stormwater assets have an age profile commensurate to the development of the individual suburbs. The oldest suburbs have pipe systems that do not meet current standards and these are more than 80 years old.

3.4. Performance

3.4.1. Existing level of service

The Levels of Service adopted by Roads ACT are constrained and influenced by a number of factors. These include legislative and common law requirements, which includes the relevant ACT legislation that influences and affects operations including “duty of care” obligations; customer expectations and demand. Roads ACT conducts various customer satisfaction and performance assessments for each asset class through Artcraft and Austroads’ *Customer Satisfaction Index Surveys*, and from the in-house Roads ACT *Customer Service Requests Database*. Commencing in 2004-05, Roads ACT is participating in the *City Management Customer Satisfaction Surveys*. An analysis of customer complaints received in the past year highlights that there has been no significant increase in the community’s satisfaction levels with the overall maintenance of stormwater assets.

Table B: Stormwater Asset Levels of Service

	Asset Attribute	Current Service Standards
Programmed Maintenance	Above Ground	Reactive and some planned based on routine inspections
	Below Ground	Reactive during and after storms to clear chokes
	Dam Maintenance	Safety inspections annually Comprehensive inspections every 5 years Major inspections after floods and

	Hydrology & Hydrographics Gross Pollutant Traps	earthquakes Continuous monitoring Clean twice yearly or when sediment >50% Empty trash racks when blocked more than 30%
Routine Maintenance		Reactive based on complaints and reports of system failures

Table C – Stormwater Asset Condition Summary

Asset Condition¹	Excellent (%)	Good (%)	Satisfactory/ Fair (%)	Poor (%)	Unsatisfactory/ Very Poor (%)
Stormwater					
Channels	30	30	20	10	10
Pipes	20	30	20	10	20
Dams & Weirs	10	90	0	0	0

4. ELECTRICITY

4.1. Supply

ActewAGL Distribution owns and operates the electricity network in the ACT, including 132 kV sub-transmission network, 11 kV and 22 kV high voltage distribution network, and 415/240 volts low voltage network. ActewAGL sources electricity supply principally from TransGrid's transmission network at Canberra with a much smaller supply (about 5%) through Queanbeyan Substation. A third supply point, in the south of the ACT is currently under development with the expected completion in 2009 and further capacity improvements in 2012. ActewAGL does not own major generation facilities. However, there are a small number of mini-hydro and methane gas generators connected to ActewAGL's networks. The overall imbedded generation capacity is less than 10 MWs and therefore is comparatively insignificant.

Over 154,000 customers are connected to the electricity distribution network, based on the number of metered supply points on the network, including both active and non-active accounts. More than 2,900,000 megawatt-hour (MWh) of electricity is supplied through the distribution network. ActewAGL estimates a rate of growth in electricity supply of approximately 2.5 per cent per annum.

The ACT has approximately 5,000 km of electricity distribution network lines at 132 kV, 22 kV, 11 kV and 415 voltage levels. This is small compared to other jurisdictions and reflects the geographically concentrated customer pool (and denser distribution networks) in the ACT. There are 15 retailers licensed to supply electricity in the ACT. However, only five retailers are actively serving both domestic and non-domestic customers.

4.2. Demand

More than 2,900,000 MWh of electricity is supplied into the ACT, of which 40 per cent is supplied to domestic customers. The average electricity consumption in the ACT (among all customer types) is around 19 MWh per customer. Average domestic electricity consumption in the ACT is approximately 8 MWh per annum, which is higher than most other jurisdictions. However, this is not surprising given the ACT seasonal temperature extremes. The ACT has relatively high-energy requirements, especially in residential electricity consumption. These high-energy requirements are attributed to the consumption of electricity from household heating during winter and the recent increase in air-conditioners for use during summer.

In the ACT there are an estimated 146,000 retail electricity customers. Of these, 130,000 customers use less than 100 MWh per year, and most of them are households. To the end of February 2006, over 25,000 electricity customers, using less than 100MWh, had elected to enter into negotiated contracts with ActewAGL or another electricity retailer.

The average non-domestic electricity consumption in the ACT is around 120 MWh per annum.

It is estimated that over 2,800,000 tonnes of CO₂-e (carbon dioxide equivalent) is emitted every year, as a result of electricity consumption in the ACT.

4.2.1. Demand Drivers

Population is the single biggest factor in demand growth, which impact on both domestic demand and business/government electricity consumption. In addition, economic growth and technological changes lead to increase of electricity consumption per capita. Evolution of suburban lifestyle is the next factor contributing to demand change, in particular, increased dwelling size, and increased use of domestic air-conditioning systems, which can be observed in the ACT. Other factors include increased use of energy efficient building materials and design (including an introduction of a star energy rating system for residential dwellings in the ACT) and use of energy efficient appliances.

Gas supply and price, especially in the space heating, hot water and cooking market applications, is another significant factor affecting demand. Recent years in the ACT have shown only moderate increases in demand during winter due to the impact of gas (in particular, gas heating) and summer demand growth, which significantly exceeded growth in winter demand. Overall, the supply capacity in the ACT is defined by summer operating conditions of load demand and higher ambient temperature. A decade ago, the network capacity was limited by the winter conditions. Currently, there are no significant capacity constraints within ActewAGL network. TransGrid, as the main provider of transmission services to the ACT, recently augmented the capacity of the existing principal and subsidiary bulk supply connection points to the ACT i.e. the Canberra Substation in West Belconnen, and the Queanbeyan Substation.

4.3. Investment/ Planning

ActewAGL's network development is based on a ten-year investment strategy that aims to facilitate prudent investment, an adequate level of network capacity and overall capability to meet electricity demand. The ten year investment strategy covers new capital investment resulting from land development and redevelopment, network augmentation to maintain capacity and reliability performance, replacement of ageing and faulty equipment, in particular condemned wooden poles, and development of IT and communication infrastructure that supports the operation of the electricity networks. Currently, ActewAGL and TransGrid are working jointly on establishing a second major bulk supply to the ACT by 2009.

ActewAGL works closely with NSW transmission network service provider TransGrid to maintain the capacity, reliability and security of the supply into the ACT. ActewAGL has been also actively considering and exploring other opportunities in provision of local generation, such as large-scale 'peaking' local gas-fired generation, wind generation at or near ACT, rooftop solar generation, and other new technological solutions that may potentially provide a range of benefits, in particular economic and environmental benefits.

4.4. Policy and Regulation

Currently, ActewAGL Distribution is regulated by the jurisdictional economic regulator, the Independent Competition and Regulatory Commission (ICRC) and the ACT Technical Regulator, within the framework set up under the National Electricity Law and the *ACT Utilities Act 2000*.

4.4.1. National Energy Reform

A key issue concerns continuing progress on the national energy reform, which should result in a regulatory framework balancing the interests of various stakeholders including customers, utilities and regulators.

4.4.2. National Electricity Market (NEM)

In the 1990s, the Industry Commission recommended a major restructure of the electricity industry, leading to the development of the National Electricity Market (NEM). The NEM consists of generation, transmission, distribution, and retail, and interconnects the electricity markets of Queensland, NSW, Victoria, South Australia, the ACT, and Tasmania.

Establishment of the NEM was the result of extensive consultation and collaboration between the States and the electricity supply industry. The reforms led to the disaggregation of vertically integrated government-owned electricity authorities into separate generation, transmission, distribution and retail sales sectors in most of the jurisdictions. The aim of the reform process was to increase competition in the industry and provide greater choice for end-use electricity consumers.

In the ACT, the electricity market largely consists of the distribution and retail sectors. The ACT has no major electricity generation infrastructure (generating less than 1 per cent of the electricity used), with electricity supplied from various interstate sources.

On average, the ACT experiences distribution and sub-transmission electricity network losses of below 5 per cent of total distribution network inputs.

ActewAGL Distribution holds the only distribution licence in the ACT, allowing for the provision of distribution and electricity connection services (metering). TransGrid provides transmission services to the ACT, but is exempt from the licence requirements. Country Energy owns and operates a small electricity distribution line servicing a small number of ACT residents, and has been granted an exemption from having to hold a licence.

4.4.3. Full Retail Contestability (FRC)

As a result of full retail contestability (FRC), introduced in the ACT in 2003, the ACT serves both franchise and non-franchise customers. Franchise customers are those electricity customers who have not negotiated a contract with ActewAGL, or with any of the alternative retailers after FRC was introduced, automatically entering into a standard contract. Non-franchise customers have chosen to purchase a differentiated service from either of the servicing retailers.

ActewAGL Retail is the incumbent retailer in the ACT, licensed to supply electricity to both franchise and non-franchise customers. Country Energy supplies predominantly non-franchise customers and has a provision that allows them to supply electricity to a small number of ACT franchise customers due to its special distribution arrangements. All other retailers are licensed to supply electricity to non-franchise customers.

Customers are also differentiated between large non-residential customers using more than 160 MWh of electricity per year; non-residential customers each using more than 100 MWh but less than 160 MWh per year; and small residential and non-residential customers each using less than 100 MWh per year (either as franchise or non-franchise customers).

4.4.4. Transitional Franchise Tariff (TFT)

From a market perspective, a key constraint operating in the ACT is retail price regulation, otherwise known as the Transitional Franchise Tariff (TFT). To assist in the transition toward FRC in 2003, the ACT Government implemented a TFT. The TFT is effectively a price cap on retail electricity prices aimed at protecting against the abuse of market power by ActewAGL, and allowing other competitors to enter the ACT market during the interim.

FRC benefits consumers by promoting the efficient supply of energy, through transparent energy service costs and wider choice.

4.4.5. Current and future pricing issues

Network pricing issues need to be considered separately from energy pricing issues. Energy pricing is the result of the operation of the competitive wholesale and retail energy markets. The pricing of distribution network services is subject to the jurisdictional regulatory framework set up under the National Electricity Law as well as the national regulatory framework for transmission network services. In recent years in the ACT, changes and adjustments made to network tariff structures were designed to provide pricing signals to customers, which reflect more closely the cost components of providing network services and help to manage demand.

It must be noted that there is only a limited opportunity to introduce price signals such as higher demand charges without offending additional objectives of the regulators, community interest groups and government such as equity and social justice. Nevertheless, in recent years, ActewAGL Distribution has introduced network tariffs based on supply capacity (a so called "capacity charge" based the annual consumption demand) and changed a balance between the energy component and demand component of some commercial tariffs to encourage demand management. The overall level of tariff changes was kept below CPI.

In December 2005 the ACT Metrology Regulator recommended the installation of interval (smart) meters in all new and replacement situations. The effectiveness of this new policy is yet to be tested. A proposed wider national introduction of interval meters will provide opportunities for network

service providers and retailers to introduce new tariff structures which may have useful demand management impacts.

4.4.6. Competition

Given the natural monopoly characteristics inherent in network services, as elsewhere there is no competition in provision of electricity network services in the ACT. Distribution network services are provided by ActewAGL, the licensed network service provider under the *ACT Utilities Act 2000*, and are subject to price regulation, currently by the Independent Competition and Regulatory Commission.

4.5. Key Issues/ Priorities

ActewAGL develops and maintains a ten-year Investment Strategy. Major projects are being planned or are under way relating to the provision of emergency supply capacity to the ACT, a new bulk transmission connection point at southern end of ACT, a new zone substation to replace the ageing Fyshwick Zone Substation, progressive increase of existing zone substation capacity at multiple zone substations across the network, relocation of existing sub-transmission assets including Belconnen Zone Substation and Causeway Switching Station, progressive augmentation of HV distribution network capacity and expansion of the network to meet the need of ongoing land development.

Under the ACT Asset Management Code, ActewAGL, as the licensed distribution network service provider, prepares and implements an ongoing asset maintenance program. Currently, a major part of the maintenance program is related to the inspection and replacement of the ageing natural timber distribution poles.

4.6. Performance Assessment

ActewAGL Distribution is a licensed distribution network service provider that is required to conform to *the ACT Utilities Act 2000*, and related regulations. This includes the requirement to report against 15 industry and technical codes, covering a range of performance issues such as reliability, customer service, asset operations and maintenance and quality of supply.

The Technical Regulator (within the ACT Planning and Land Authority) and Independent Competition and Regulatory Commission (ICRC) have responsibility for overseeing ActewAGL's compliance with all relevant codes and regulations. A comprehensive annual report is submitted to the regulators annually (on the 1st October each year). The ICRC assesses ActewAGL's compliance and performance in their (publicly available) annual reports. In addition, ActewAGL conducts internal audits, and NEMMCO, NCSI and the jurisdictional regulators conduct a number of other regular audits.

5. GAS

5.1. Supply

In the ACT, natural gas is supplied largely from the Cooper Basin via the Moomba to Sydney pipeline and from the Gippsland Basin via the Eastern Gas Pipeline. There is no natural gas production in the ACT.

Eastern Australian Pipeline Limited (EAPL) holds the only gas transmission licence in the ACT. The transmission pipeline within the ACT is relative short, a 6 km section of the Moomba to Sydney pipeline. This pipeline distributes gas through the Canberra distribution system network to approximately 108,000 consumers.

ActewAGL Distribution holds the only gas distribution licence in the ACT, which allows ACTEW AGL to distribute gas and provide gas connection services to ACT consumers. Around 85,000 customers are connected to the ACT gas distribution network, of which, domestic customers make up around 98 per cent of the market. The ACTEW AGL Distribution's gas network covers around 3,500 km of pipelines.

The ACT retail gas supply market was opened to competition in January 2002, giving customers the freedom to choose their gas supplier. ACTEW AGL Retail is licensed to supply both franchise and non-franchise customers. Country Energy, ENERGEX Retail and Energy Australia are licensed to supply gas in the ACT to non-franchise customers.

5.2. Demand

The volume of gas supplied in the ACT is about 7,000 Terrajoules (TJ), with the average annual consumption by domestic gas supply customers is around 50 TJ and 1,200 TJ by non-domestic customers.

Over 470,000 tonnes of CO₂-e (carbon dioxide equivalent) is emitted every year, as a result of natural gas consumption in the ACT.

5.3. Policy and Regulation

Third party access to the gas network in the ACT and Queanbeyan is regulated by the ACT Independent Competition & Regulatory Commission (ICRC) under the *Access Arrangement for ActewAGL Gas Distribution System in ACT and Greater Queanbeyan*. This regulatory function is due to be transferred to the Australian Energy Regulator (AER) on 1 July 2007.

The ACT and NSW technical regulators, the ACT Planning & Land Authority (ACTPLA) and the NSW Department of Energy, Utilities & Sustainability, respectively, also regulate ActewAGL Distribution.

5.3.1. The Australian Energy Market Agreement 2004 (AEMA)

The Australian Energy Market Agreement 2004, as amended in 2006, also incorporates natural gas reforms. By 1 January 2007, all functions relating to rule-making currently under the National Gas Pipelines Advisory Committee

and the Code Register relating to natural gas transmission and distribution networks will move to the AEMC.

In terms of retail, the ACT agreed, under the AEMA, to phase out the exercise of retail price regulation for natural gas if effective competition can be demonstrated. Assessment of competition by the AEMC will commence from January 2007.

5.4. Performance and Investment

ActewAGL is an equal public and private joint venture. The joint venture partners are ACTEW Corporation Limited, which is wholly owned by the ACT government, and the Australian Gas Light Company (AGL) and hence the gas network asset base is comprised of equal levels of government and private sector investment.

ActewAGL conducts an annual assessment of the performance and capacity of the ACT gas network infrastructure to meet forecast future demands. Capacity development projects are identified as part of the planning process and are scheduled when the investment is considered to be prudent. The annual performance assessment is an input into the ten-year investment strategy as outlined below.

5.4.1. Ten Year Investment Strategy

ActewAGL network development is based on a ten-year investment strategy that aims to facilitate prudent investment, an optimal level of network capacity and overall capability to meet gas demand. The strategy covers new capital investment as a result of growth in load in the residential sector including new housing estates and urban infill, and load growth in the industrial and commercial sectors of the economy. The strategy also covers network augmentation to maintain capacity and reliability performance and renewal and upgrade of ageing assets.

5.5. Key Issues/ Priorities

Key development initiatives underway and planned include the installation of a 5km high-pressure gas pipeline from Gungahlin to Belconnen. This initiative is part of a long-term plan for the ACT gas network and provides capacity for future growth and security of supply to the Belconnen region of the ACT. Other initiatives planned include the future installation of a pressure regulating station in Belconnen and further capacity upgrades of the high and medium pressure networks.

6. WATER

6.1. Background

Providing essential services, particularly water, to the National Capital was a key feature in determining the Australian Capital Territory and the site of Canberra. The city was planned in the years following the massive 1897 to 1902 drought and the wrangling over the allocation of the Murray waters at federation (1901).

These demands drove the final decision of the location of a national capital to establish the ACT borders based on major water catchments, with the catchments of the Cotter, Gudgenby, Naas and Paddy's Rivers lying wholly within the Territory.

The origins of Canberra and the ACT are linked with water, and our future must be as well. Since that time successive administrations have utilised that vision by creating a series of dams and water features that distinguish Canberra from other cities. Indeed, our claim to be one of the sustainable cities of the world depend largely on the great fortune we have in our water assets.

6.2. Supply/ Demand

6.2.1. Overview

ACTEW currently manages and operates:

- four storage dams, Corin, Bendora, Googong* and Cotter, two water treatment plants, 44 reservoirs, 22 water pump stations and almost 3,000km of water trunk reticulation mains;
- 3,000km of sewers, 27 sewage pump stations, the Lower Molonglo Water Quality Control Centre plus 3 smaller Sewage Treatment Plants; and
- for the reclaimed water system there are 2 treatment facilities, one pump station, one reservoir and approximately 15 km of distribution and reticulation mains.

The estimated replacement value of these assets at the last valuation date of 30 June 2002 is \$2.91 billion. Since then, \$128 million of new or enhanced assets have been constructed by or gifted to ACTEW.

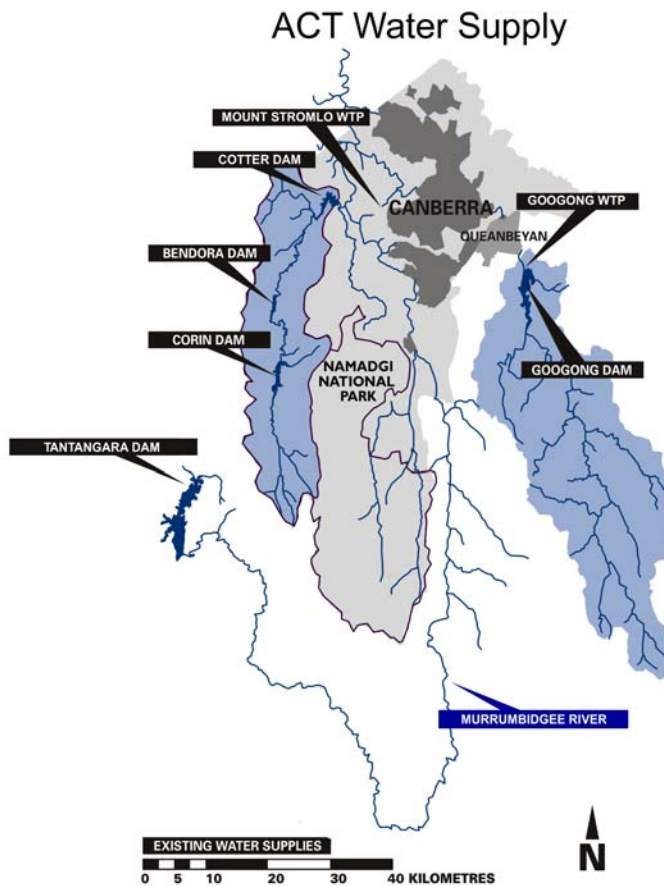
6.2.2. Water Supply and Treatment

Water is currently supplied to the ACT and Canberra population through two main water supply sources:

* Note: The issue of formal control and management of Googong Dam and related land is in the process of being resolved between the Commonwealth and ACT Governments.

- the Cotter River supply, within ACT Namadgi National Park. This consists of storage at the Corin, Bendora and Cotter Dams with treatment at the Mount Stromlo Water Treatment Plant (WTP); *and*
- the Queanbeyan River supply in NSW. This consists of storage at the Googong Dam with treatment at Googong Water Treatment Plant.

Under normal circumstances most of the water required to meet demands is drawn from the Cotter system via Bendora Dam, with water from Googong being drawn to meet peaks in demand in summer, during extensive dry periods or when the supply from the Cotter catchment is interrupted (e.g., for maintenance purposes). The Cotter Dam has recently been brought back into service and a pumping station has been constructed on the Murrumbidgee River for additional supply as part of drought contingency initiatives for the recent drought (2002-06).



ACTEW's water supply and treatment operates in accordance with the ACT Health, Drinking Water Code of Practice (2000), and the Australian Drinking Water Guidelines (1996).

6.2.3. Cotter River

There are three water supply dams on the Cotter River: Corin, Bendora and Cotter dams. Water is supplied to the city from Bendora and Cotter Dams on the Cotter River. Water is released into the Cotter River from Corin, thereby controlling the level of storage in Bendora Dam below.

The Cotter Dam was ACT's first dam. Construction was completed in 1912 and the height was raised in 1951 to accommodate Canberra's growing population. Located on the Cotter River it is the lowest of the three dams on this system. It is a concrete gravity dam with a storage capacity of 4,700 ML. It has an immediate catchment area of 192.4 sq km.

Over the years, the Cotter Dam and its pump stations have not been used regularly and the water quality has deteriorated slightly. They were kept in reserve in case of any breakdown in the supply from Bendora or Googong Dams, drought, or unusually high peak demands. In 2004 they were brought back online as part of the drought contingency measures.

In the 1950s it became apparent that Cotter Dam could not hold enough water to cope with Australia's extended drought periods and so a second dam was commissioned. Bendora Dam was completed in 1961, with the Bendora gravity main completed in 1967. Located on the Cotter River above the Cotter Dam, Bendora Dam has a double curvature concrete arch construction with a storage capacity of 10,700 ML and an immediate catchment of 91.4 sq km.

The Bendora gravity main is a 20 kilometre, 1500 mm diameter steel pipe that can supply up to 310 ML of water by gravity from the intake tower at Bendora Dam to the Mount Stromlo Water Treatment Plant. This avoids the high cost of pumping associated with using water from Cotter Dam and Googong Dam, making it a preferred source.

The third dam on the Cotter River, Corin Dam, was completed in 1967. Corin Dam is the largest dam on the Cotter River system. It has an earth and rock-fill embankment with a side channel spillway. It has a storage capacity of 75,400 ML and a catchment area of 196.3 sq km.

Most of this catchment, including the catchments for Corin and Bendora Dams, is zoned as a national park, Namadgi National Park, and is heavily protected from recreational and agricultural activities that potentially affect water quality. The lower part of the catchment is not protected and its land use includes forested pine plantations.

The water from Bendora is historically of a high quality and required very little treatment at the Mount Stromlo Water Treatment Plant (WTP). However in 2003, bushfires in the catchment caused extensive damage to the vegetation cover to the extent that water quality could no longer be guaranteed for some

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time. As a result, short and long-term solutions were developed and capital works approved to maintain supply capacity and quality. This included the construction of a new water treatment plant at Mount Stromlo.

Nine catchment recovery projects are in place with a budget of \$1.2 million. They involve online monitoring, hydrological and hydrodynamic modelling, vegetation recovery and research with the Australian National University to gauge the long-term effects of the 2003 bushfires on the catchment.

ACTEW has worked with Environment ACT to develop a Namadgi Management Plan currently (2005) being considered by the ACT Government. This plan would provide a statutory framework for controlling activities within the Corin and Bendora Catchments.

The water quality from the Lower Cotter catchment has been greatly affected by the bushfires and ongoing forestry activities. In 2004, ACTEW brought Cotter Dam back into service as part of the drought contingency initiatives. Since then ACTEW has completed the Cotter to Googong Bulk Transfer (CGBT) project, to transfer excess Cotter water through the existing mains reticulation network and into Googong Dam to maintain overall storage levels. The CGBT is now being extended to incorporate UV treatment, which is expected to be completed during 2007. These two initiatives mean that there is a new dependency on water sourced from Cotter Dam. ACTEW has proactively commenced working with the ACT Government and other stakeholders to ensure the catchment is managed appropriately for water quality as well as other land uses.

6.2.4. Water Treatment (Mount Stromlo)

The original Mount Stromlo Water Treatment Plant (WTP) was commissioned in June 1967. It contained facilities for chlorination, fluoridation and pH correction of all water drawn from the Cotter system via Bendora but was not able to treat the water from the Cotter dam to drinking water quality.

After the fires, the water quality from the entire catchment was compromised and vulnerable to turbidity problems. A new \$40 million filtration plant was designed and completed for the summer of 2004/2005 to enable the water from the fire-affected catchment to be treated to drinking water standards. The new plant can treat up to 250 ML/day of water. It is even able to treat water from the Cotter reservoir after being mixed (diluted) with Bendora water.

Water arriving at the plant is dosed with lime to increase its alkalinity, or buffering capacity to resist change in pH. Carbon dioxide is then added to reduce the pH back to a range suitable for the addition of coagulants without consuming the alkalinity. If manganese levels are elevated, potassium permanganate is added to oxidise the manganese into a form that can be taken out in filtration. When mixed in rapidly with water, coagulants destabilise the water and allow particles trapped in suspension to join together into flocs. At Mount Stromlo WTP, Aluminium Sulphate and Polyaluminium chloride can be used as coagulants. Following coagulation, the water flows

through two stages of flocculation where slow mixing allows the small flocs to grow to a suitable size for filtration.

Stromlo WTP has up to ten filters that can be selected depending on the amount of water requiring treatment. The water flows by gravity through the filters and flocs are trapped on the surface of the filter media. When the filters get dirty they are backflushed with air then water. The filtered water is then dosed with chlorine for disinfection, fluoride for dental protection, and lime for additional pH and alkalinity adjustment.

When the water being treated is high in turbidity, the filters need to be washed much more frequently. There is a limit to this, so an additional process called dissolved air flotation filtration (DAFF) is employed. By introducing air saturated water to the coagulated water just prior to the filters, fine air bubbles actually float a lot of the flocs onto the surface. These form a blanket that is floated off intermittently. By reducing the amount of particles being trapped in the filters, the filters last longer.

The wastewater produced by backwashing the filters, or floating off the sludge must be treated. The wastewater is pumped to a thickener where the solids are concentrated sufficiently to be de-watered by a centrifuge into a cake suitable for landfill. The supernatant is sufficiently clean to be returned to the start of the process for re-treatment.

6.2.4. Queanbeyan River

Population projections conducted after the construction of Corin Dam indicated that by 1979 the Cotter River system of dams would not be able to provide sufficient water for Canberra's growing population. Googong Dam was constructed on the Queanbeyan River in NSW to increase security of supply and was completed in 1979.

Googong is an earth and rock-fill embankment dam with adjoining converging chute spillway and nearby 13 metre high earth-fill saddle embankment. It has a storage capacity of 124,500 mega litres and a catchment area of 873 sq km.

The Googong dam catchment is not protected and has rural residential and agricultural land uses. This has meant that the quality of water from Googong requires treatment for drinking water at the Googong WTP.

Improved catchment management for the Googong catchment was foreshadowed as a consideration in the negotiation of a cross-border arrangement, finalised in August 2006.

Projects being undertaken in the catchment include an update of the 2000 sanitary survey, hydrological modelling and bathymetry of Googong Reservoir.

Googong Water Treatment Plant was commissioned in 1979. The Queanbeyan River catchment, which feeds Googong Dam, is an occupied

rural catchment, and as such full treatment at the Googong Water Treatment Plant is necessary to ensure a safe drinking water supply.

The location of the dam is such that the water drawn from the reservoir needs to be pumped to the adjoining Googong WTP at an additional cost. Water supplied from Googong WTP costs much more to produce than Bendora water treated at the Stromlo WTP due additional pumping costs.

Under normal conditions water from the Cotter system is used and the Googong system is shut down and placed on standby. Googong WTP was used extensively during the drought and following the bushfires in January 2003 due to the damage to the Cotter water supply catchment area. It is also available to use at times of exceptionally high summer demand or otherwise as required.

The treatment of the Googong reservoir water involves conventional treatment:

- coagulation by liquid alum and a polymer coagulant aid;
- flocculation;
- clarification and filtration;
- disinfection by chlorination;
- pH adjustment and stabilisation with lime;
- fluoridation by sodium silico fluoride;
- powdered activated carbon (PAC) as required.

The capacity of the original (Stage 1) plant was 180 ML/day. Following the 2003 bushfires, a major augmentation (Stage 2) of the plant was completed which increased the capacity of the plant to 270 ML/day. The new 90 ML/day section of the plant is a dissolved air flotation-filtration (DAFF) plant, which is fully integrated with the existing water treatment plant.

6.2.5. Murrumbidgee River

The Murrumbidgee River was introduced as a new supply source as a contingency measure for the recent drought (2002-05). A pump station has been constructed near Cotter Pump Station to allow up to 50 ML/day to be pumped from the Murrumbidgee to the Mount Stromlo Water Treatment Plant.

This supply will only be drawn upon in emergency conditions such as extreme droughts. The Murrumbidgee River catchment includes agriculture and urban land uses and is difficult to manage for water quality due to the size of the catchments and the stakeholders involved.

ACTEW has been looking at what options are feasible to allow the use of Murrumbidgee River water as an ongoing water supply for the ACT rather than just for emergency use during drought and other catastrophes. Options assessed include investing in a dedicated pipeline to pump water from the Murrumbidgee to Googong Dam and/or upgrading treatment processes at Stromlo to enable more reliable removal of pathogens (via UV or the like).

6.2.6. Wastewater

The Lower Molonglo Water Quality Control Centre (LMWQCC) is the main wastewater treatment facility for Canberra and is the largest inland treatment centre in Australia.

Located one kilometre upstream from the junction of the Murrumbidgee and Molonglo Rivers, LMWQCC treats more than 90 million litres of Canberra's wastewater each day. The process includes physical, chemical, and biological treatment processes before the water is discharged into the Molonglo River.

Some wastewater from the industrial area of Fyshwick and adjacent suburbs is partially treated at the Fyshwick Sewage Treatment Plant and returned to the sewer for full treatment at LMWQCC.

As the wastewater enters LMWQCC, a range of objects are collected by a screening process. Some interesting finds include goldfish, dentures and a range of children's toys. Some items can be seen in the screen room during tours of the facility.

ActewAGL's treatment process ensures that the water that is discharged into the Molonglo River will not affect the environment and downstream users. *The ACT Environmental Protection Act 1997*, under which LMWQCC operates, sets strict licence conditions aimed at protecting the rivers into which water is discharged. LMWQCC meets all these licence requirements, including chemical testing and biological monitoring programs. Performance results are reported monthly.

Extensive monitoring is undertaken to ensure water quality, and ecological monitoring, such as the Fish Monitoring Program, provides information on the river's health. The numbers of macroinvertebrates, which are small crustaceans and insects, are also monitored regularly. Platypuses are often seen near where the treated water re-enters the Molonglo River, and have been known to visit the plant!

The treated water from LMWQCC plays an important role in keeping the rivers flowing and helps support aquatic life, especially during dry periods. Also, the treatment process reduces the levels of nutrients that algae feed on, so that they do not grow in our water systems.

In line with ActewAGL's commitment to ecological sustainability, LMWQCC has developed an Environmental Management Program. LMWQCC was the first sewage treatment facility in Australia to gain certification for the following International Standards:

- AS/NZS ISO 9002 - Quality Management Systems
- AS/NZS ISO 14001 - Environmental Management Systems

During the treatment process all of the solid material, which is called "sewage sludge", is removed and incinerated in a high temperature furnace. The resulting ash, Agri-Ash, is sold to farmers as a soil conditioner.

6.2.7. Wastewater reuse

ActewAGL operates three wastewater reuse projects in the ACT. Via the Lower Molonglo Water Reuse Scheme, a proportion of the wastewater treated at LMWQCC is supplied to nearby vineyards (100 hectares) and a golf course (30 hectares) for irrigation.

LMWQCC is remote from the rest of the city and major reuse opportunity from here is driven by agricultural or industrial activity near the plant.

The LMWQCC also has a role in remotely monitoring and controlling the North Canberra Effluent Reuse Scheme.

6.2.8. Cross Border Water Supply

Through the ACT-NSW Regional Management Framework, NSW and the ACT have entered into more detailed agreements for Water and Settlement. This has led to the finalisation of Memorandums of Understanding (MoU's) between NSW and the ACT on cross border region settlement and on cross border water resources - with the latter agreement being also signed by the Commonwealth. There are a number of legal parameters that govern the provision of water resources, which are the subject of a further tripartite agreement: the Summary of Legislative Responsibilities - Cross Border Water Supply.

The Water Resources MoU (through an exchange of letters amending the wording in the body of the text) provides that the ACT will provide water to developments in the cross border region subject to agreement with NSW whereby developments in the cross border region meet the principles within the Settlement MoU.

There are a series of conditions for the supply of ACT water to the cross border region that must be met. These include:

- consistency with the Settlement MoU;
- compliance with legislative requirements;
- that the Territory has capacity to supply as well as meet its environmental flows and intergovernmental agreement commitments;
- that additional waters from ACT to NSW is taken from the NSW Cap under the Murray Darling Basin allocations;
- that there is compliance with legislative requirements recognising Googong Dam as a priority catchment for the supply of potable water;
- that catchment management embraces emerging best practice to protect down stream flows and water quality;
- that those receiving ACT water are subjected to the same demand management principles and measures as recipients in the ACT;
- that the cost of providing additional infrastructure to access ACT water is not borne by the Territory;
- that other costs of providing services to NSW residents from ACT water supply are agreed and then met other than by the Territory;
- that the same water charging regimes are applied, including the water abstraction charge; and

- that yield and water quality in the catchments takes into account the Commonwealth's paramount rights.
- The ACT-NSW Regional Management Framework and Cross Border Settlement Agreements came into effect in March 2006.
- The ACT-NSW Cross Border Water Resources Agreement came into effect in August 2006.

6.2.9. Cotter Googong Bulk Transfer

On 25 May 2005, the ACTEW Corporation Board of Directors approved the commencement of work on the Cotter to Googong Bulk Transfer (CGBT) scheme to augment the ACT water supply. Involving a \$25 million investment, it will immediately boost the ACT's water supply by providing up to an additional 12 gigalitres per annum.

The CGBT scheme will secure water supply for at least 5 years. In order to secure water supply until at least 2023, the Future Water Options Implementation Plan informed that the ACT water supply system would need to be supplemented by the transfer of water from the Murrumbidgee River. The Implementation Plan recommended to the ACT Government that water could be abstracted from Angle Crossing and transferred to Googong Dam, and that this option be implemented immediately.

The information concluded in April 2005 was based on conceptual designs only. Since presentation of the FWO Implementation Plan, ACTEW has further developed the hydrological, water quality, operating cost analysis and considerations for both an extended Cotter Googong Bulk Transfer project and Angle Crossing to Googong proposal. The difference between the original CGBT and the extended CGBT (ECGBT) is that the extended project includes abstracting water from the Murrumbidgee River at Cotter Pump Station, pumping to Mount Stromlo and applying UV treatment before transferring to Googong for storage, in addition to the Bendora and Cotter water. In effect, this is the same as the Angle Crossing project but with a different point of abstraction from the Murrumbidgee.

ACTEW has concluded that it is feasible to extend the performance of the Cotter to Googong Bulk Transfer scheme and use it as the principal means to secure reliability of water supply to 2023. A further investment of \$15 million has now been approved by the Government to implement the ECGBT.

6.2.10. Demand Management

There are many factors that have recently affected ACTEW's water management strategies. These range from natural disasters to national water policies. The drought, environmental flow requirements and the 2003 bushfires have all reduced the ACT and the surrounding regions available water. The ACT Government's water resource strategy *Think Water, Act Water* and accompanying Implementation Plan, provides the framework for managing, using and conserving the regions water resources for both community and government. The aim is to minimise local environmental

impacts while still achieving other national objectives such as the Murray-Darling River system.

6.3. Investment

6.3.1. Role of ACTEW

ACTEW Corporation Ltd (ACTEW) is a government owned holding company with interests in providing water, wastewater, natural gas, telecommunications and energy services to the people of Canberra and the surrounding region of the ACT.

ACTEW operates a unique public-private partnership with Australian Gas Light Company (AGL), and contracts ActewAGL to handle all operations. ActewAGL began operations on 3rd October 2000 as a joint venture (JV). Through the JV arrangement:

- ACTEW retains ownership of all water and wastewater infrastructure;
- ACTEW holds all the operational licences; and
- ACTEW engages ActewAGL to manage and operate ACTEW's water and wastewater business governed by a "Utilities Management Agreement" (UMA).

The joint venture, along with ACTEW, continues to provide some of the best quality services in Australia, and remains committed to environmental sustainability and supporting the local community.

ACTEW strives to optimise its water and wastewater utility services, and in doing so maintain a leadership role of a multi-utility operating in the public private partnership model. ACTEW aims to manage its assets and business sustainably, to provide quality service to our customers while building value for our owners.

6.3.2. Water and Sewerage Business

Utilities Management Agreement (UMA): As 100% owner of the water and wastewater assets and licence holder for service provision, ACTEW Corporation manages the operation and maintenance contract for water services with ActewAGL Water Division. The water and sewerage business is run under a long-term contract for operations and maintenance with ACTEW AGL, the Utilities Management Agreement (UMA). The UMA was finalised in 2005 after a five-year transitional period in an Alliance Agreement. The Alliance Agreement Phase was used to establish true costs and risks associated with the business, with most risks in that time borne by ACTEW. Under the UMA appropriate risks and rewards are shared with ACTEW AGL joint venture.

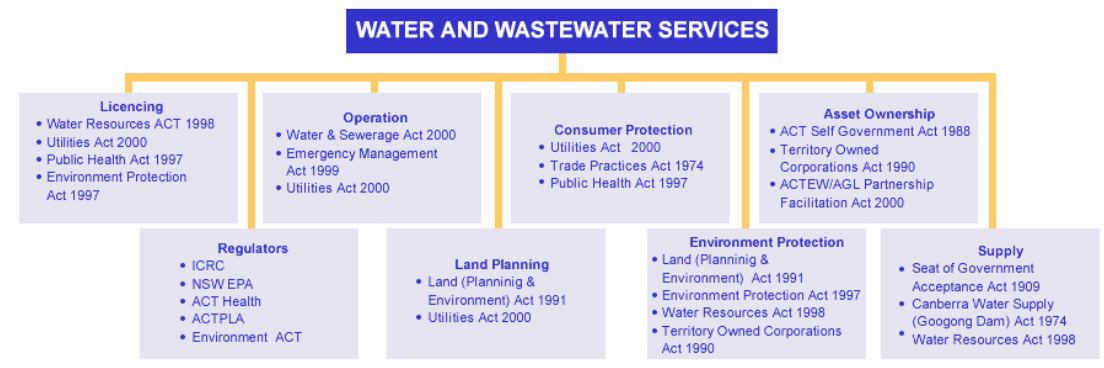
The UMA is managed through a range of plans listed below:

- Water and Sewerage Emergency Plan;
- Water Resources Management Plan;
- Risk Management Plan;
- Asset Management Plan;
- Compliance Plan;

- Exit Plan;
- Operating Plan;
- Research & Development and Industry Development Plan;
- Health Safety & Environment Management Plan;
- Customer Services Plan;
- Human Resources Plan.

Recognising the long lives of most infrastructure, a lifecycle asset management approach has been implemented to minimise lifecycle assets costs through effective planning, design, creation, operation, maintenance, replacement and disposal of assets. Detailed asset management plans are prepared and reviewed annually based on continuous monitoring of asset condition and performance. Computerised asset registers, spatial information systems (GIS & CAD) and works management systems are used by ActewAGL to record data on asset performance.

ACTEW is responsible for the funding of both operational expenditure and the capital works program that is established each year through these plans. The licensed entity and ultimate responsibility in providing the water and sewerage services to the Canberra community is ACTEW. Legislation governing the supply of water and sewerage services to the ACT region is outlined below.



6.4. Planning Development and Regulation

6.4.1. ACT Government Water Resources Strategy

The ACT Government announced the development of a draft Water Resources Strategy in December 2002. Following extensive community involvement and input from a range of experts, the ACT Government released the final water resources strategy *Think Water, Act Water – A Strategy For Sustainable Water Resources Management* on 28 April 2004.

The strategy defined actions to achieve sustainability objectives for water use in the ACT to 2050, including to:

- increase the efficiency of water usage; and
- provide a long term reliable source of water for the ACT and region.

ACTEW has delivered against the key objectives outlined in *Think Water, Act Water*. One of ACTEW's key responsibilities was to report back to the ACT Government on options for a new water source to the ACT and region

6.4.2. Future Water Options

Previous analysis had indicated that the ACT would need a new water supply by 2017, to meet demand for a population of about 405,000. Several issues had emerged in recent years that motivated reassessment of this prediction:

- The current drought was developing into one of the worst on record with experts concerned it may be an indication of permanent climate change for the region;
- The Cotter River water supply catchment was almost completely burnt in the bushfires of 2003 and is expected to deliver reduced inflows to water storages as it recovers over time;
- The ACT Government announced a population policy in the Canberra Spatial Plan of 500,000 by 2032;
- The Government's water strategy, *Think Water, Act Water* had set water efficiency targets of a reduction in per capita mains water use of 12 per cent by 2013 and 25 per cent by 2023;
- Environmental Flow Guidelines were first introduced in 1999 and have since been reviewed; and
- As water restrictions continued, the impacts on the community were being realised as significant, bringing attention to determining what levels of water restrictions should be allowed for in planning for a long-term reliable water supply.

Think Water, Act Water charged ACTEW with the responsibility of assessing the reliability of the existing water supply and recommending options for new sources for the ACT Government, and set a target of March 2005 to achieve this.

The Future Water Options Project was launched on 30 April 2004 by ACTEW. The Project built on earlier work that had identified possible new water sources for the ACT and Region, and investigated three main water sources for future supply:

- Building a new dam near Mount Tennent, south of Tharwa;
- Enlarging the existing Cotter Dam; and
- Transferring water from Tantangara Dam in NSW into the ACT.

After nine months of detailed study and analysis the Future Water Options team provided their crucial findings and recommendations to the ACTEW Board and ACT Government.

Two key reports were provided to the ACT Government:

- An assessment of the need to increase the ACT's water storage in December 2004 predicting the future reliability of the existing supply; and
- Implementation Plan – A recommended strategy to increase the ACT's water supply in April 2005 recommending implementing options to increase the reliability of the ACT's water supply.

The final recommendations of Future Water Options were to:

- Implement the Cotter Googong Bulk Transfer where surplus water from the Cotter water supply catchment in the west is transferred through the existing reticulation network into Googong Dam (currently only 1/3 full); and
- Implement the Angle Crossing Option where water is pumped from the Murrumbidgee River, near Angle Crossing, to Googong Dam via Burra Creek.

Additionally, it was recommended that:

- The remaining options of an enlarged Cotter Dam to 78 GL, a small (43 GL) or a large (159 GL) Tennent Dam and transferring water from Tantangara Dam down the Murrumbidgee River into the ACT be retained as future viable options;
- ACTEW be ready to implement one of these options without delay, if required, through the development of a work program, implementation of formal processes for regularly reviewing the six assumptions, and completing analysis, design and other relevant technical studies for an approval process; and
- Additional technical analysis be undertaken for each of the dam options, including refining the dam design, further detailed examination of pipeline routes and additional examination of the benefits of building a new water treatment plant near the Tennent Dam versus transferring water from the Tennent Dam into the Mount Stromlo Water Treatment Plant.

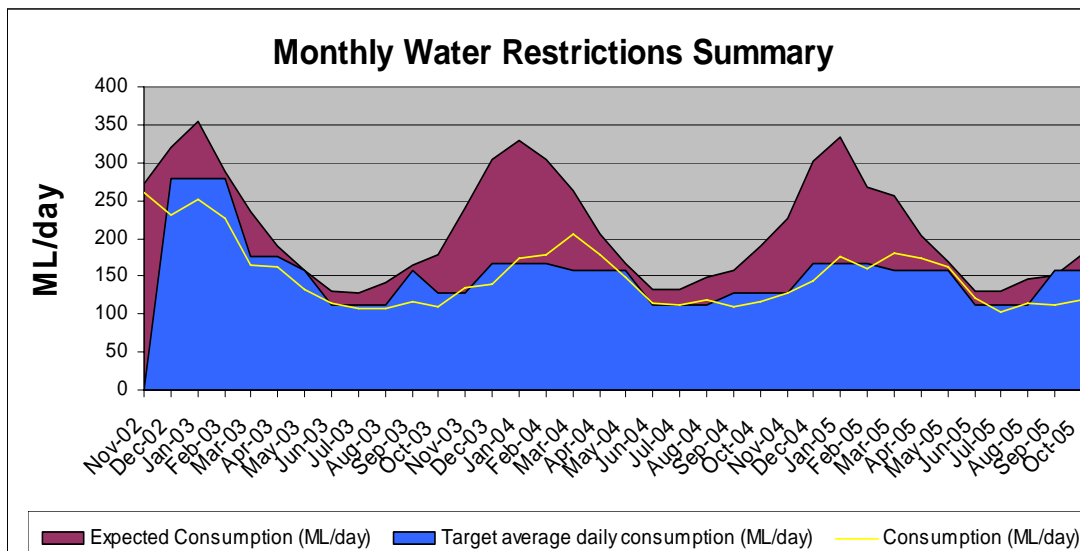
6.5. Key Issues and Priorities

6.5.1. Drought and Water Restrictions

Like most jurisdictions, the ACT has imposed temporary water restrictions over the last few years, as well as introducing permanent water conservation measures in 2006.

An extensive public education campaign was undertaken to raise awareness, seek cooperation and educate the community about the seriousness of the situation as well as ways to reduce water consumption. The ACT has observed a high level of compliance with water restrictions since their introduction.

Below is a graph showing the effectiveness of the recent restrictions. The maroon line represents expected water consumption if restrictions were not in place. The yellow line represents actual consumption that generally follows the blue area representing target consumption. This indicates the success of the combination of measures taken to protect ACT water during this drought.



Tighter restrictions applied over the summer months as this was found to be the most effective period to conserve water due to the highly variable climate in the ACT with cold frosty winters and hot, dry, summers. The significant difference in demands for summer and winter were due to the high proportion of water used in summer for garden irrigation.

6.5.2. Permanent Water Conservation Measures

ACTEW continued to work with the ACT Government to maintain and develop initiatives to reduce water demand. With improved security of supply, the year saw a shift in focus from short-term water restrictions to a continuation of the many sensible water use habits the community had practiced during the early stages of the drought.

On 1 November 2005, ACTEW lifted Stage 2 Water Restrictions and in their place launched a trial of water conservation measures on behalf of the ACT Government.

On 31 March 2006 the final scheme of Permanent Water Conservation Measures (PWCM) was launched. The ACT Government, through its water resource strategy *Think Water, Act Water*, foreshadowed the introduction of PWCM, a set of low level water use limits to be put in place on a permanent basis as a means of achieving potable water savings of 25 per cent by 2023..

6.5.3. Water Sensitive Urban Design Guidelines

In April 2006, the ACT Planning and Land Authority (ACTPLA) released draft guidelines for water sensitive urban design (WSUD) in Canberra. WSUD is a philosophical approach to urban planning and design that aims to integrate the management of the total water cycle in to the urban development process. The implementation of WSUD involves the application of a broad range of measures aimed at:

- reducing the reliance on the town water supply system;

- optimizing the opportunities for the reuse of wastewater (both treated effluent and greywater) and stormwater; and
- reducing the export of stormwater runoff and associated pollutants to pre-development levels.

The guidelines provide mandatory targets for mains water use reduction and for stormwater quantity and quality managements. The guidelines also provide guidance on a range of measures that can be implemented to achieve these targets, details of assessment tools (including input parameters) and a range of acceptable solutions. They apply to all development and redevelopment regardless of whether it is residential, commercial, industrial or institutional. The guidelines apply to all phases of the planning and development from metropolitan level planning down to requirements on individual blocks. As such, the guidelines define a shared responsibility between government, developers and builders.

Following public and industry consultation, ACTPLA is refining the guidelines based on feedback from this consultation process. Once these amendments have been finalized, the guidelines will be added to the Register of Planning Guidelines under the Territory Plan and their application will become mandatory in all future development and redevelopment.

Given the inherent uncertainties in the provision of a long term, secure water supply, and the continuing issues with drought and climate change, the key priorities for water in the ACT are as follows:

6.5.4. Future Water Supply

To ensure a secure supply into the future, ACTEW will continue its work on the Future Water Options, including:

- Review, monitor and report on the six key water supply planning assumptions (population growth and cross border water supply; climate change; environmental flows; recovery of water supply catchments after 2003 bushfires; water efficiency targets in *Think Water Act Water*, system performance criteria - duration, frequency and severity of water restrictions);
- Continue additional work including technical analysis and planning on the three main water options: enlarged Cotter Dam, new Tennent Dam and transfer from Tantangara Dam in NSW;
- Optimise the Cotter Googong Bulk Transfer of water from the Cotter catchment to the Googong Dam;
- Implement the extended CBGT by drawing water direct from the Murrumbidgee River and applying a UV treatment process;
- Provide the ACT Government with a report on the success of the Cotter Googong Bulk Transfer Scheme, including analysis of the security of the ACT's water supply as a result of the scheme;
- Investigate opportunities to further maximise the efficiency of the existing water supply system with any necessary investment in capital expenditure and new technology;
- Liaise with the Environmental Protection Authority regarding the monitoring of the newly introduced environmental flow levels;

- Work with the ACT Government to achieve: a satisfactory ACT Cap for the Murray - Darling Basin; and the promotion of an integrated regional approach to ACT/NSW cross-border water supply and management.

6.5.5. Future Water Demand

ACTEW will administer and report on the introduction and management of Permanent Water Conservation Measures to achieve an ongoing reduction in water consumption; and prepare to manage the revised water restrictions regime if necessary.

ACTEW will work with the ACT Government to achieve:

- a reduction in per capita consumption of mains water by 12% by 2013 and 25% by 2023 and an increase in the efficiency of water usage.
- Sustainable total water cycle management.

6.5.6. Wastewater

- Investigate opportunities to further maximise the efficiency of the existing wastewater system with any necessary investment in capital expenditure and new technology.
- Develop a strategic plan for the development of Fyshwick Sewerage Treatment Plant and the North Canberra Water Reuse Scheme.
- Investigate and monitor new industry standards in relation to modelling of wastewater network performance.
- Complete preliminary design work and commence detailed design for the expansion of the secondary treatment facilities at Lower Molonglo Water Quality Control Centre.

6.5.7. Water Catchments

- ACTEW will work with the ACT Government to achieve appropriate catchment management governance and management arrangements in Cotter, Googong and Murrumbidgee Rivers catchments.
- Continue the rehabilitation of the lower Cotter catchment to improve water quality in the reservoir.