

# 2005 Australian Capital Territory Infrastructure Report Card

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# Communiqué

World-class infrastructure is vital to the Australian Capital Territory's (ACT) economy. It underpins the delivery of essential services, drives economic growth, supports social needs and is closely linked to the high quality of life that ACT residents enjoy today.

All ACT individuals, corporations and governments benefit from appropriate infrastructure or suffer the costs of inadequate or deteriorating infrastructure.

The benefits and costs associated with infrastructure performance are continuous and, over time, can accumulate to amounts of major economic significance. It is therefore of paramount importance that infrastructure meets today's needs and through responsible planning, maintenance and construction and continues to do so in the future.

While noting the generally sound state of ACT infrastructure, Engineers Australia is concerned that:

- ▶ Significant parts of the ACT's infrastructure are aging and nearing the end of their economically useful life.
- ▶ Current funding commitments are either inadequate or yet to be identified, to support the substantial costs of renewal and replacement.
- ▶ Current planning and political processes may not provide the necessary long-term focus.
- ▶ Only limited infrastructure information was available in some key areas, such as Telecommunications.

To articulate the importance of infrastructure in the wider community and explain these concerns, Engineers Australia has produced the *2005 Australian Capital Territory Infrastructure Report Card*.

The report examines key infrastructure sectors in the ACT, evaluates the status of assets and planning processes and assigns a rating which can range from A (very good) to F (inadequate). In the ACT, all ratings are in the range A to C.

Detailed ratings are given below, alongside the national ratings from the *2001 Australian Infrastructure Report Card*.

Category	2005 ACT Report	2001 Australian Report
Roads	<b>B</b>	C
Rail	<b>Not rated</b>	D-
Airports	<b>B</b>	B
Potable Water	<b>C</b>	C
Wastewater	<b>B</b>	C-
Stormwater	<b>C</b>	D
Electricity	<b>B</b>	B-
Gas	<b>A-</b>	C
Telecommunications	<b>Not rated</b>	B

The ACT has a number of advantages over other jurisdictions in Australia in the area of infrastructure provision and maintenance, including the compactness of the Territory and the single layer of sub-federal government.

Substantial infrastructure was transferred from the Federal Government to the ACT Government in 1989, with the subsequent sixteen years of self-government seeing considerable achievements in ACT infrastructure planning and management.

While ACT infrastructure is generally in a better state than the average for Australia, ACT residents should not be complacent, particularly given ACT population growth forecasts and the age of infrastructure in the ACT. This report finds that there is some evidence of insufficient priority being placed on the funding of maintenance and refurbishment of infrastructure assets.

Most sectors, with the exception of the gas sector, require significant enhancement before they could be regarded as meeting current and future needs. The only way that this will occur is if infrastructure planning, maintenance and development become a priority for both levels of Government — Federal and Territorial.

For those sectors that have rated a C, early attention is needed in one or more areas. Typically, major changes are required in asset reliability, asset management, strategic planning and/or sustainability. Delays in initiating and funding the necessary changes will lead to serious impacts on the community.

From the limited information available, it is unclear whether the current policies and practices of government and infrastructure providers adequately address the security needs of key ACT infrastructure.

The provision and management of infrastructure needs to achieve a balance between a number of factors, including levels of service, pricing, environmental, sustainability, and the community's ability and willingness to pay. Community choices on infrastructure services should be based on sufficient and reliable information. This report seeks to provide reliable, independent information and ratings on the ACT's infrastructure, and to stimulate debate on the requirements for maintaining and developing that infrastructure into the future.

## Recommendations

Engineers Australia recommends the following to ensure that the ACT's infrastructure will, in time, meet the needs and expectations of the business and government sectors, and the wider community.

1. Funding for infrastructure must be increased to ensure it is being maintained at a level that optimises its life, and continues to support the ACT's social and economic development.
2. The ACT government should establish a mechanism to periodically obtain independent advice on the planning, provision, operation, maintenance, performance, funding and resourcing of each key infrastructure sector.
3. The ACT community should be appropriately informed about and actively participate in the debate around infrastructure service standards.
4. The benefits to be gained from increasing private investment and other private sector activity in the ACT's infrastructure should be identified by governments as a key element in the planning, delivery, development and maintenance of that infrastructure.
5. The ACT government must take a more proactive role in the telecommunications sector to encourage the provision of infrastructure and services collectively by the various telecommunications providers within the ACT.

# Ratings Summary

The following table summarises the 2005 ACT Infrastructure Report Card ratings.

Category	Grade	Comment
<b>Roads</b>	<b>B</b>	The overall rating for roads is based on committed expenditure on road maintenance being above current service standards, but below long-term target levels, which is an important asset management strategy if the optimum life of the road assets is to be achieved. It also takes into account the successful implementation of road safety strategies, and that there are increasing levels of public interest in the condition of roads-related infrastructure.
<b>Rail</b>	<b>Not rated</b>	As the rail infrastructure to the ACT is relatively insignificant and only limited information on its condition is available, no rating has been given.
<b>Airports</b>	<b>B</b>	The rating for airports reflects that infrastructure requirements for improving the capacity and functionality of the airport have been identified, and are programmed as part of upgrade works. It also takes into account infrastructure constraints such as apron space for overnight aircraft parking not meeting current demand, heavy aircraft restrictions applying to the runway (which restricts the type and number of heavy landings / take-offs in a given time period) and inadequate terminal capacity for passengers at peak periods.
<b>Potable Water</b>	<b>C</b>	The performance of the potable water system in meeting water quality standards is adequate, with no recent non-performance or regulatory breaches. However, the potable water sector in the ACT has been rated as C because significant additional investment is required to meet current and near-term future demand for water in the ACT and surrounding region. This is required in order to capture and store available water resources so as to bring service standards in terms of water restrictions more in line with community expectations.
<b>Wastewater</b>	<b>B</b>	The overall rating for the wastewater sector in the ACT takes into account that the ACT's sewage treatment facilities continue to provide high quality effluent that satisfactorily complies with discharge licensing requirements. The rating also reflects new initiatives to capture the economic value inherent in wastewater, such as sewer mining or wastewater discharge reuse, have been initiated. This is balanced by reports that many sewer mains are operating at capacity levels, which may need enlarging to serve increased urban development in those areas. The extent of the funding required to increase sewerage system capacity was not available for inclusion in this study.

Category	Grade	Comment
Stormwater	C	The rating for stormwater infrastructure in the ACT has been assessed as C, reflecting the known condition of the current asset and current expenditure levels. It also takes into consideration the increasing density of the urban environment and associated greater potential for stormwater runoff, which is not sufficiently offset by other initiatives such as the installation of rainwater tanks or temporary storage of stormwater runoff on-site. Also identified was a lack of strategic planning, which is important in relation to the integration and financing of stormwater initiatives.
Electricity	B	The overall rating for electricity is based on no recent material failure in the delivery of electricity supply services. As well, investment in preventive maintenance and new capital works to maintain current service standards and increase capacity appears appropriate to meet demand. Demand management initiatives and the development of renewable energy sources are also contributing to the overall sustainability of electricity in the ACT.
Gas	A-	The rating for the gas infrastructure sector acknowledges that the age of the assets compared to regulatory life is low; the security and reliability of supply is backed up with a second gas supply point; and, the gas supply system is reported to meet customer expectations, with appropriate levels of service being met.
Telecommunications	Not rated	Only limited information on telecommunications infrastructure in the ACT was available for this study. Therefore, no rating has been given.

# 1. Overview

## 1.1 Purpose

The purposes of the *2005 Australian Capital Territory Infrastructure Report Card* include:

- ▶ Raising awareness of the fact that infrastructure underpins the community's quality of life and that inadequate infrastructure impedes economic and social growth;
- ▶ Generating debate on the quality and level of infrastructure provision (which includes condition, distribution, funding and timing) required to meet society's needs;
- ▶ Encouraging the implementation of best practice infrastructure provision and management including adopting total asset management principles, triple bottom line approach and demand management; and
- ▶ Identifying the state of the infrastructure sectors and the challenges facing infrastructure providers.

## 1.2 Background

The *2005 Australian Capital Territory Infrastructure Report Card* has been developed to provide a published resource focused on key infrastructure assets within the Australian Capital Territory. The *2005 Australian Capital Territory Infrastructure Report Card* was researched and documented by GHD Pty Ltd on behalf of Engineers Australia. This follows a sequence of similar documents for Australia as a whole and for the other States and Territories as outlined below.

- ▶ In 2000, *A Report Card on the Nation's Infrastructure* was published, which examined roads, bridges, railways, water and wastewater.
- ▶ In 2001, the *Australian Infrastructure Report Card* was published, being an expansion on the previous report.
- ▶ In 2003, the first of the State specific publications was published with the *New South Wales Infrastructure Report Card*.
- ▶ 2004 saw the second of the State specific publications with the *Queensland Infrastructure Report Card* being developed.
- ▶ In 2005 a round of State and territory specific report cards were progressively produced, with the *Victorian Infrastructure Report Card* released in June and the balance by September 2005.

These documents highlight issues relating to Australia's physical infrastructure, outlining key themes and areas for improvement. The documents provide readers with the ability to understand the complexity, scope and issues facing our infrastructure, thus leading to an increased level of understanding by the general community.

This report provides a strategic overview of the ACT's infrastructure that other organisations can use when they undertake detailed analysis of particular infrastructure types. It also provides a benchmark that the community can use to identify needs and evaluate alternative infrastructure priorities over time.

## 1.3 Process

The general objective of this Report Card is to rate the quality of transportation (roads, airport, rail), potable water, stormwater, wastewater, electricity, gas and telecommunications infrastructure at a Territory level. Ratings have been based on an assessment of asset condition, asset availability and reliability, asset management, sustainability (including economic, environmental and social issues) and security.

Ratings used are identical to those used for the *2001 Report Card* and are:

- A Very Good** Infrastructure is fit for its current and anticipated purpose in terms of infrastructure condition, committed investment, regulatory appropriateness and compliance, and planning processes.
- B Good** Minor changes required in one or more of the above areas to enable infrastructure to be fit for its current and anticipated purpose.
- C Adequate** Major changes required in one or more of the above areas to enable infrastructure to be fit for its current and anticipated purpose
- D Poor** Critical changes required in one or more of the above areas to be fit for its current and anticipated purpose.
- F Inadequate** Inadequate for current and future needs.

The assessment was carried out through research and consultation. Interviews were held with relevant stakeholders and industry groups, various publicly available documents were researched and analysed, and a summary report was written. Each sector was then assessed using the methodology contained in the Appendices.

In arriving at a rating, the concepts of 'level of service' and 'fitness for purpose' were reviewed for each infrastructure sector. The process was to consider whether 'level of service' was defined and how it varied; identify changes or trends or future needs; any performance indicators; then assess whether the infrastructure was fit for its current and anticipated service based on these parameters; and finally determine a rating.

The assessment has relied on publicly available information and has, in line with its aims, focused on strategic issues, supplemented by quantitative performance measures where these were readily available. The work was oversighted and coordinated by a Steering Committee of Engineers Australia Canberra Division members and officers, with the support of a range of sector experts drawn from Engineers Australia's member base in providing advice and input to the report.

This report, together with the previous Report Cards and associated information, is available electronically on the website [www.InfrastructureReportCard.org.au](http://www.InfrastructureReportCard.org.au).

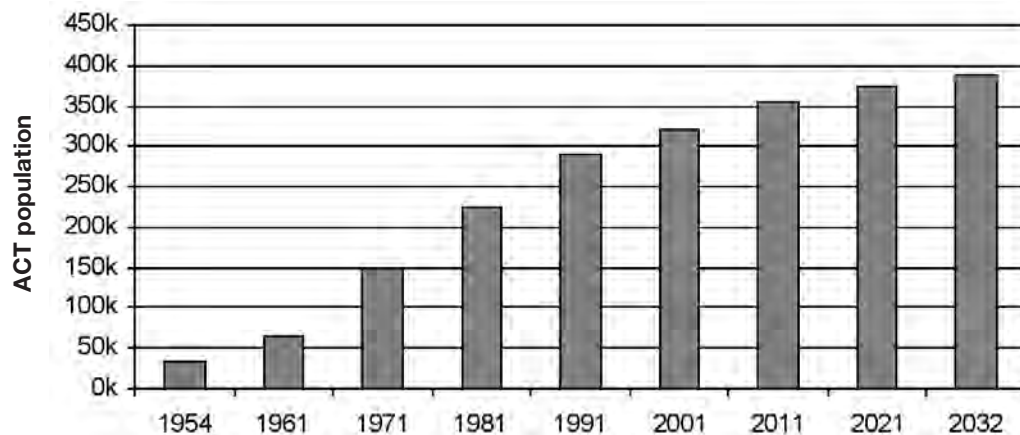
## 1.4 General Significant Issues

### 1.4.1 Canberra and the ACT

Statistics made available by the Australian Bureau of Statistics indicate that, as at 2001, 99.8 percent of the ACT population resided in Canberra. Infrastructure in the ACT is therefore predominantly that which exists in and supports the Canberra urban environment, a fact that is reflected in this report, which predominantly assesses Canberra's infrastructure. It is noted that many of the same issues identified with infrastructure in Canberra also apply to smaller rural centres within the ACT.

### 1.4.2 Population Growth in the ACT

The following graph indicates the 'official projected population growth' in the ACT as at 2003<sup>1</sup>. On current trends the population of Canberra is predicted to grow to approximately 389,000 by 2032. At 30 June 2003, the ACT's population was determined to be 322,600.

**Figure 1: Population Growth for the ACT**

### 1.4.3 Canberra the National Capital

Canberra, as the Nation's Capital, is a showplace for what is best about Australia. It provides a window on Australia for both Australians and people overseas.

Most of the high standard infrastructure that supports this profile was developed by the Federal government, prior to handing most of it to the ACT Government in 1989 to operate, maintain, replace and upgrade. The need to manage those infrastructure assets so that they continue to meet the high standards befitting Australia's national capital is a significant challenge to the ACT Government, particularly as the ACT Government seeks to balance that need against the ability and willingness of the ACT community to pay.

Further, Canberra is the seat of government for Australia. It provides Australians with a sense of national identity. It also provides our neighbours in the region and our overseas partners with a focal point for establishing and maintaining international dialogue, and as an entrée into our national administration and institutions.

### 1.4.4 General Information on Canberra

The ACT is an area of around 2,360 square kilometres, transferred to the Commonwealth of Australia by the State of New South Wales in 1911. Canberra is located to the northern end of the ACT, and is around 300 km by road from Sydney and 650 km by road from Melbourne.

Self-government for the ACT was proclaimed on 11 May 1989. While the ACT has the second smallest population of Australia's six States and two Territories, it has the highest population density, and is the only one of the eight without a sea border. The ACT has a height above sea level of around 570 metres, and is one of the driest capital cities in Australia.

At 30 June 2003, the ACT's population was determined to be 322,600.

### 1.4.5 ACT Urban Planning Arrangements

#### *National Capital Authority*

The National Capital Authority (NCA), a Federal Government agency within the Local Government, Territories and Roads function of the Department of Transport and Regional Services, is a Statutory Authority.

The NCA was established in 1989 as part of the introduction of self-government in the ACT. It was established to secure the Federal Government's continuing interest in the planning and development of Canberra as the nation's capital. Canberra is a unique place in Australia being the nations capital as well as an evolving city and community.

The NCA fulfils its role of “safeguarding and enhancing the significance of the national capital”.

Under the Australian Capital Territory (Planning and Land Management) Act 1998, the NCA is required to prepare and administer the National Capital Plan, including constant review and public consultation.

The object of the National Capital Plan is to ensure that Canberra and the Territory are planned and developed in accordance with their national significance.

The National Capital Plan is the overarching strategic plan for the ACT — a land use policy plan that reflects the national significance of Canberra and the Territory. It is complimented by a Territory Plan that is prepared and administered by the Australian Capital Territory Planning Authority.<sup>2</sup>

### **ACTPLA**

The ACT Planning and Land Authority (ACTPLA) is the current planning body, which was created on 1 July 2003 replacing its predecessor, the Planning and Land Management Authority (PALM). ACTPLA is responsible for the Territory Plan, the land release program, development applications, leases and licenses, regulating development and the building industry, land use, community consultation and public information.

The fundamental purpose of the Territory Plan is to provide the principles for managing land use change and development within the ACT in a manner consistent with strategic directions set from time to time by the ACT Government, Legislative Assembly and community. Together with the *Land Act* and National Capital Plan, it provides a comprehensive and transparent framework for consideration of development proposals.

The Territory Plan is the key statutory planning document in the ACT, providing the policy framework for the administration of planning in the ACT in the form of land use policies for development in the ACT. The Territory Plan is established under part 2 of the *Land (Planning and Environment) Act 1991*. The core objective of the plan is to provide the people of the ACT with an ecologically sustainable, healthy, attractive and safe environment in which to live, work and recreate.

The purpose of the Territory Plan is to manage land use change and development in a manner consistent with strategic directions set by the ACT Government, Legislative Assembly and the community. It must not be inconsistent with the National Capital Plan. The Territory Plan includes broad principles and policies that guide development, through land use specific objectives and policies. The Territory Plan consists of the Territory Plan Map (the Map) and the written statement, and may also be subject to draft variations.

Any development undertaken in the ACT has the potential to impact on the principles in the Territory Plan. Where there is a potential impact, the development will need to undertake a preliminary assessment, and in significant cases may require an Environmental Impact Statement. This is followed by a development application, coupled with a variation to the Territory Plan where appropriate.

The Canberra Spatial Plan (2004) is one of the three elements making up the ACT Government’s Canberra Plan, with the other two being the Social Plan and Economic White Paper. The Spatial Plan has created a strategic land use planning framework that takes account of transport, land use, population growth, employment location, land availability, retail and leisure activity, social and cultural issues and ecological factors.

#### **1.4.6 ACT Infrastructure**

Infrastructure in the ACT is owned and managed by a range of entities, both public and private sector, and joint arrangements between public and private sector organisations. Within the public sector, infrastructure assets are primarily those of the ACT Government, although the Federal Government maintains ownership of key assets in and around the Parliamentary Triangle.

Governance of those assets is also subject to input and review by a number of key agencies, including:

- ▶ ACT Government agencies including: Treasury, the Chief Minister's Department, the Office of Sustainability, and Environment ACT.
- ▶ Regulatory agencies including: the Independent Competition and Regulatory Commission in the ACT, and Federal regulatory bodies such as the Australian Communications Authority and the Australian Competition and Consumer Commission.
- ▶ Federal Government through the National Capital Authority.

The asset value of the infrastructure covered in this report is considerable and totals many billions of dollars. Significant proportions are publicly owned assets of the ACT community. Ensuring that the value of these assets is maintained and that service levels are met are major tasks for the ACT Government.

#### 1.4.7 Connectivity

Connectivity is a significant issue for Canberra. It is critical for Canberra to be connected to the rest of Australia by transport infrastructure of the highest standard. This means dual carriage highways heading north out of the ACT linking up with highways heading into Sydney, and dual carriage highways heading south out of the ACT linking up with highways leading to Melbourne. It is noted that sections of the existing Barton and Hume highways that link the ACT to Yass and Melbourne are currently only of single carriageway standard.

Similarly, Canberra will need to be included as a key destination in any fast train infrastructure planning.

Ensuring Canberra maintains a viable air transportation service is an element in a connected transportation network. Not only does this facilitate the workings of the Federal Government, it also ensures all Australians can readily access their nation's capital.

There are similar connectivity issues in the water, energy and telecommunications infrastructure sectors.

#### 1.4.8 Infrastructure Security

The ACT Government has produced a draft protective security policy, which was not made available for this report. It is understood that this policy does not include specific advice in regard to the protection of infrastructure from security threats.

### 1.5 Queanbeyan and Surrounding NSW

The Canberra Spatial Plan acknowledges that Queanbeyan is recognised as part of the urban structure for Canberra, with urban development and growth planning for Canberra to be undertaken such that it is integrated with similar planning in Queanbeyan<sup>3</sup>.

This raises challenges in that planning within the ACT and in Queanbeyan are subject to different legislative and funding arrangements, introducing complexity in joint planning initiatives. This is no different to towns that are on either side of other interstate borders and is an area where the Federal Government can facilitate the planning process. By providing appropriate incentives, action by the Federal Government can lead to the delivery of outcomes that are beneficial to both parties and provide the greatest overall benefit, particularly in the case of the ACT where its close neighbour has a population equating to around 10 percent of its own.

It is noted that in terms of infrastructure, joint arrangements exist where one jurisdiction takes advantage of the close proximity of the other, such as potable water in Queanbeyan which is harvested and delivered using water resource and distribution infrastructure primarily based in the ACT. Similar joint arrangements are in place for sewage and gas infrastructure.

## 1.6 Significant Sector Issues

### 1.6.1 Potable Water

As an essential service, there is concern over the large number of agencies who have roles and responsibilities in the potable water sector, all of which have an important contribution to make. While not a major focus of this report, it was not clear which is the head agency responsible for long-term planning and programming.

### 1.6.2 Wastewater

As many sewer mains are operating at their capacity limits, and many of those systems are nearing the end of their useful service life, there is a need for detailed strategic planning of the upgrading and replacement of those assets. This information was not forthcoming during the course of this study.

Similarly, information on the capacity of the Lower Molonglo Water Quality Control Centre (LMWQCC), relative to current capacity was not available.

### 1.6.3 Stormwater

Knowledge on the condition of stormwater assets in the ACT is limited. Combined with increasing demand and the aging of assets in Canberra's older suburbs, there is a need for improved strategic planning in the management of the stormwater assets.

### 1.6.4 Electricity and Gas

Electricity and gas provision in the ACT were previously owned and operated by two separate organisations. In recent times, these two have been merged into one joint venture, which has effectively reduced competition within and across these sectors. However, the newly regulated ability for retail customers to choose their electricity supplier has reintroduced competition into that sector and provides the model for greater competition across both these sectors in the future.

### 1.6.5 Telecommunications

In preparing this report, the intention was to rate this sector, primarily as it is a critical contributor to the success of the ACT's business sector as well as enabling the efficient operation of the Federal and Territory governments. Rating was not possible due to the lack of publicly available information in a sector that is subject to significant, dynamic competition, and in which technology is rapidly changing the nature of service provision. Greater transparency of infrastructure asset planning and service provision in this sector is required.

## 1.7 Future Directions

### 1.7.1 Infrastructure Development

#### *Levels of Service and Community Choice*

The ACT community needs to be kept informed about the state of the ACT's infrastructure, particularly in regard to the funding required to:

- ▶ Maintain the condition of infrastructure assets at appropriate levels.
- ▶ Operate and maintain those assets safely, efficiently and with respect for the environment.
- ▶ Replace and upgrade those assets to meet the future demands of the community.

The key concept is to provide the community with the opportunity to contribute to the development of infrastructure service standards. This will require greater transparency in asset management planning, with more information being made publicly available than is presently the case.

### *Funding and Delivery*

The development of infrastructure assets typically requires long lead times, reflecting the significant planning required to ensure the community is appropriately consulted, needs are prioritised in accordance with funding constraints, and the regulatory and urban planning requirements are worked through. The Federal Government built almost all the ACT's major infrastructure when it was the single government of the ACT. The current situation is quite different. In the case of future major infrastructure projects such as for potable water and wastewater, achieving the necessary inter-governmental agreements and arrangements will probably be very time-consuming. The overall lead times could span three or more terms of the Federal, ACT and NSW governments.

In working with funding constraints, other jurisdictions have recognised the merit in broadening the availability of infrastructure financing options. There is an opportunity for the ACT Government to make use of the best element of those programs in approaching the development of infrastructure in the ACT.

#### **1.7.2 Key Themes**

The key themes that have become apparent during the development of this Report Card with regards to ensuring a successful future direction for the ACT's infrastructure are as follows:

1. Maintaining the ACT's infrastructure so that it provides the community with the services it requires is a process that needs appropriate consultation and long term planning, as evidenced by the current debate surrounding key infrastructure developments such as the Gungahlin Drive Extension and the augmentation of the ACT's water supply.
2. Two sectors where there is significant private sector involvement in infrastructure provision and maintenance, namely gas and electricity, have rated well in this Report Card. Both sectors are subject to regulation by the Independent Competition and Regulatory Commission, and both are open to competition at a number of levels. The introduction of competition or the threat of competition in some infrastructure sectors is therefore an important contributor to maintaining adequate infrastructure in the ACT, provided competition is supported by effective regulation.
3. Where funding for infrastructure development and maintenance is primarily delivered through government agencies, both Federal and State, such as is the case with roads, water and sewerage, there is a need to ensure the allocation of that funding is done with regard to priorities across the sectors. Funding within each sector, though, will need to reflect community expectations in regard to service standards, and the willingness of the community to fund those expectations.



## 2. Roads

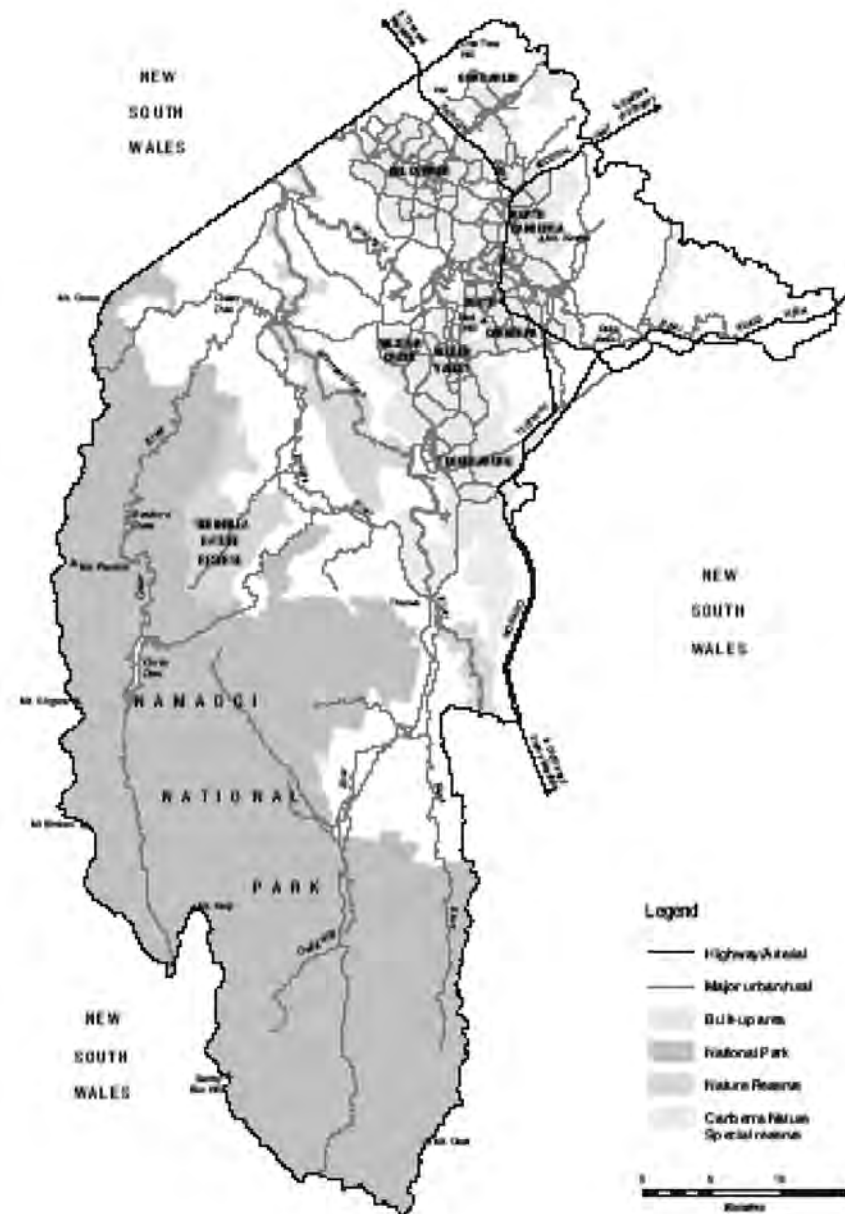
### 2.1 Overview

#### 2.1.1 System Description

The road network in the ACT consists of various classes of road, as well as verges and associated street tree plantings, street lighting, signage, traffic signals, footpaths / bicycle paths and designated on-road bus and bicycle lanes. Detailed information on the existing road network in the ACT is contained in section 2.1.9.

The following diagram illustrates the extent of the ACT road network.

Figure 2: ACT Road Network<sup>4</sup>



Roads in the ACT also include rural roads, although these make up a very small proportion of the road network. They are important to the Canberra community, particularly those small communities outside Canberra that the rural roads directly service, as well as tourism.

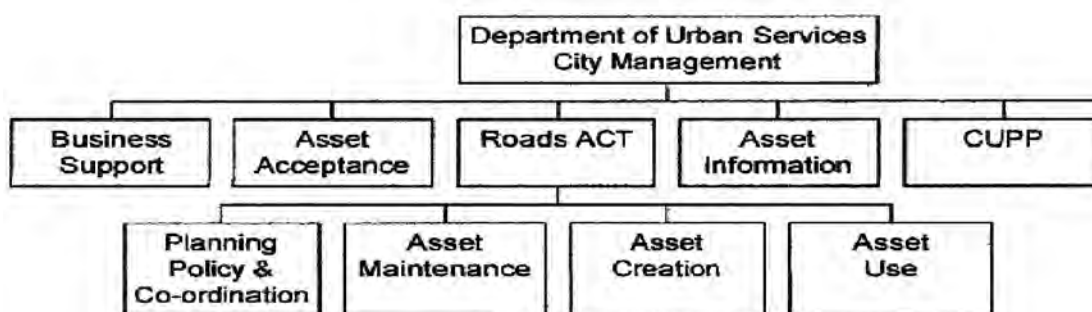
### 2.1.2 Ownership

#### *Roads ACT, Department of Urban Services, ACT Government*

The road system in the ACT is primarily made up of assets owned by the ACT Government, with the remaining road assets owned by the Federal Government.

Within the ACT Government, the Department of Urban Services is responsible for the road network, with Roads ACT the business unit taking the lead role. An organisational structure for the Department of Urban Services is illustrated in the following figure, showing the various units within it.

**Figure 3: Urban Services Organisational Structure<sup>5</sup>**



#### *National Capital Authority*

The NCA is also responsible for the maintenance of key roads and infrastructure within the Parliamentary Triangle, and to a limited extent other assets in central Canberra. The Federal Government retains ownership of these roads as part of the National Capital function.

The NCA manages the following road based assets in the ACT:

- ▶ Commonwealth and Kings Avenue Bridges
- ▶ Scrivener Dam Bridge
- ▶ A number of bridges throughout Capital Circle
- ▶ Anzac Parade, Federation Mall, Capital Circle, King Edward/George Terraces
- ▶ Numerous other roads around central Canberra

The total value of NCA owned roads assets is approximately \$109M, with planned replacements over the next 5 years as part of the Capital Works Program being in the order of \$22M.

### 2.1.3 Governance & Legislative Framework<sup>6</sup>

Legislative requirements influencing and affecting asset operation by Roads ACT include:

- ▶ *ACT (Planning & Land Management) Act 1988*
- ▶ *ACT Government Procurement Act 2001*
- ▶ *Environmental Protection Act 1997*
- ▶ *Fees and Charges (validation) Act 1997*
- ▶ *Gungahlin Drive Extension Authorisation Act 2004*
- ▶ *Heritage Act 2004*
- ▶ *Land (Planning and Environment) Act 1991*

- ▶ *National Environment Protection Council Act 1994*
- ▶ *Road Transport (Dimensions and Mass) Act 1990*
- ▶ *Road Transport (Safety and Traffic Management) Act 1999*
- ▶ *Roads and Public Places Act 1937*
- ▶ *Territory Act 2002*
- ▶ *ACT Utilities Act 2000* (plus subsequent amendments)
- ▶ *Waste Minimisation Act 2001*

### 2.1.4 Sector Trends

There has been recent emphasis by the ACT Government on the development of strategies to promote transport planning in the context of a healthier city<sup>7</sup>. This has translated into programs to focus urban development towards building a more compact city, further development of bus ways (with the potential for inclusion of light rail within the corridors in the future) and facilitating walking and cycling activities.

The strategy also recognises the need to develop ‘missing links’ within the overall road network to ensure that the system for vehicle transport (which includes public transport buses) enables the most efficient use of cars and trucks and other motor vehicles. These improvements to the road network will create the potential for reductions in greenhouse gas emissions, noise pollution and accident costs. Examples of where these significant links have been or are in the process of being developed include:

- ▶ The development of the Barton Highway in north Canberra.
- ▶ The duplication of Fairbairn Avenue in Campbell.
- ▶ The commencement of works associated with the Gungahlin Drive Extension.

The overall trend in the transportation sector is therefore to create an integrated approach to ‘moving people in urban Canberra’<sup>8</sup>, with the roads network remaining a key part of that strategy.

Transportation planning has always had a strong basis with the establishment of key linkages between land use planning and transport planning during the development of Canberra. This planning has also included scope for the development of the public transport system, particularly with the provision of Inter-town Public Transport corridors.

### 2.1.5 Connectivity

As highlighted in section 1.4.1, connectivity of the ACT through its transportation systems is imperative. In the context of roads, this means the following external links require attention in order to maintain this connection to the capital:

- ▶ The links between the ACT and surrounding NSW, primarily Queanbeyan, Yass and Cooma.
- ▶ Improving the Canberra-Sydney and Canberra-Albury corridors, particularly the latter.
- ▶ Establishing and maintaining effective, efficient and safe roads corridors within the ACT, linking town centres, employment nodes, industrial estates and strengthening employment corridors.

Some of these are national issues requiring cooperation between NSW and the ACT and the support of the Federal Government, both in coordination and in funding. The new *AusLink* program should look at these major links and provide the funding support.

### 2.1.6 Security

The security of roads infrastructure in the ACT (aside from petty criminal activity such as vandalism) is not in general, considered to be a significant priority requiring the attention of the asset owners and managers.

### 2.1.7 Sustainability

#### *Economic*

According to the Federal Government's *AusLink* White Paper, the costs of urban road traffic delays in the ACT were estimated to be \$50m in 1995, and are projected to increase to \$200m by 2015. This indicates an increasing congestion profile that has the potential to negatively impact on the ACT economy. However, the road traffic delays are seen to be relatively less of an issue than those in some other major urban centres in Australia, and therefore road congestion in the ACT is more a matter of the expectations of the community.

#### *Environmental*

The ACT road network provides a high level of accessibility and facilitates the ease of movement for Canberra's community, especially by car. Overall congestion and greenhouse gas emissions will be substantially less than that of some other capital cities in Australia. However, as a lack of congestion can stimulate demand, this situation is expected to worsen as population levels rise and as private use vehicle movements continue to grow.

In that context, there are two strategies for the consideration by the ACT community and Government in planning the creation, improvement and maintenance of its roads network:

- ▶ Maintaining a roads system that minimises congestion and therefore minimises trip times, greenhouse emissions, energy consumption, etc.
- ▶ Developing alternative transport options that provide sufficient incentives (i.e. improved public transport services, increased parking charges) for those currently using cars to substitute that mode of transport for one that is more 'sustainable', such as public transport.

These two strategies can be in conflict. For instance, rather than invest in new or upgraded infrastructure to reduce congestion, the congestion can be part of the encouragement for commuters to shift from private cars to public transport.

However, attention to both strategies is required in order to develop a balanced, sustainable approach to transportation that acknowledges the value in investing in developing and maintaining the road network in order to reduce congestion. The planning of Canberra's road network, with its strong hierarchical principles, has effectively contributed to congestion reduction in the ACT and is an important aspect to be maintained in future transport planning.

#### *Social*

Transportation facilitates accessibility to services and lifestyle options for the entire community, and as such, needs to cater to a multitude of requirements. Australian lifestyles today are predominantly based upon the desire for individual choice of transport modes, resulting in the use of private motor vehicles as the main mode of transport for moving around.

An efficient and safe road network is therefore required to support this lifestyle choice, while other initiatives to encourage the use of alternative modes of transport may be developed in parallel, such as encouraging the use of public transport .

It is important that the demand for the road network, and the quality of that network, be managed to ensure that the levels of service adopted meet community expectations and reflect the overall ability and willingness of the community to fund those expectations in the context of other demands for services in the community.

It is noted that the ACT Government's asset management strategy for the roads network emphasises that '*adequate management information on the condition of...[road]...assets*' is required in order to '*support long term planning decisions*', and that the Roads ACT asset management plan states that Roads ACT undertakes a number of community consultations towards identifying 'customer expectations' for the road network as part of defining service standards<sup>9</sup>.

Using the Austroads User Satisfaction Index, a measure of road user satisfaction with the road system, Roads ACT's management of issues including traffic control and safety infrastructure, meeting road user needs, traffic flow management and customer service, were rated to be better than any other road authority in Australia and New Zealand<sup>10</sup>.

### 2.1.8 Queanbeyan and Surrounding NSW

For a population centre of 29,000 the Queanbeyan area receives more traffic than would be expected for its size. A number of factors<sup>11</sup> contribute to the higher traffic volumes including:

- Industrial traffic from Queanbeyan's two industrial areas.
- Proximity to the ACT giving rise to 65 percent of Queanbeyan's labour force commuting to the ACT each day for work. This equates to 8 percent of the ACT's labour force requirements being sourced from Queanbeyan<sup>12</sup>.
- The geographical location of Queanbeyan in respect to the ACT sees most travellers to both the NSW ski fields and the NSW south coast passing through this town.

### 2.1.9 Existing Infrastructure

#### *Roads*

Roads ACT owns and maintains 5,625 lane kilometres of Territorial and municipal sealed roads, and 220 lane kilometres of unsealed road. Roads ACT owns both Territorial roads which are State roads including the arterial road network, as well as Municipal roads including Collector and Local Access roads.

There are major highways in the ACT, which may receive federal funding.

The replacement cost of roads assets managed by Roads ACT is \$2.4 billion.

The NCA owns approximately 24 km of road pavement of varying degrees of classification. The classification of each road varies from category 3 roads, having minor significance or low volume, to category 1 roads that are high profile roads requiring the highest standard of condition. The classification of NCA owned roads differs to that of Roads ACT, with NCA assets generally being nationally significant roads that add to the value of the nation's capital.

The total replacement cost of the NCA owned assets is approximately \$37M.

#### *Bridges and Tunnels*

Roads ACT owns and operates 1,067 bridges and structures, with 687 on the general road network, and 380 on the oversize vehicle network. There are also two short tunnels in the ACT, one on State Circle managed by the NCA and one in Acton managed by Roads ACT.

It is noted by Roads ACT that most of the existing bridge assets in the ACT were designed to meet the design loading criteria current at the time. The bridge assets in the ACT are reported in Roads ACT's asset management plan to be in a fair to good condition. Some minor deficiencies occur throughout the system in relation to wearing surface, expansion joints, and signage. Generally, the condition of ACT bridges is better than interstate assets, as other States have more aged and exposed bridges.<sup>13</sup>

The total replacement cost of bridges owned by Roads ACT (as at June 2004) is \$593 million.

The ACT Government has included a further \$500,000 in its 2005–2006 budget for its ongoing bridge-strengthening program.

The NCA maintain a number of bridges throughout the ACT, the main ones being Commonwealth Avenue and Kings Avenue bridges. There are also several bridges around Capital Hill. The total replacement cost of these bridge assets owned by the NCA is \$71M.

### *Traffic Signals and Street lighting*

Roads ACT are responsible for 214 signalised intersections. A 2001 ARRB study found that the condition of signalised intersections compares well to other interstate bodies, particularly with those of a similar magnitude to the ACT. The total replacement value of these Roads ACT assets is \$21.9 million.

The Roads ACT asset management plan reports that significant funding to upgrade signal controllers and lanterns to LED based systems is required over the next period (2005/2006) in order to avoid increased expenditure in the future.

Roads ACT also controls 72,000 streetlights throughout the ACT. The condition of the underground assets of the streetlights is unknown. The performance of such assets is below Australian and International standards in some older suburbs and will require upgrading in order to reflect the current standards. Current target levels of service in these suburbs are not being achieved. To achieve the target levels of service, it is envisaged that an extra \$100,000 of funding will be required per annum. As at June 2004, the total replacement cost of the street lighting assets controlled by Roads ACT was \$264 million.<sup>14</sup>

### *Lines and Signs*

Roads ACT are responsible for over 70,000 signs (80 percent of which are regulatory) and 6,000 lane kilometres of line marking. The total replacement value of these assets is \$30 million, with line marking of average condition, and signs of good condition. There is a significant portion of the assets reaching the end of their design life, as well as damage and obstruction to some of the assets, which will need addressing in the future. Additional funding to replace and maintain signs of \$3.2 million will be required based on a design life of 12 years.<sup>15</sup>

### *Paths and Cycle ways*

Roads ACT are responsible for 1,797 kilometres of footpaths of varying widths (1.2m to 1.8m) and 355 kilometres of cycle paths of varying widths (1.8m to 3m). The ARRB study<sup>16</sup> found that maintenance of current paths was managed reactively, and a more managed and proactive approach to meet performance requirements is crucial. Approximately 18 percent of community paths require immediate attention, with most damage to paths occurring from tree root invasion/expansion. The total replacement cost for the paths assets of Roads ACT is \$118.6 million as at June 2004.

Due to the increasing age of the path network, and the current performance of 0.6 percent of community paths programmed for maintenance, there is a trend for more liability to arise from damaged pavements. The targeted maintenance levels are 2 percent of total length with a projected increase in funding for maintenance of \$2.0 million annually required to achieve this target.<sup>17</sup>

### *Street Trees and Public Places*

Street trees are an important aspect of the road network, with some substantial plantings in the 1920s contributing to the conversion of the ACT from a 'treeless plain' to what it is today. A number of trees, such as in the median of Canberra Avenue, were planted by professional bodies, including Engineers Australia. Many of those trees planted remain today.

Public civic space is equally an important element of the road network, particularly in regard to the road assets maintained by the NCA, which also have a role as major pieces of social infrastructure at certain times of the year — eg. ANZAC Parade on ANZAC Day.

The issue of trees and their age, condition, maintenance and replacement, is an area where asset management planning techniques would be of benefit, particularly in predicting future financial requirements.

## 2.2 Evaluation

### 2.2.1 Funding

#### *Capital Expenditure*

Major capital expenditure required for the roads network in the ACT includes funding for:

- ▶ New major road links
- ▶ Upgrading major roads, such as duplication or improvement of congested roads
- ▶ The Gungahlin Drive Extension

Where Federal government funding is provided to the ACT for capital expenditure on road improvements, greater transparency is desirable in asset management planning and ACT government budgeting to highlight the allocation of this funding.

As mentioned in section 2.1.5 the new AusLink program should look at providing capital expenditure funding for major road links.

#### *Predicted Maintenance Expenditure*

Roads in the ACT were mostly planned and designed at a time when the Federal Government was responsible for funding their construction, operation and maintenance. In addition, many parkways, arterial (and distributor) roads were designed at a time when the current projections were for a population much greater than the population likely for the near future. The legacy handed over to the ACT Government is therefore a very comprehensive road infrastructure network that requires an above average funding commitment if it is to be maintained at appropriate levels.

In terms of identifying investment requirements for the roads network, the Roads ACT asset management plan provides a structured and sound approach to prioritising expenditure.

Currently, the target level of service for maintenance of roads assets is applying treatments to 3 percent of the road network on an annual basis, with the target level of service being 7 percent.

The following table shows the expenditure amount required to treat 3 percent of the existing road network, compared to both the budget for the 2004–2005 period and target expenditure budget levels to achieve the 7 percent level of service target.

**Table 1: Current and Predicted Road Maintenance Budgets<sup>18</sup>**

Asset Type	Maintenance Expenditure \$			
	Current (3 Year Avg) @ 3% SL	Budget (2004–05)	Target (2004–05) @ 7% SL	Difference
<b>Programmed Maintenance</b>				
Municipal Roads	3,280,900	4,250,000	7,655,400	(3,405,400)
Territorial Roads	4,295,100	6,282,000	9,937,900	(3,655,900)
<b>Routine Maintenance</b>				
Municipal Roads	1,153,600	1,200,000	2,691,733	(1,491,733)
Territorial Roads	864,400	1,000,000	2,016,933	(1,016,933)
<b>TOTAL</b>	<b>9,558,999</b>	<b>12,732,000</b>	<b>22,301,966</b>	<b>(9,569,966)</b>

Inspection of the figures indicates that Roads ACT is committed to spending above the current service standard of 3 percent for 2004/2005 — in the order of 4 percent. It is noted however that this is still significantly below the projected expenditure levels required to achieve the target levels of service for maintenance.

In the Roads ACT 'Customer Satisfaction Matrix', it is reported that the state of the road system and its maintenance are considered to meet community expectations<sup>19</sup>. Prior to committing to expend above the 2004/2005 level of 4 percent, Roads ACT will need to evaluate the benefit to the community of doing so by analysing the road assets to plan to optimise their life by making strategic maintenance investments. This will enable the justification of any additional expenditure identified.

### 2.2.2 Asset Management

#### *Strategic Asset Management*

ACT Treasury introduced a requirement for asset management plans across government agencies in 1997/98. The asset management strategy called for initial, draft plans for ACT Government Departments to be provided by 1997–98, and full plans from 1998–99.

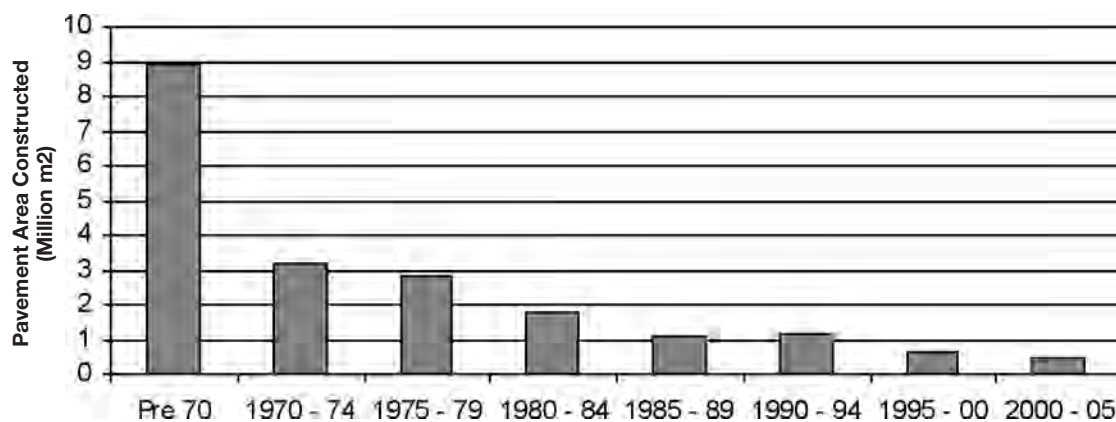
The latest Roads ACT Asset Management Plan 2004–2007 was prepared to reflect requirements set out by the ACT Government's asset management strategy and Urban Services' Framework for an Asset Management Plan for Business Units in Urban Services and Best Practice Guide for Asset Management in Business Units in Urban Services.

These are in accordance with the International Infrastructure Management Manual, with the main requirement of business units being that they must have a sound knowledge of the existing state of their assets and how they are performing.

#### *Asset Condition*

Pavements placed by Roads ACT and, it is understood, those placed by private developers and gifted to Roads ACT, have been designed for a service life of 20 to 25 years. This life can be extended given correct rehabilitation and maintenance regimes that form part of the asset management program. 75 percent of ACT roads were built over 20 years ago, with the following graph indicating the constructed pavement assets over previous years.

**Figure 4: Age Distribution of Roads ACT Road Assets<sup>20</sup>**



With over 75 percent of the ACT's roads constructed more than 20 years ago, and more than 60 percent of the municipal roads having a road surfacing older than 10 years of age, it is not surprising that currently over 30 percent of municipal road pavement surfaces were rated as poor to very poor in condition. The road assets require an extra \$9.6 Million in funding to achieve the new target levels based on target levels and performance criteria outlined later in this section.<sup>21</sup>

Road maintenance expenditure has been decreasing over the past years as shown in the Table below (the Table accounts for inflation). This decrease exists despite the fact that asset size and consumption of assets are increasing, and utilisation of the road asset has increased causing more wear on the surfaces. Furthermore, the asset is continuously aging, and increased expenditure would be expected to ensure that appropriate levels of service are met.

**Table 2: Road Pavement Maintenance Expenditure by Roads ACT**

	Actual Expenditure (\$M)	Expenditure (\$M) Adjusted for Inflation
1997–98	12.3	14.75
1998–99	13.41	15.41
1999–00	11.21	12.84
2000–01	11.62	13.11
2001–02	9.97	11.08
2002–03	7.42	7.77
2003–04	10.5	10.5
2004–05 (Budget)	12.7	12.7

The NCA maintained assets within the Parliamentary Triangle have varying historical and ceremonial significance, with higher significance roads requiring more attention to give a higher standard of serviceability and condition than lower significance roads.

A report on the condition of the NCA maintained assets suggested that 62 percent of road pavements in the network exhibited cracking, with 1.9 percent having potholes.<sup>22</sup>

The structural capacity (i.e. the pavement condition) of NCA roads has been found to be rated, on average, as reasonable. All of the higher category roads meet target levels of roughness, while 16 percent of lower category roads are in poor condition.

Bridges maintained by the NCA require some maintenance, with most issues related to expansion joints, bearings, drainage and some wearing surface defects.

### 2.2.3 Levels of Service

The levels of service for road infrastructure are determined by a number of factors, including:

- ▶ Customer expectations;
- ▶ Technical, safety, and environmental requirements;
- ▶ Legislative and common law requirements; and,
- ▶ Economic considerations and corporate strategies.

These levels of service are delivered through each agency's asset maintenance regime, reflecting asset use and age, and incorporating new assets created into the program. It is important to note that service levels, and therefore, funding priorities are allocated on safety, technical requirements, and to reflect the opinion of the community in terms of setting service targets and a general willingness to pay.

There is a 'duty of care' element to the maintenance of roads infrastructure that acts as a key driver to keeping the assets at a certain level of performance.

The Roads ACT Asset Management Plan 2004–2007 identifies a number changes to the asset management cycle with new standards for desired/target levels of service, including changing from prescriptive based standards to a performance based approach that facilitates measurement and monitoring of current performance against target levels.

The current service levels, and the target service standards, are provided below. Inspection of that information indicates Roads ACT is not achieving current target levels of service<sup>23</sup>.

### *Current versus Target Service Standards*

The target service standards are set out in the 2004–2007 Asset Management Plan and are taken from the ARRB's 'Strategic Asset Management Study' carried out for Austroads in 2000–01. It reviewed the current and target service levels, which resulted in a change of methodology for asset management and associated levels of service in the ACT.

The following tables outline the current service standards as well as the target service standards for roads and bridges. The following table's target levels reflect the more proactive approach required by new asset management strategies for maintenance, with tighter restrictions and time periods for completion of repairs and the like.

**Table 3: Current and Target Service Standards for Road Assets**

Issue/Attribute	Service Standard	
	Current	Target
<b>Programmed Maintenance</b>		
Municipal Roads	Treat 3% Annually	Treat 7–10% Annually
Territorial Roads	Treat 3% Annually	Treat 8–10% Annually
Arterial Road Intervention Levels		
(a) Roughness	Based on a subjective assessment of safety	95% < 100 counts/km 50% < 75 counts/km
(b) Rutting		< 15 mm in >95% of any km
(c) Cracking		< 30 % on any 100m increment
(d) Skid Resistance		All sections > 30m exceeding Austroads recommended level investigated
<b>Routine Maintenance</b>		
Inspections	Ad hoc	Structured inspection program
Intervention Levels		
(a) Potholes and Edging	Repaired within 1 week	Repaired within 2 days
(b) Heavy Patching	Ad hoc	Repaired within 1 month

**Table 4: Current and Target Service Standards for Bridge Assets**

Issue/Attribute	Service Standard	
	Current	Target
<b>Programmed Maintenance</b>		
Replace Bridge Joints	Every 20–30 Years	As required following inspection
Re-level approach slabs	Every 15–20 Years	As required following inspection
Replace bridge bearings	As Required	As required following inspection
Re-analyse major arterial bridge strength	First Analysis now in progress	As required following inspection, prior to any increase in legal load
<b>Routine Maintenance</b>		
Inspections	Based on structured inspection program and reaction to public complaints	Based on structured inspection program
Cleanliness, waterways, removal of blockages and hazards	Based on assessment of safety and government priorities	Based on assessment of safety and government priorities

**Table 5: Current and Target Service Standards for Bridge Inspections**

Issue/Attribute	Service Standard		
	Current	Target	
		Level 1	Level 2
Barriers	3 years	6 months	3 years
Timber Bridges	12 months	6 months	12 months
Concrete Bridges	3 years	6 months	3–5 years
Prestressed Concrete	3 years	6 months	3–5 years
Culverts	3 years	6 months	3–5 years
Retaining Walls	As Required	As Required	As Required
Tunnels	1 week	3 Years	3 Years

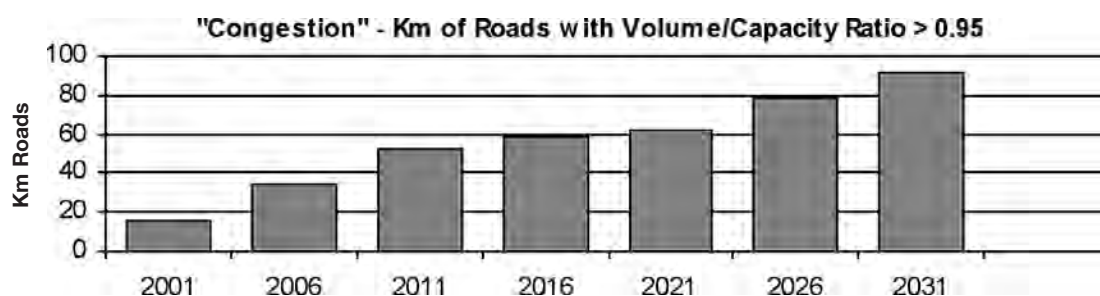
\* Note: Level 1 – Routine Inspections of larger bridges, Level 2 – Condition Inspections of all bridges

Similarly, the above tables for the bridge assets show a more structured approach to maintenance and inspections is targeted, due to the critical nature of these assets as part of the overall network.

**Convenience of Travel**

An indicator of both asset capacity as well as convenience of travel and community expectation is congestion on roads. Currently, the congestion levels of Canberra are low, however the following graph<sup>24</sup> shows the forecasted growth in congestion levels in the years ahead assuming the current ratio of public to private transport.

Figure 5: Growth in Congestion Levels



### Community Expectation

A number of surveys have been conducted since 1997 on the satisfaction of asset users for roads. These surveys indicate both the increasing awareness of customers of asset condition as well as increasing expectation for performance or levels of service.

A 'Customer Satisfaction and Performance Indices Study' in 2000 indicated that the management of roads infrastructure was generally meeting the expectations of the community, with some scope for potentially reducing expenditure although this would need to be undertaken with reference to the more detailed service standards established by Roads ACT.

The following survey<sup>25</sup> as conducted by Artcraft for Roads ACT since 1997 indicates the satisfaction or efficiency of the relevant asset performance indicators. The survey indicates increasing levels of efficiency with a higher rate depicting greater satisfaction.

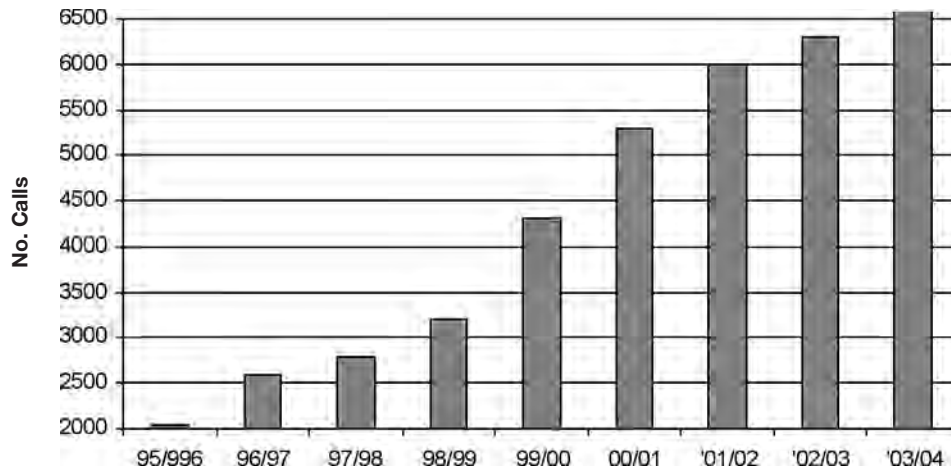
**Table 6: Artcraft Survey of Customer Satisfaction – Road Assets<sup>26</sup>**

Performance Measures	1997	1998	1999	2000	2002	2003	2004
The maintenance of main roads and arterial roads	7.5	7.3	7.1	7.2	7.3	7.2	8.4
The maintenance of residential streets	7.0	7.1	7.3	7.1	7.1	7.1	7.9
The state of road system generally throughout ACT	7.7	7.7	7.5	7.4	7.8	7.5	9.2
Reducing road congestion	7.2	7.1	7.0	6.4	6.7	6.6	7.1
Overall traffic flow during peak times	N/a	N/a	N/a	N/a	6.7	6.4	6.9
Overall traffic flow during off-peak	N/a	N/a	N/a	N/a	8.4	8.1	9.5
The efficiency and sequencing of traffic light/s	N/a	N/a	8.2	8.0	7.2	7.0	7.6
Local area traffic management schemes	6.8	6.7	7.1	7.0	7.0	6.7	7.6

\* Note: 1 – 10 satisfaction level, with 10 being most satisfied.

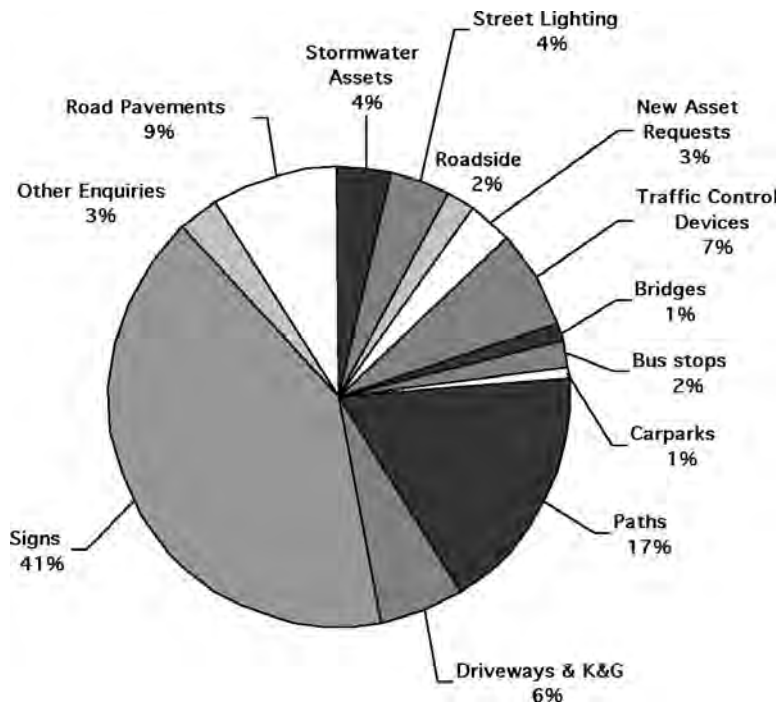
The following figure<sup>27</sup> shows the trend of callers placing work enquiries and complaints for road and traffic assets. The trend indicates an increase from previous years, with a less severe increase over more recent years. The trend may correlate to an increasing awareness within the community of their right to voice their expectations, which appears to be approaching a steady state level.

**Figure 6: Number of Road and Traffic Requests Received by Roads ACT**



Of the calls received, the following figure<sup>28</sup> shows the break-up of asset type calls received from 1999–2000 to 2003–2004. The asset, which attracted the most number of callers, was for signs.

**Figure 7: Calls Received by Asset Type by Roads ACT**



It is noted that Roads ACT analysis of complaints received suggests that there is an increasing community awareness of the condition of the roads infrastructure, and a corresponding increase in community expectations in regard to the maintenance of roads infrastructure. In that context Roads ACT have analysed the results of surveys and complaints data to identify areas requiring attention, which include:

- ▶ Street lighting
- ▶ Road pavements
- ▶ Traffic control devices

## 2.2.4 Road Safety

### *ACT Road Safety Strategy*

The ACT Government has developed an ACT Road Safety Strategy, with the aim of significantly reducing death, injury and trauma on ACT roads by 2005<sup>29</sup>.

Recognising community responsibility for road safety, the strategy was prepared in consultation with more than 100 community, industry and government representatives. The ultimate objective of the strategy is for the community to see deaths on ACT roads as being unacceptable. The goals of the strategy are to:

- ▶ Significantly reduce road trauma levels despite increasing population and travel
- ▶ Create community responsibility for, and participation in, road safety

Indicators of success for the road safety strategy, based on five year rolling averages, are:

- ▶ Less than 160 hospitalisation injuries (prime indicator)
- ▶ 15 fatalities or less (subsidiary indicator)

It is understood from a report prepared by Roads ACT, *Road Traffic Crashes in the ACT – 2003* that for the five-year period (1999–2003) the annual average for the two indicators were:

- ▶ 164 injuries requiring hospitalisation
- ▶ 15 fatalities

Note: This does not include injuries/fatalities on nearby NSW roads and therefore is not directly comparable to other States.

### *Safety Performance*

The following table shows the trends in casualties in the ACT from 1994 to 2003. The table indicates that the total casualties are decreasing, with all indicators reducing. It must be noted that there would be an increased number of cars on ACT roads from 1994 to 2003 and that this is not taken into account in the following data. Were this information taken into account, it would show an even greater rate of reduction in casualties over the same period.

**Table 7: Trends in Casualties in the ACT 1994–2003**

Year	Received Medical Treatment	Admitted to Hospital	Fatality	Total Casualties
1994	445	186	18	649
1995	481	172	13	666
1996	480	245	23	748
1997	494	222	17	733
1998	586	203	22	811
1999	550	182	18	750
2000	469	174	18	661
2001	416	176	16	608
2002	245	150	10	405
2003	238	138	11	387

**National Road Safety Strategy**

Recent strategies to support the National Road Safety Strategy include attention in the following six areas, with the first two considered the most important:

- ▶ Speed management
- ▶ Application of engineering measures to improve the safety of roads
- ▶ Driver impairment
- ▶ Vehicle measures
- ▶ Licensing and driver management
- ▶ Special groups and issues

It is noted from the 2004 Progress Report, that the ACT Government has either completed or is in the process of implementing almost every measure in the action plan detailing activity against the above six areas.

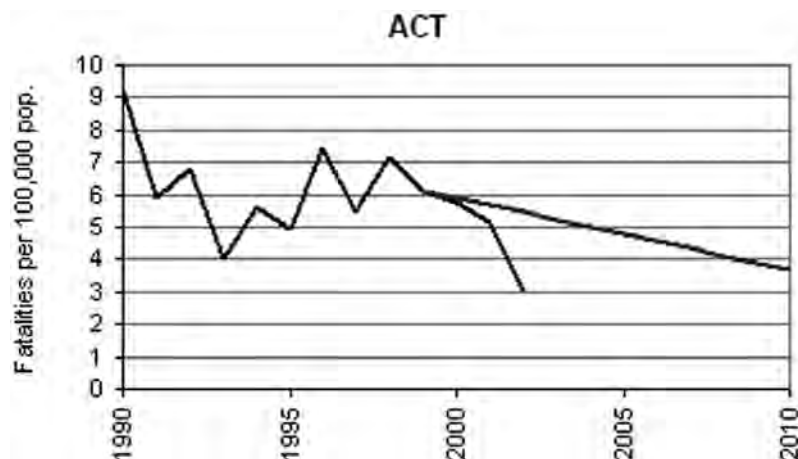
The 2004 progress report for the National Road Safety Strategy 2001-2010 initiative reports the trend for road accident fatalities in the ACT as follows<sup>30</sup>.

**Table 8: Fatalities per 100,000 population**

Year	Fatalities per 100,000 population
1997–1999 (average)	6.2
1999	6.1
2000	5.7
2001	5.0
2002	3.1
2003	3.4
2004 (12 months to September)	3.4
Change from 2000 to 2002	-46%
Change from 2002 to September 2004	+10%
Change from 2000 to September 2004	-40%

In comparing the ACT’s performance over the 1990-2002 period against targets set for the 2000–2010 period it is reported that the ACT is ‘on target’<sup>31</sup>, as indicated by the following diagram.

**Figure 8: ACT Fatalities & Targeted Reductions**



Roads ACT reports that the ACT is well below the target, acknowledging that the challenge is maintaining this position given the relatively small number of fatal crashes in the ACT, as the chart can change dramatically with only a very small increase in the number of fatal crashes<sup>32</sup>. The high level of safety of ACT roads is underpinned by the well developed road hierarchy existing in most of Canberra.

### **Black Spot Program**

Approved Federal funding<sup>33</sup> for, and Federal and ACT government expenditure<sup>34</sup> on, projects to treat 'black spots' in the ACT road network under the Federal Government's 'National Black Spot Program' is as follows.

**Table 9: Black Spot Program Funding and Expenditure for the ACT**

Year	Approved funding (Federal)	Actual Expenditure	
		Federal	ACT
1996–1997	\$480,000	\$500,000	\$1,300,000
1997–1998	\$880,000	\$500,000	\$1,200,000
1999–2000	\$531,000	\$400,000	\$400,000
2000–2001	\$490,000	\$500,000	\$100,000
2001–2002	\$513,000	\$1,800,000	\$1,300,000
2002–2003	\$615,000	N/A*	N/A*
2003–2004	\$473,000	N/A*	N/A*
2004–2005	\$638,000	N/A*	N/A*

\* N/A – Information not available.

## **2.3 Future Directions**

### **2.3.1 Future Demand**

Future demand for road assets are driven by a number of factors including growth and new development and changes to any planning schemes surrounding the ACT.

The following key items drive demand for the ACT:

- ▶ National Capital Plan
- ▶ Territory Plan
- ▶ Canberra Plan
- ▶ Spatial Plan
- Sustainable Transport Plan
- ▶ Sustainability Policy
- ▶ Development in NSW adjacent to ACT border
- ▶ An increasing population

From the previously listed items, the changes in land use, and modes of transport between each land use sector will affect the demand on the assets. The trend for vehicle ownership will also affect this demand as well as the locations of commercial areas in relation to residential and industrial areas. These are all influenced by population growth, development and planning schemes.

### 2.3.2 Canberra Spatial Planning

Principles in the Canberra Spatial Plan reported by Roads ACT as being relevant to planning the management of roads infrastructure include:

- ▶ Containing growth within 15 km of the Canberra city centre
- ▶ Increasing the number of homes within 7.5 km of the city centre
- ▶ Providing good travel connections to minimise journey times and trip length

In this context, the Canberra Spatial Plan describes indicators that can be used to measure the effectiveness of initiatives undertaken as part of policy responses to issues such as sustainable transport or maintaining and enhancing the ease of getting around, including for example:

- ▶ The average trip distance of all journeys between travel destinations
- ▶ Vehicle kilometres travelled per year per capita
- ▶ Average trip time
- ▶ Amount spent on transport infrastructure to create regional linkages per capita ACT and NSW sub-region

It is noted that there is an indicator for monitoring the amount spent on the creation and maintenance of footpaths or multi-use paths and an indicator for monitoring the amount spent on public transport infrastructure improvements. However, there is not a similar indicator for investment in road upgrades and maintenance, particular the latter. While performance in this area is picked up in the other roads infrastructure related indicators, the cost of maintaining an effective roads network would be a useful indicator to be tracking in the overall context of community information and of facilitating travel in the ACT.

### 2.3.3 Evolving Customer Expectation<sup>35</sup>

Community expectations arising from recent road trends and land developments based on the Canberra Spatial Plan include:

- ▶ Dedicated trunk public transport routes
- ▶ Public transport priority systems
- ▶ Trunk cycle and community path systems
- ▶ Parking policies to reduce private car usage
- ▶ Improved transit interchanges
- ▶ Extensions of major roads to reduce traffic impacts
- ▶ Greenfield site development to address transport connections
- ▶ Development of corridors to improve transport capacity between key areas

The strategies listed above, taking into account increasing demand, would result in better asset utilisation and hence reduce the need for more road infrastructure.

## 2.4 Report Card Rating

Roads ACT have provided excellent information and data for the development of this report, which is reflected in the detail of the content contained in this roads section. Their very good data on the performance of the roads system against service targets that are based upon and reflect community opinion, is contributing to the development of very thorough asset management plans.

The rating for roads, predominantly based on the performance of Roads ACT but also including those roads being maintained by the NCA, is considered to be **B**. That is, only minor changes are required in terms of addressing increasing expectation within the community on the standard of roads infrastructure in the ACT to ensure it is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- ▶ Very well developed asset management strategies and plans, together with systematic monitoring, enabling effective and transparent decision making by Roads ACT.
- ▶ Committed expenditure on road maintenance above current service standards, but below long term target levels, which are an important asset management strategy if the optimum life of the road assets is to be achieved.
- ▶ The age profile of key road assets in the ACT will lead to a significant increase in maintenance expenditure in the near future. This can be minimised by properly programmed 'just in time' maintenance to prevent or reduce unnecessary expenditure.
- ▶ The successful implementation of road safety strategies.
- ▶ Increasing levels of interest and therefore complaints on the condition of roads-related infrastructure.
- ▶ The progressively evolving problem of the need for increasing maintenance and expenditure.

Notwithstanding the above rating of **B**, there is concern that high levels of community expectation, a build up of required maintenance expenditure and aging infrastructure will require particularly careful management in the future.

## 2.5 Case Study

Road safety performance in the ACT is at target levels for both fatalities and hospital injuries. This is an example of how an initiative, with the support of a number of strategies, can deliver against long-term objectives.

The ACT has implemented a road safety program with the aim of further reducing and maintaining the reduced fatality rate in the ACT. The long-term target is no road fatalities in the ACT, acknowledging that accidents on any road network are practically unavoidable. The program works with key national strategies such as the Black Spot Program and the National Road Safety Strategy, supported by Federal Government funding.

Fatality and injury levels for the five-year period 1999-2003 were on target for the ACT, steadily declining throughout that period. In comparison to national target levels and results the ACT has the lowest fatality and hospital injury rate per 100,000 population.

While the ACT is performing well in terms of road safety there will be challenges maintaining this level in the future. The fatality rates in particular are very sensitive to small changes in the number of fatalities. With a relatively small population in the ACT, two or three fatalities can significantly alter the fatality rate.

## 3. Rail

### 3.1 System Description

The railway line to Canberra is a branch from the main line between Sydney and Melbourne.

The link to Canberra passes through the nearby area of Queanbeyan, as well as other population centres such as Goulburn, before connecting to Sydney.

Services generally cater for passenger movements, however a quantity of locally used fuel is also transported to Canberra by rail.

The rail line into Canberra provided an important transport link in the establishment of the city in the 1920's and 30s. In addition to passenger movements, significant quantities of building materials and coal were transported by rail to the then industrialised areas of Kingston and Fyshwick.

#### 3.1.1 Ownership

The Australian Rail Track Corporation was established to take control of Commonwealth-owned track and the provision to operators of access to the national track, including NSW from 5 September 2004. It is understood that rail infrastructure assets in the ACT are controlled by the Corporation.

CountryLink operates the rail service into and out of Canberra as part of its Western Region services.

### 3.2 Evaluation

#### 3.2.1 Connectivity

There are three issues associated with the connectivity of rail to the ACT:

- ▶ Service standards and pricing for rail into and out of the ACT are determined by the NSW Government as part of its management of the NSW rail network.
- ▶ The past twelve months has seen the delivery of rail services into the ACT subject to review by the NSW Government because of apparently poor service usage by the ACT community, with train services being replaced by bus services for a lengthy period.
- ▶ Canberra has been included in a number of fast train proposals, none of which have proceeded.

The Canberra Spatial Plan, in discussing regional linkages, emphasises the need to maintain an effective and viable rail service between Canberra and Sydney<sup>36</sup>. It also raises the need for the ACT to support further investigation into the potential for a high speed train connection. The plan nominates the airport as the preferred site for a rail terminus associated with a high-speed rail service connecting Canberra with Sydney.

#### 3.2.2 Sustainability

##### *Economic*

Infrastructure development typically requires significant capital and ongoing operation and maintenance expenditure. The maintenance of a rail link to Canberra will therefore need to reflect the level of patronage of the train service.

Rail passenger numbers have been declining, as illustrated by the following table.

**Table 10: Rail Passenger Numbers for Canberra, 1999 to 2003<sup>37</sup>**

Year	Boarding	Alighting
1999	104,000	108,000
2000	93,000	94,000
2001	99,000	101,000
2002	85,000	86,000
2003	64,000	66,000

A number of privately operated bus services operate along the route providing public transport competition to train services, particularly where they service Sydney airport en route to the Sydney CBD. Passenger numbers on coaches travelling into and out of the ACT have shown an increase of 11 percent between 2002 and 2003, indicating a shift from train to buses as a mode of transport. It is understood this is the reason the NSW Government in 2004 temporarily halted train services to Canberra, providing an opportunity to evaluate the level of commuter interest in maintaining the rail link.

#### *Environmental and Social*

Environmentally, public transport services such as trains are considered to provide a more sustainable option for certain trips than the use of the car. For instance, travellers between major urban centres or to key locations such as airports are likely to generate a number of trips commencing and concluding very close to each other. In that situation, there is scope for the substitution of those car trips with train or bus services.

Train services to Canberra are in a position to contribute to improved environmental outcomes in regard to key trips, but are unlikely to be economically competitive if competing solely with coach operators. Where train services are likely to be attractive to travellers is the concept of a fast train service, which introduces competition with the airlines and makes the train service a genuine alternative for key trips.

### **3.3 Future Directions**

#### *Rail Services to Canberra*

A number of proposals have been made over many years for high-speed rail links between major cities in Australia. Canberra has been included in some of these proposals as a stopping point en route Melbourne to Sydney, or Melbourne to Brisbane.

The declining passenger numbers departing and alighting in Canberra on the current rail service between Sydney and Canberra do not suggest that there is a strong consumer demand for rail links to Canberra at current service levels. Previous proposals for a high-speed rail link on the east coast (potentially including Canberra) have been put forward, but have not proceeded to date for a variety of reasons.

Similarly, the demand for rail freight in and out of Canberra is also unclear.

#### *Proposals for a Light Rail System in Canberra*

The ACT government continues to give consideration to the future implementation of a light rail network. The current design of expansion of the express bus way systems has compatibility for the future addition of light rail within the same corridors.

Over past decades there have been many feasibility studies and proposals for a light rail system. These have generally focussed on the Inter-Town Public Transport corridors connecting to the town centres, which are currently serviced by express buses operating in part on dedicated bus ways. Inter-Town Public Transport corridors were included in early transport planning in the ACT and while a number of these corridors remain available, there has been encroachment by other developments.

The achievements of a light rail system to serve the town centres would require substantial funding, a suitable population level and a marked shift to increased patronage of public transport by Canberra commuters.

### **3.4 Report Card Rating**

As the rail infrastructure to the ACT is currently relatively insignificant and only limited information on its condition is available, no rating has been given in this report.



# 4. Airports

## 4.1 Overview

### 4.1.1 System Description

Airport infrastructure in the ACT primarily consists of an airport located at Pialligo, serviced by domestic flights, with the capacity to handle international flights, including VIP flights. The airport covers a total area of 436 hectares and comprises a number of key assets including:

- ▶ Runways, taxiways, and hardstand areas
- ▶ Airport terminal and associated car parking
- ▶ General Aviation area
- ▶ Hangars and service areas
- ▶ Fairbairn (including the RAAF VIP Squadron area and former RAAF base)

Direct air services link Canberra with five Australian State capital cities, a number of regional locations, and infrequent international destinations (eg VIP flights and charters).

The airport, unlike other capital city airports, has no operational curfew restricting aircraft arrival and departure times. Passenger services generally operate within conventional hours. However, freight, Federal Government / VIP and military aircraft do use the airport between the hours of 11 pm and 6 am, providing for flexible operation of the airport.

**Figure 9: Location of Canberra Airport**



### 4.1.2 Ownership

The Capital Airport Group Pty Ltd purchased the airport from the Federal Government in May 1998, as a long-term lease of 49 years with an option for an additional 50 years. The sale took place as part of phase two of the Federal Government's privatisation of federally owned airports. At the end of the first 49 years, or the total 99 years if the current owners take up the option, ownership of the airport along with all improvements will revert to the Federal Government.

Included in the sale were a range of development rights that have enabled the airport owners to diversify their business interests in the vicinity of the airport, primarily through the development of a business park. This development right has been incorporated in the National Capital Plan<sup>38</sup>. The owners claim that this ability to significantly diversify their investment at the airport has enabled them to weather the 'collapse of Ansett, SARS and the ongoing war against terrorism'<sup>39</sup>, thereby maintaining funding for the provision and maintenance of airport infrastructure.

### 4.1.3 Governance

The airport is subject to planning and operational regulation at the Federal Government level, via the National Capital Authority and Department of Transport and Regional Services.

Under the *Airports Act 1996*, development of the airport must be consistent with a Master Plan that has been subject to community consultation, with major developments to be subject to a Major Development Plan, which must also go through a community consultation process.

In addition, any proposed infrastructure works at the airport require approval from the National Capital Authority, as the site is a 'Designated Area' under the National Capital Plan<sup>40</sup>.

At a local level, the airport is not subject to the planning policy or requirements of the ACT Government. It is noted that as a key piece of infrastructure, the airport is considered in the broader context of the ACT Economic White Paper (2003), Canberra Spatial Plan (2004) and the Territory Plan.

It is also noted that the airport is serviced by ACT Government infrastructure, including road access (external only), water, sewerage, and electricity.

### 4.1.4 Sector Trends

Domestic and regional passenger growth at the airport is projected to increase by 4.0 percent annually to 2024–25, according to studies commissioned by the airport owners. This projection is based on historic passenger growth and expected aviation trends.

Current trends in the aviation industry are related to flight costs for the end user, and the transportation capacity of the aircraft, with recent releases of larger aircraft expected to come into service in Australia in the very near future. Carriers are opting to use the larger aircraft on routes where they can achieve economic savings.

It is not clear to what extent these aircraft will be used for services into and out of Canberra, however with future trends to use larger planes there is a need to consider this potential carrier demand. It is noted that runway and taxiway capacity and function have been examined as part of developing the airport's 2005 Master Plan and found to be generally adequate, but an extension to one of the runways would realise additional payload benefits<sup>41</sup>.

### 4.1.5 Connectivity

A viable air service capability is required to ensure Canberra, as the National Capital, remains readily accessible to all Australians, and to facilitate the efficient working of the Federal Government.

Establishing direct air links with international destinations will contribute towards strengthening Australia's relationship with neighbouring countries, particularly facilitating overseas business visitors to Federal Government agencies.

The Canberra airport is a hub for a number of Canberra's aviation transport streams including conventional passenger liners, private business trips, freight transport both in and out, military use, government officials and VIP visitors from within Australia and internationally.

Direct air services currently link Canberra with five Australian State capital cities, and three regional locations. A service to an international destination originating from Canberra is available, linking in with another capital city en route.

Access to the Canberra airport has been identified as a key objective of the ACT Government's initiative to increase economic gain within the ACT, with the ACT Government recognising 'Canberra International Airport as a major activity centre' and that it will 'work with the ... [Australian] ... Government and airport management to continue to upgrade connections to the Airport, especially from Civic'<sup>42</sup>.

**Figure 10: Direct Services from Canberra Airport<sup>i</sup>**



#### 4.1.6 Infrastructure Services / Interdependencies

Canberra airport relies upon other infrastructure services in order to function, including roads, water, gas, telecommunications and electricity. The development of a business park at the site increases the demand on these services (with that development taking place outside the planning process administered by the ACT Government).

The 2005 Master Plan examined the provision of utility services and identified improvements that will be required in some services.

It is noted that the airport is not included in any existing ACT Government bus services, either to/from the Canberra CBD or other town centres.

#### 4.1.7 Security

Security within the aviation sector, both in Australia and overseas, is highly regulated and a matter receiving significant attention by government. The intent of this report is not to restate the current debate surrounding airport and aviation security.

It is noted that Canberra airport undertakes passenger screening in accordance with Federal Government requirements, and that checked bag screening is being introduced as part of a progressive program across Australia.

Road access to the Fairbairn area of the site is limited to a single point of entry off Pialligo Avenue, which restricts entry/egress.

<sup>i</sup> Rex is no longer operating out of Canberra Airport.

### 4.1.8 Sustainability

#### *Economic*

Economic sustainability in this context takes on two perspectives:

- ▶ The sustainability of the airport itself, particularly in light of external threats to the business such as airline collapses, and global downturns related to issues such as SARS, terrorism, ACT marketing and fuel prices.
- ▶ The contribution the airport precinct makes to the overall ACT economy.

It is concluded from the 2005 Master Plan for the Canberra airport that an understanding of the current capacity limitations of the airport are known, the likely future demand for services at the airport have been identified, and a plan has been developed to address any current and future limitations. The airport owners have strategies to diversify and expand the service offerings at the airport in order to strengthen their revenue streams into the future, further enabling the ability of the airport to ride out any future short-term threats to the aviation sector.

A key announcement in this regard has been the decision by one of the major commercial airlines to base some of its maintenance services at Canberra airport, strengthening the economic sustainability of aircraft operations.

#### *Environmental*

A key factor in considering environmental issues in the context of an airport is noise. This issue is covered in more detail under section 4.2.2. In essence, noise has the potential for generating conflict between residential development and restrictions to areas under the main flight paths.

It is noted in relation to this issue that one of the key strategic strengths of the airport is its ability to operate night flights in the absence of a curfew. The consideration of adjacent development activity and managing noise emanating from aircraft will need to consider the importance of this capability to the overall, long-term economic viability of the airport.

The Canberra airport has developed, maintains and reports against an Airport Environment Strategy. A number of environmental improvement initiatives have been implemented over the past five years (eg on-site utilisation and recharge of groundwater to reduce potable water consumption, and stormwater quality monitoring). Similarly, a number of potential environmental issues associated with the future development of the airport have been identified and are being addressed as part of the development plans for the airport.

#### *Social*

Airports are a core part of today's transportation needs, particularly in the Australian context where they enable the ready movement of people, and freight, across vast distances.

As Australia's National Capital, Canberra is a key location in Australia's transportation network. It is therefore essential that Canberra maintain a viable aviation transportation capability that can be sustained into the future.

The vision for the Canberra airport, as outlined in its 2005 Master Plan, should enable this vital piece of infrastructure to continue to support the ACT and surrounding NSW communities, and to service the rest of Australia in accessing their nation's capital.

## 4.2 Evaluation

The airport's service levels are discussed below by considering performance in the areas of capacity and noise, and issues associated with key functions at the airport.

### 4.2.1 Capacity

The 2005 Master Plan for the airport notes that at peak periods the capacity of the existing terminal is insufficient to service passenger flows. Additionally, the facilities for international flights are of a temporary nature and do not adequately cater to the efficient management of those passenger flows, particularly in regard to the additional security, customs and immigration requirements associated with international passengers.

Domestic and regional passenger growth at the airport is projected to increase to peak hour passenger movements of 1,823 in 2024–25 as compared to the 2003–04 figure of 800 movements.

A number of key infrastructure capacity limitations that constrain the ability of the airport to meet current, and future, demands have been identified, including:

- ▶ Passenger flows currently exceed the terminal's capacity during peak periods.
- ▶ No permanent arrangements currently exist to provide capacity for international passenger movements.
- ▶ Apron space for overnight aircraft parking does not meet current demand all of the time, with taxiways used during those times.
- ▶ A number of other storage areas, such as fuel storage areas, vehicle parking and storage areas, and aircraft ground servicing are also at or above capacity during peak periods.
- ▶ Heavy aircraft restrictions apply to the runway, which restrict the number of heavy landings / take-offs in a given time period. The recent United States of America Presidential visit exceeded this restriction and forced the closure of the runway to heavy aircraft, hindering the arrival of other Heads of State to Canberra<sup>43</sup>.
- ▶ Heavy aircraft may land, but fuel will be restricted on take-off due to weight restrictions. This will limit flight distances, and may require aircraft to refuel prior to leaving Australia.
- ▶ There are forecasted wide body passenger flights overseas at three to four movements per day by 2020. Current infrastructure will not allow this movement due to the excess mass of the aircraft.

The airport, in its current configuration, is expected to reach its long-term practical capacity by 2050.

There are also a number of smaller, general aviation activities within the ACT, including non-commercial, non-military small aircraft activity that is currently re-located with the Canberra airport. As the commercial airline activity at Canberra airport increases, there will be increasing restrictions on light aircraft movements. A number of light aircraft are reported to be already operating out of grass fields elsewhere in Canberra. The need for a secondary airfield servicing light aircraft movements is likely to emerge over the next two to three years.

### 4.2.2 Noise

Successful performance in the management of noise associated with operations at the airport is critical to the long-term financial success of the airport. This is particularly so if the Canberra airport is to grow as expected in terms of domestic patronage, introducing and expanding international services.

The airport has developed a High Noise Corridor Plan, as part of ensuring there is an opportunity to separate residential land use from areas where high noise from low flying aircraft arriving and departing may be expected. The airport owners expect that areas that have been designated as 'high noise' will not be utilised for urban development, allowing for these unrestricted plane movements that will be required if the future plans of the airport to increase capacity and efficiency are to be realised.

It is noted that the airport owners are only stakeholders in the debate surrounding residential land development in the ACT and adjacent areas of NSW, and therefore may only propose the corridor as part of overall considerations for land use planning. There is potential, therefore, for land use planning decisions to impinge on the operation of the airport in the future, particularly if those decisions restrict, for instance, night-time flights. Land development is a sensitive issue for both the airport owners and the surrounding areas, particularly in Queanbeyan.

### 4.2.3 Functional Issues

A number of other issues exist in regard to the functional capability of the existing infrastructure, including:

- ▶ Upgrading existing approach radar capability
- ▶ Improving airfield lighting and signage
- ▶ Redeveloping the control tower

## 4.3 Future Directions

### 4.3.1 Growth

The airport's 2005 Master Plan identifies a number of growth areas, with potential for large growth in international and domestic transport at the terminal resulting in an increased need for infrastructure both at, and delivering to the airport.

The following table highlights the growth in passenger numbers over the past five years for the four major routes serviced by the airport.

**Table 11: Canberra's Major Routes – Growth over the past 5 years**

	1998–1999	2003–2004	Growth
Adelaide	93,155	168,535	↑80.9%
Brisbane	184,582	405,584	↑119.7%
Melbourne	697,571	781,654	↑12.1%
Sydney	836,122	837,670	↑0.1%

Independent forecasts, which were undertaken in 2003, project total domestic passenger movements approaching five million by 2024–2025, from a current level of 2.3 million passenger movements in 2003–2004. The forecast is based on a generally accepted 4 percent annual growth rate <sup>ii</sup>.

The expected growth in passenger numbers to 2024–2025 is shown in the following table.

**Table 12: Forecast Passenger Numbers at Canberra Airport**

	2002–2003 (Actual)	2003–2004 (Actual)	2009–2010	2024–2025
Domestic/Regional % growth p.a.	1,920,991	2,305,517 20.0%	2,754,097 4.0%	4,959,973 4.0%
International % growth p.a.	N/A*	N/A	75,785 35.0%**	252,034 5.4%
Total % growth p.a.	1,920,991	2,305,517 20.0%	2,829,882 4.4%	5,212,007 4.1%

\* Data not available

\*\* Annual growth at that time

ii Source reported to be Airplan (2003).

Aside from air freight being carried in the cargo holds of passenger aircraft, air freight activity at the airport currently consists of five night time flights. With the establishment by the airport owner of a proposed dedicated 'freight hub' (i.e. freight interchange centre), it is anticipated that the number of freight flights will double or triple. These air freight movements will be predominantly into, rather than out of, Canberra.

#### 4.3.2 Infrastructure Development

Planned infrastructure development activity at the airport includes:

- ▶ A 450m extension to the south end of the main runway — Runway 17/35
- ▶ An extension of Taxiway Bravo to the new south end of Runway 17/35
- ▶ An extension of Taxiway Bravo to the northern end of runway 17/35
- ▶ Strengthening of existing parts of Runway 17/35 and the connecting taxiways
- ▶ Upgrading the aircraft run-up bay located north of Fairbairn to cater for Boeing 747 size aircraft
- ▶ Passenger terminal redevelopment

There is potential for funding support for some of these upgrades and improvements to be sought from the Federal government.

#### 4.4 Report Card Rating

The rating for aviation, being dominated by the Canberra airport, is considered to be **B**. That is, minor changes are required in terms of ongoing investment commitments to ensure that aviation sector infrastructure in the ACT is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- ▶ The airport has managed significant growth in passenger services over the past five years and is actively planning for forecast growth over the next five years.
- ▶ The airport's management have identified infrastructure requirements for improving the capacity and functionality of the airport, and are actively programming the upgrade work.
- ▶ Passenger flows currently exceed the terminal's capacity during peak periods.
- ▶ Apron space for overnight aircraft parking does not meet current demands all of the time.
- ▶ Heavy aircraft restrictions apply to the runway, which restrict the number of heavy landings / take-offs in a given time period.
- ▶ The electricity supply system is reported to have limited capacity during the warmer months.

#### 4.5 Case Study

The Canberra International Airport 2005 Master Plan provides a comprehensive overview of aviation in the ACT, one of the key transportation elements. It is a publicly available document, and developed subject to a community consultation phase as prescribed in its governing legislation.

As an example of a corporate-level document that explains an infrastructure system, its importance to local and regional economies, and its position in terms of infrastructure services in the future, the 2005 Master Plan represents a clear picture of the strategic direction for a core piece of infrastructure in the ACT.

The 2005 Master Plan recognises the planning environment within which the airport operates, and how that planning framework can be used to ensure the sustainability of the airport operations. The basis for diversification of activity at the airport is clearly articulated, and provides the reader with a clear understanding of future demand and how that demand will be met.

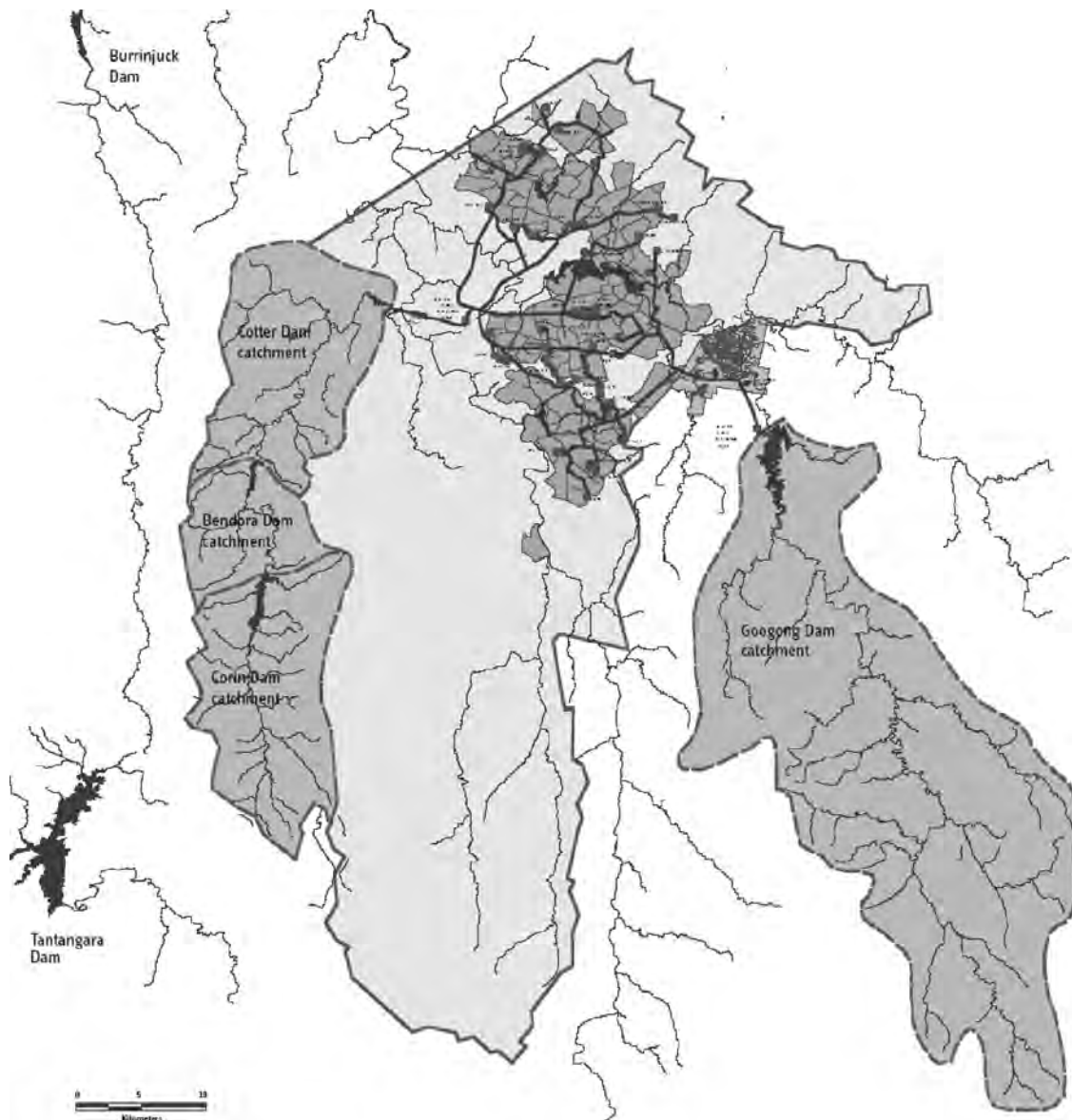
# 5. Potable Water

## 5.1 Overview

### 5.1.1 System Description

Bulk water in the ACT is harvested in the Corin, Bendora, Cotter and Googong dams, capturing water from the Cotter River and Queanbeyan River catchments. The stored water is delivered to the ACT via supply mains, with water treatment facilities located at Googong and Mount Stromlo. The water reticulates through a network of pipes to the end user from service reservoirs located throughout the ACT. The figure below indicates current catchment areas for the supply of water to the ACT and Queanbeyan, and some of the trunk supply mains.

**Figure 11: ACT's Water Network and Catchments<sup>44</sup>**



### Catchments

The ACT Government is represented on the Murrumbidgee Catchment Management Board, and is a partner to the Murray Darling Basin Commission managed agreement in regard to the cap on water extraction in the basin. Debate around the availability of water resources, the potential to extract more for use by the ACT community, and the potential impact upstream users may have on the quality of the water being harvested by the ACT, are all required to be undertaken in the context of these institutional arrangements.

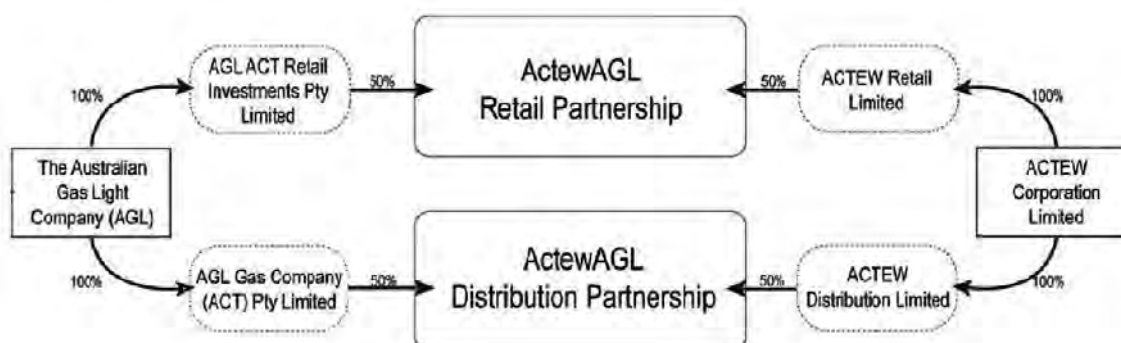
The Googong catchment is outside the ACT's territory, and therefore not subject to the direct control of the ACT Government. However, participation by the ACT Government in the Murrumbidgee Catchment Management Board provides an opportunity to influence control over activities that may impact upon the water quantity and quality in the Googong storage.

### 5.1.2 Ownership

ACTEW Corporation Ltd (ACTEW) is an ACT government body that owns the water supply infrastructure assets in the ACT. ActewAGL is a part government, part privately owned entity that operates and maintains the water supply assets for ACTEW, via a service agreement.

The ownership structure for the operator, ActewAGL, is illustrated in the following diagram.

**Figure 12: ActewAGL Ownership Structure**



### 5.1.3 Governance

ACTEW, as the asset owner, holds a Utility Services License under the *Utilities Act 2000*, which permits it to provide utility services. Under the *Public Health Act (1997)*, ACTEW holds a Drinking Water Utilities Licence, which permits it to operate as a drinking water utility. ACTEW also holds a licence to extract water and release environmental flows under the *Water Resources Act 1998*.

The agreement between ACTEW and ActewAGL requires that drinking water is supplied in accordance with the Drinking Water Utilities Licence, the *Drinking Water Quality Code of Practice 2000* (the Code) and the *Australian Drinking Water Guidelines (1996)*.

The requirement for environmental water releases is determined and monitored by Environment ACT through the *Water Resources Act*. This requires ACTEW, via the environmental flow guidelines, to release water from the catchments to service downstream environmental quality by maintaining stream flows.

### 5.1.4 Sector Trends

Major sector trends of relevance to the ACT's potable water supply include:

- Introducing greater incentives for reducing the demand for potable water, such as encouraging drip irrigation systems in gardens, stimulating demand for onsite grey water treatment and bulk water harvesting, and increasing the base cost for the supply of water to better reflect the true costs of supply. This is particularly relevant given the drought conditions that currently exist in the ACT and many other areas of Australia.

- ▶ Related to demand for water is community debate on whether water restrictions are acceptable and, if so, to what extent, how often and for how long. Engagement and further consultation with the community on this issue is expected.
- ▶ Ensuring environmental flows, as a result of the *Water Resources Act*, are structured towards providing a balanced share of water to consumers and the environment, and providing that streams flow in variable quantities to reflect the time of year and other seasonal variations.
- ▶ The debate surrounding the use of water, particularly in regard to incentives to shift water from low to high value enterprises. That is, moving water use from inefficient industries and sectors to those where the water is more highly valued because of the higher amenity placed on the water by the user.

### 5.1.5 Connectivity

ACTEW currently has an arrangement in place for supply of treated potable water to nearby Queanbeyan. In addition, ACTEW has supported and assisted the study of further cross-border<sup>45</sup> water supply potential, focusing on water supply assistance to urban centres such as Yass and Sutton. Given their specific water supply difficulties, cross border water supply would benefit both regional centres. Supplying water from the ACT catchment to areas in NSW other than Queanbeyan will likely bring forward the date for augmentation of ACT water resources.

An option being considered for augmenting ACT water resources is a tunnel and/or pipeline connecting the Tantangara Dam in NSW with the ACT, which will require the ACT to purchase water entitlements.

### 5.1.6 Security

Potable water assets in the ACT, as in other parts of Australia, provide an essential service and therefore require attention to controlling security risks, particularly at critical points in the supply process and areas currently vulnerable to attack.

The Federal Government has recently made available funding for the assessment of the vulnerability of computer networks. A key area requiring investigation by water supply utilities, particularly given the current threat environment, is the vulnerability of their SCADA<sup>iii</sup> networks, which were typically installed primarily for the purpose of ease of control without specific reference to security issues.

ACTEW has reported the development, implementation and simulated testing of crisis and emergency plans and procedures for water and sewerage services<sup>46</sup>.

### 5.1.7 Sustainability

#### *Economic*

In terms of pricing, it is noted that the tariff regime for potable water in the ACT has been determined based on 90 percent of all customers experiencing a reduction in the amount they are paying for 'indoor use' of water in 2004–2005 compared with 2002–2003<sup>47</sup>. The aim of the tariff structure is to provide incentives for reducing water consumption without unduly penalising consumers at the lower end of the economic scale.

#### *Environmental*

While current water usage in the ACT is significantly less than the total water potentially available to be consumed, it is an ongoing goal of the ACT Government to reduce water usage by 25 percent per capita by the year 2032. This is consistent with the *Final Report and Price Direction* by the regulator, the Independent Competition and Regulatory Commission, wherein the new tariff arrangements were expected to provide incentives for reducing water consumption and thereby put off the need for additional water extraction<sup>48</sup>. An element of this reduction in water consumption is making use of grey

iii Supervisory Control And Data Acquisition — systems used to monitor, control and log information, allowing for the remote operation of assets and overall control of a system from single or multiple points.

water reuse and the installation of rainwater tanks, neither of which is necessarily economically beneficial to the ACT community.

Environmental flows<sup>iv</sup> have the potential to impact on the receiving aquatic environments, depending upon the volume being released, the time of year (season) and current weather patterns (eg. drought).

### Social

Current assessment of capability identifies a population of 1,000,000 able to be supported by present water resources<sup>49</sup>, with the limiting factor not the supply of water but the ability to harvest and store the water resource available.

The original design of the existing system was for a population of 450,000, without environmental flows as they are now defined under the Water Resources Act and, for the worst drought on record at the time. This design did not allow for any restrictions on water use. The design population was revised to 405,000 to include the introduction of environmental releases and severe restrictions on water use.

ACTEW's April 2005 Report<sup>50</sup> states that given a current population of 350,000 and environmental releases, restrictions are to be expected 30 percent of the time. This is well over the suggested 5 percent by ACTEW for a reliable urban water source.

A number of options have been presented for increased water storage, as well as strategies to reduce water usage throughout the ACT. The current drought in the ACT, combined with the effect of the January 2003 bushfires on water resources, has created a situation where water consumption is subject to greater community awareness and debate. There is now ACT Government support for programs to reduce demand and increasing consumer interest in purchasing and installing water saving technology.

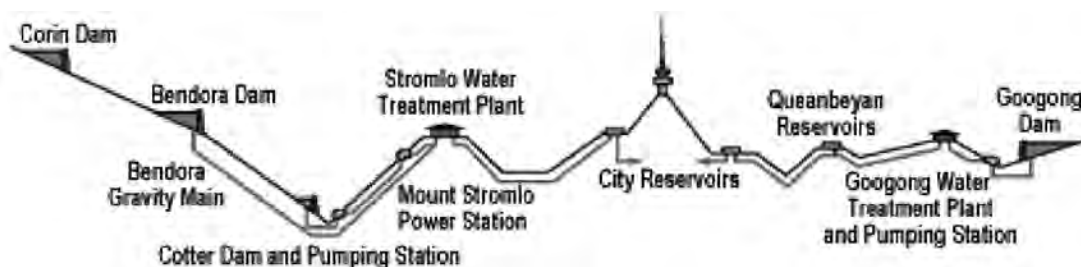
It is particularly important to debate these issues publicly. The current drought, generally being a temporary event, provides a glimpse of what might be permanent weather patterns in the future.

## 5.1.8 Existing Infrastructure

### Potable Water Network

A profile of the ACT's water supply network is illustrated in the following diagram.

Figure 13: ACT Water Supply Profile



The potable water infrastructure in the ACT consists of the pipe network and associated pumps and storage, dams, and water treatment plants.

Canberra's water supply system consists of:

- ▶ 4 catchment reservoirs, including the Cotter, Corin, Bendora and Googong dams
- ▶ 2 water treatment plants at Mt Stromlo and Googong
- ▶ 44 service reservoirs (total available reservoir storage is 912 million litres of water)
- ▶ 21 pump stations
- ▶ 3,000 km of water mains

<sup>iv</sup> Environmental flows are those water flows required for environmental purposes as required by the Water Resources Act.

### Water Storages

The following table indicates dam capacities, types and year of construction.

**Table 13: Information on ACT Dams<sup>51</sup>**

Dam	Capacity (GL)	Level When Full (m)	Type	Constructed
Cotter	4.7	500.69	Mass Concrete (gravity)	1915–51
Bendora	10.7	778.2	Double Arch Concrete	1961
Corin	75.5	955.54	Earth and Rock Fill	1967
Googong	124.5	663.00	Earth and Rock Fill	1979
<b>Total</b>	<b>215.4</b>			

### Operational Requirements

The following data, obtained from ActewAGL, outlines the operational requirements and changes over the past 4 year period for the ACT. The increase in customer numbers has occurred at a time when the daily demand and annual consumption per person is decreasing. This is likely to be due to the recent water restrictions imposed on the ACT community.

**Table 14: ACT Water Operational Requirements**

	2000–2001	2001–2002	2002–2003	2003–2004
Customers	124,570	126,750	129,114	131,893
Max daily demand	392 ML	415.7 ML	366.7 ML	323 ML
Total consumption	62,834 ML	65,904 ML	65,567 ML	52,262 ML
Consumption per person	185.6 kL	193.7 kL	206.2 kL	156 kL
Annual Rainfall	618.2 mm	633.2 mm	340.2 mm	463 mm

### Water Delivery

Water from the treatment plants is delivered by gravity fed bulk supply mains to service reservoirs. There are 44 service reservoirs in the Canberra water supply system, which are either the excavated, concrete lined type, or the circular, above ground type in concrete or steel. All reservoirs are roofed and designed to blend in with the environment. Pump stations are used to pump water from lower to higher service reservoirs.

Consumers receive water through a pipe reticulation network of varying sized mains. This reticulation system is segregated into numerous pressure zones with each zone being supplied water from one or more local service reservoirs according to the required flows and pressures in that zone.

## 5.2 Evaluation

### 5.2.1 Levels of Service

Levels of service for potable water supply in the ACT are driven by the following legislation, codes and other requirements:

- ▶ *Utilities Act 2000*
- ▶ Water Supply and Sewerage Service Standards Code

- ▶ Consumer Protection Code
- ▶ Drinking Water Quality Code
- ▶ Dam Safety Code
- ▶ Water and Sewerage Network (Design and Maintenance) Code
- ▶ ACTEW operating licences
- ▶ ActewAGL Joint Venture Service Agreement

Key information is available in the compliance and performance reports prepared by ActewAGL for ACTEW on an annual basis.

This report does not intend to replicate the detailed information available on service standards and performance in meeting those standards. Rather information on some key levels of service issues are provided here for the purposes of discussing important parts of the potable water supply function, such as the capacity of the existing network.

It is noted however, that ActewAGL's performance in meeting current service standards is considered as being satisfactory, with no failure to meet those standards being reported. The Independent Competition and Regulatory Commission's report on compliance for the 2003/2004 period notes that there were no material breaches of regulatory requirements, and that performance standards were generally being met<sup>52</sup>.

### *Key Service Targets*

Key service targets for ACTEW in regard to potable water supply are reported to be those contained in the following table.

**Table 15: Key Service Targets<sup>53</sup>**

<b>Service</b>	<b>Performance Measure</b>	<b>Target</b>
Supply	Interruptions per 1000 properties	< 80 pa
	% interruptions corrected within 5 hours	> 95%
Water Quality	Meet the requirements of the Australian Drinking Water Guidelines for aesthetics	95%
	Meet the requirements of the Australian Drinking Water Guidelines for health	100%

### *Water Main Bursts*

ActewAGL reports that it is currently meeting the service standard with regard to loss of supply due to water main bursts of keeping the interruption to supply to less than 5 hours in 95 percent of all cases.

It is noted that water main failures follow a seasonal trend, with a higher number of breaks at the end of long dry periods. This information provides ActewAGL with an opportunity to vary the availability of its repair teams, and with further analysis of the statistical trends may provide ActewAGL with an opportunity to improve the service standard.

## 5.2.2 Capacity

### *Storage*

In terms of storage capacity a number of reports investigating the future need for extra storage, as well as possible options for providing that storage, have been prepared. The reports indicate that current storage capacity for ACT is adequate during normal rainfall years.<sup>54</sup>

It is noted however, that the current drought in the ACT is one of the worst on record. This means the current bulk water harvesting configuration (i.e. the dams) does not have appropriate capacity to harvest the amount of water required to meet the ACT's current needs, particularly in light of recent modelling on climate variations and the impact of natural disasters such as bushfires<sup>55</sup>.

#### *Treatment Plants/Pumping Stations*<sup>56</sup>

The capacity of the Googong Water Treatment Plant was 180 ML of water treated per day until 2003–04. The addition of a new dissolved air flotation and filtration treatment plant and the installation of two variable speed pumps in the raw water pump station increased the capacity to 270 ML per day.

ACTEW funded the re-commissioning of an old sedimentation basin at Mount Stromlo water treatment plant in October 2003 with the aim of ensuring the supply of water to the ACT. Subsequently the new Stromlo water treatment plant has been constructed. The new Mount Stromlo water treatment plant has the capacity to treat 250 megalitres (ML) of water per day.

#### *Distribution Network*

A number of reports have been conducted covering most areas of Canberra in respect to hydraulic services provisions given extra demand predictions for the future. The existing infrastructure for water service in areas was designed over 40 years ago, with expectations of higher demands. As a result of this, extra capacity<sup>57</sup> now exists in the water network, with lower demand also attributed to the increased awareness of water conservation and the Governments goal of decreasing water use by 25 percent by 2023 as part of the 'Think water, act water' strategy.

The only areas that have been flagged as possibly requiring attention in the future are areas where:

- ▶ Increased fire risk may increase the 'fire risk category' and require a higher fire flow;
- ▶ Development may occur in elevated zones that may not be serviceable to the minimum pressure head requirements; and,
- ▶ Large new developments clustered together in a specific area.

Localised augmentation of infrastructure in these instances would allow the required capacity, and would not require a major overhaul of existing water supply infrastructure.

### 5.2.3 Water Quality

ACTEW conduct regular tests and monitor the quality of the ACT's water in accordance with the Australian Drinking Water Guidelines and the *ACT Drinking Water Quality Code of Practice*. ActewAGL's water quality monitoring measures biological, microbiological, physical and chemical, parameters of the water supplied, using samples from the dams, treatment plant, local reservoirs, and garden taps of Canberra residents. All sampling and analytical work is performed by a National Association of Testing Authorities registered laboratory.

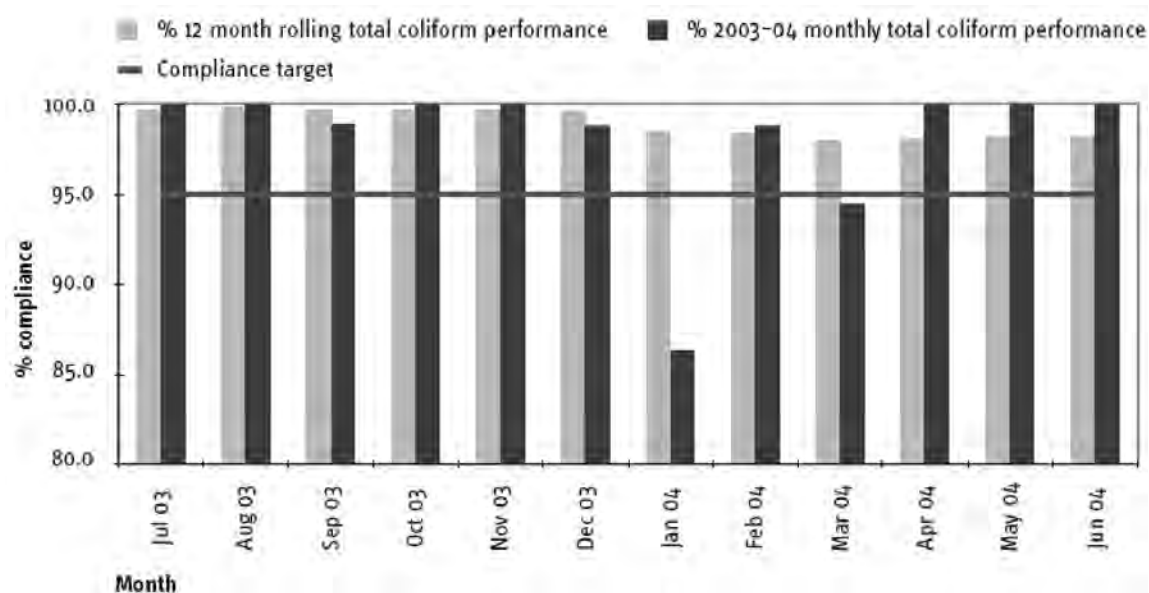
Samples are taken from the lower Cotter Reservoir tested as part of this ongoing monitoring program. None of the commonly used pesticides were detected, and neither were glyphosate, metsulfuron methyl and picloram, substances that are recently included due to concerns raised about their use in the area.<sup>58</sup>

The January 2003 fires caused a significant impact on the Cotter catchment, especially after subsequent rainstorm events. Fires in the Bendora catchment caused severe tree and vegetation loss, and these allowed inflow of sediment during the subsequent storm events. The result of this was an increase in the occurrence of highly turbid water within the reservoir, and associated with this was an increase in manganese and iron. ActewAGL subsequently temporarily closed the Bendora reservoir to avoid contamination throughout the system.

The Bendora reservoir showed improvement in water quality (turbidity and additional agents) from July to September 2003, however it did not meet the raw water quality specifications.

Coliform levels are also tested, with the following table showing the compliance targets and achieved levels. It is noted that there was non-compliance for the January 2004 period.

**Figure 14: Total Coliform Compliance Levels**



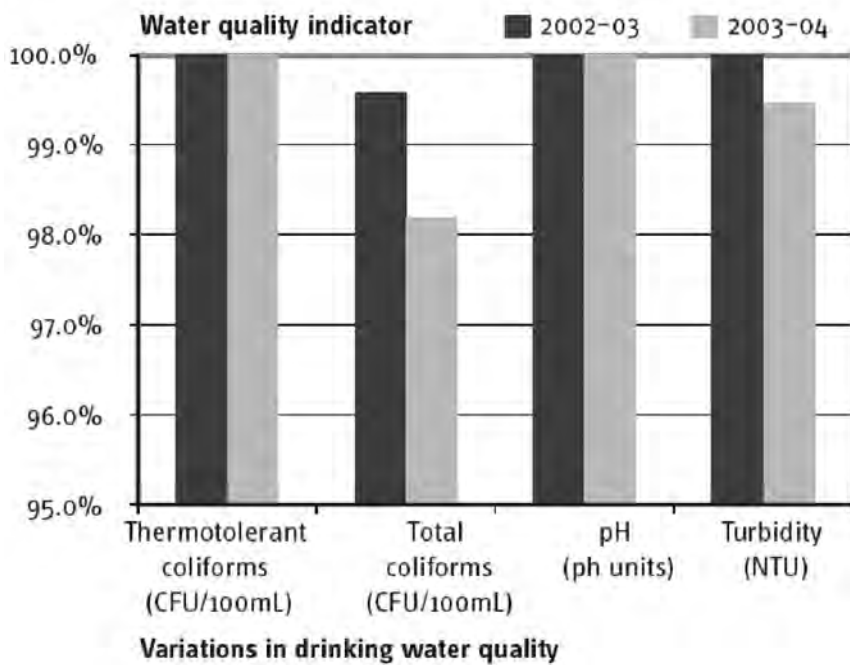
ActewAGL supply water to over 130,000 properties throughout the ACT. For each enquiry or complaint received by ActewAGL concerning water supply or quality, ActewAGL investigate the enquiry to determine the likely cause and if any corrective action is necessary.

**Table 16: Water quality Complaints in the 2003–2004 Period<sup>59</sup>**

Complaint	Number of Complaints	Possible causes
Black water	1	Black water results from a build-up of manganese in the reticulation system Black specks can be caused by deterioration of plastics in plumbing material
Blue or green water	0	Blue or green water is associated with the corrosion of copper pipes
Brown water	1	Rusty brown water usually comes from rusty galvanised iron connection services
Dirty water	227	Dirty water is associated with maintenance work or equipment failure in the system
Odour	3	Odour problems are usually short-term with complex causes
Other	7	A range of issues not categorised
Staining	0	Deposits dislodged from domestic plumbing, or from the water main can cause staining
Taste (chlorine)	2	Chlorination is used as disinfection for the water supply. These enquiries often relate to a change in the level of chlorine a customer receives

Complaint	Number of Complaints	Possible causes
Taste (other)	5	These include bitter and metallic tastes experienced by customers
White or air	17	Cloudy water resulting from air bubbles generated by flushing of the mains, hot water units or aerators on taps
Total	263	

Figure 15: Comparisons of Key Water Quality Indicators with Previous Year



### 5.2.4 Funding

There are no apparent shortfalls in operations and maintenance expenditure, with the performance of the water supply network reported to be meeting service standards. In terms of capital investment, key initiatives such as rectifying water treatment deficiencies have been developed and delivered within the service arrangements between ACTEW and ActewAGL.

The key outstanding issue in terms of funding is the augmentation of water storage capacity. The Independent Competition and Regulatory Commission’s report on the water pricing regime comments on the prospect of a major capital investment being required to fund the eventual preferred option, noting that it did not foresee any need for undue financial pressure on current and future water consumers<sup>60</sup>.

It is noted that the current drought has resulted in water restrictions that have translated to low sales of water, which is the basis for ACTEW’s (and ActewAGL’s) financial performance. The sales are based upon long-term averages; with the current climatic period suggesting those averages may need to be revised. It is noted in this context that reducing the amount of environmental flows to increase water storage volumes has the added financial benefit of temporarily making more water available for sale in the ACT.

## 5.3 Future Directions

### 5.3.1 Growth

The ACT government released a strategy in April 2004 titled 'Think Water, act water' which was aimed at providing a long-term water supply for the ACT. ACTEW Corporation submitted a report to the ACT Government in March 2005 outlining additional water storage options for the ACT, including 3 options that were suitable for a more detailed investigation.

Previous studies by ACTEW have stated that given the current population growth, a new water source would be needed by 2017 in order to service the community. Recent trends tend to indicate that because of a changing climate, bushfire impact and increasing population that ACT may require additional water storage capacity before the year 2017. ACTEW's report of April 2004 indicates the need for some immediate measures to supplement the ACT's water supply, and more substantive measures to develop the infrastructure required to meet the 2017 demand forecasts.

Regional water use will also change as expansion occurs in regional urban centres, with security of supply becoming an important issue for those growing population centres and smaller villages.

### 5.3.2 Infrastructure Development

In April 2004, ACTEW produced a report titled *Options for the next ACT water source* to address the shortage of supply that is predicted due to population growth, predicted climate change, and increased scientific awareness. This report investigated nearly 30 options for additional long-term reliable storage, and recommended that three options were suitable for further investigation.

As an answer to the possible shortage of water storage in the ACT, ACTEW initiated the Future Water Options project to investigate the three recommended options presented by the water options report. A series of investigations were carried out by a team of specialist contractors and consultants on the technical, environmental and planning aspects of each of the three options.

ACTEW submitted a report titled Future Water Options Implementation Plan to the ACT Government to recommend the preferred approach.

The three short-listed options for additional water storage were<sup>61</sup>:

- ▶ Enlarging the existing Cotter Dam, increasing the existing capacity
- ▶ Building a new dam on the Gudgenby River near Mt Tennent
- ▶ Transferring water from the Tantangara Dam in NSW

Several different scenarios were investigated for each of the three options presented, typically varying the size of storage or the location of new works with respect to the current system.

The following table outlines some of the general pros and cons of each option.

**Table 17: Advantages and Disadvantages of Additional Water Storage Options as Assessed by ACTEW**

Option	Additional Water Resource Quantity	Advantages	Disadvantages
Cotter Dam (estimated capital cost: \$120m)	73.2 GL of additional storage capacity	<ul style="list-style-type: none"> <li>▶ Enhances habitat for threatened fish species</li> <li>▶ Straightforward approvals process</li> <li>▶ Large storage capacity</li> </ul>	<ul style="list-style-type: none"> <li>▶ High sediment discharges in the catchment due to 2003 bushfires</li> <li>▶ Low elevation – require pumping</li> </ul>
Tennent Dam (estimated capital cost: \$185m)	43 GL of additional storage capacity	<ul style="list-style-type: none"> <li>▶ Diversify ACT water supply</li> <li>▶ Increased reliability</li> </ul>	<ul style="list-style-type: none"> <li>▶ Damage to native fauna and flora</li> <li>▶ Social impacts of relocating rural lessees</li> <li>▶ Catchment remediation required to protect water quality</li> <li>▶ Higher cost, due to more infrastructure requirements (treatment etc) than Cotter</li> </ul>
Tantangara (Estimated capital cost: \$35 to 40m)	20 GL of additional water resources	<ul style="list-style-type: none"> <li>▶ Increased capacity utilising transfer of water</li> <li>▶ Possible river included in design promotes aquatic life</li> </ul>	<ul style="list-style-type: none"> <li>▶ Lower level of security given that water would be obtained from NSW</li> <li>▶ Entire Upper Murrumbidgee River catchment becomes the ACT's catchment</li> </ul>

As part of the Tennent option, a ‘Virtual Tennent’ option was presented, whereby the water that would be stored in the Tennent Dam if constructed would be directly transferred from the Murrumbidgee River into the Googong Reservoir via a weir, pumps and pipeline. This option would provide an extra 12 GL of water per year, in comparison to the Cotter enlargement that would provide an additional storage volume of 78 GL and the Tennent Dam options that would increase storage by either 43 GL or 159 GL.<sup>62</sup>

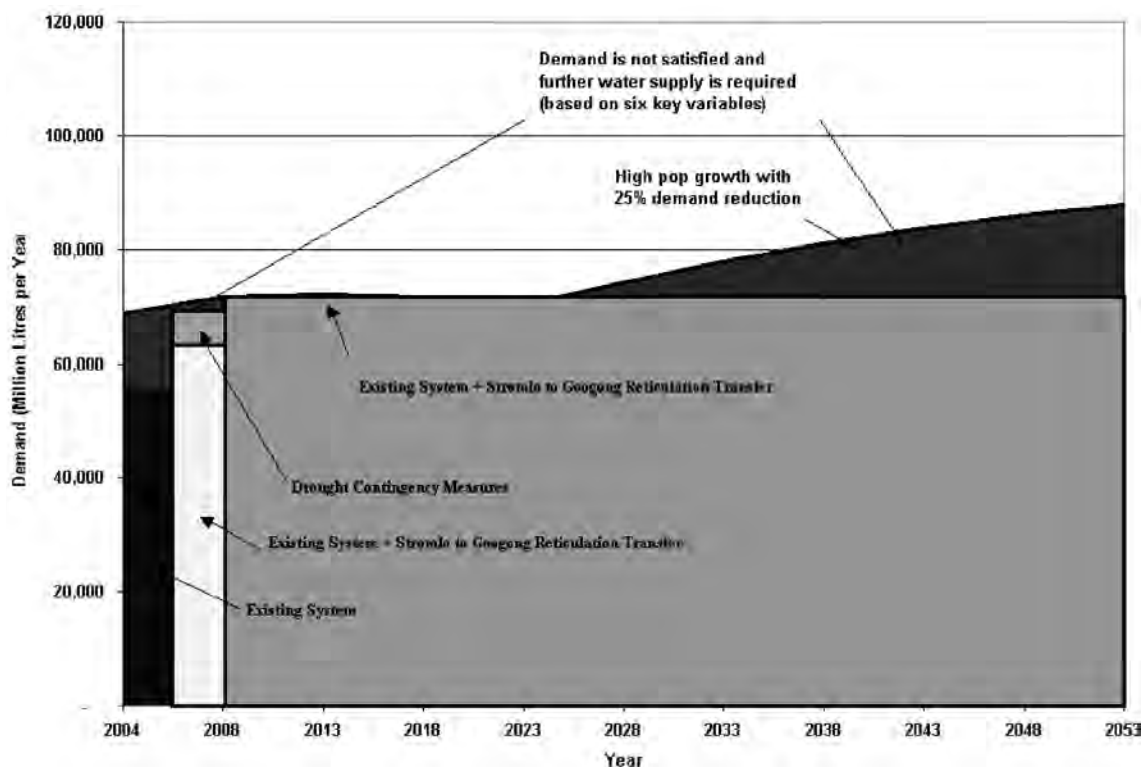
ACTEW has recommended that the ‘Virtual Tennent’ option be implemented immediately, and the remaining Cotter, Tennent, and Tantangara options be retained as future options with further technical investigation remaining to be carried out. It is noted that the lead time for development of these options could be in the order of 10 to 15 years given the extensive consultation, design, construction, implementation and filling stages that would need to be carried out. These long lead times could span the life of three or more terms of the ACT, NSW and Federal Governments.

In addition, ACTEW has decided to proceed with a scheme to transfer water from the Cotter system to Googong Dam. This is achieved by extracting surplus water from the supply network at Stromlo, transferring through the existing reticulation network and discharging directly to the Googong Dam.

It is predicted that the implementation of the 'Virtual Tennent' option, along with Stromlo to Googong reticulation, will provide the ACT with adequate reliable storage capacity until 2023, with an investment of \$60 million.<sup>63</sup>

The Virtual Tenant option presented is reported in the ACTEW Future Water Options Implementation Plan to be capable of providing sufficient water resources for the ACT until 2023. After this time, additional supply is required to maintain a reliable water source. As is evident in the figure below, when the demand (water used by the ACT) is above the available sources, insufficient water is available to the ACT and restrictions will apply (as is currently the case). The figure indicates that adoption of the 'Virtual Tennent' option, along with Stromlo to Googong reticulation, will provide sufficient water to the region until 2023.

Figure 16: Additional supply to meet future water demand<sup>64</sup>

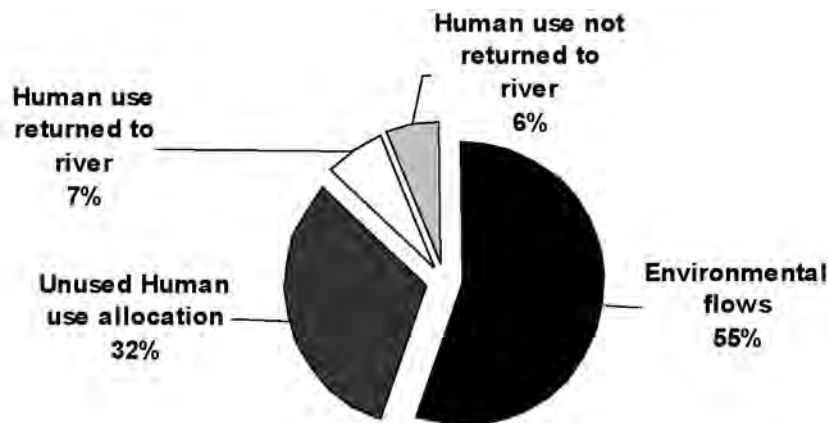


However, a decision to implement an alternative storage cannot be delayed until 2023, given the extensive period for investigation, consultation, public and peer review, design and construction that will be required. It is imperative that the planning and design for additional water supply capacity, such as constructing the Tennent Dam, proceed expeditiously.

### 5.3.3 Environmental Flows

The following diagram illustrates the proportion of the total available ACT water resources (i.e. not just the potential capacity in the ACT's dams but the total water resource available in the ACT's catchments) currently discharged as environmental flows.

Figure 17: ACT Total Water Resources – Percentage Usage



As discussed previously, early water resource planning, upon which capacity is based, did not take into account environmental flows in terms of today's expectations. As the requirement for significant environmental flows has been inserted into the water resource equation, there is potential to review the extent of the allocation of environmental flows given current climatic conditions. There may therefore be an opportunity to recover storage levels more quickly while new capacity is being developed by temporarily reducing the volume of environmental flows, while maintaining a beneficial impact on the environment.

#### 5.4 Report Card Rating

There is currently significant debate in the ACT in regard to the current capacity and configuration of the ACT's water supply infrastructure. The debate acknowledges the relatively plentiful supply of the ACT's water resources and the current high quality environmental flows being released within the context of the need to consider augmentation of the water supply to counter a potentially warming and drier climate, and to respond to natural disaster risks such as that posed by bushfires.

The response to this debate by ACTEW has been the development of a series of technical reports that recognise current and future demand issues, and which advance the debate by providing the community with detailed analysis of the options for the ACT's future water supplies.

While there are current issues associated with water in the ACT, partly due to climatic conditions, partly due to the configuration of the current infrastructure being based upon forecasts established many years ago, the approach by ACTEW both during the current water shortages and in regard to addressing future demand, has been well handled on both counts.

However, augmentation of the potable water supply to the ACT and surrounding NSW is an immediate concern. Until the immediate measures identified by ACTEW and the construction of the next phase of development of the ACT's bulk water storage and delivery has commenced, significant issues will remain about the current ability of the potable water infrastructure to meet the ACT's needs today and into the future. This will need to be decided in consultation with the ACT community in terms of what level of water restrictions are considered appropriate, and what level of environmental flows should be provided so as to maintain the health of the environment.

The rating for **potable water** is therefore considered to be **C**. That is, major changes are required in terms of addressing the current water shortage faced by the ACT community to ensure potable water infrastructure is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- ▶ The performance of the potable water system, both in terms of delivering water and in meeting water quality standards, is adequate, with no recent non-performance or regulatory breaches.
- ▶ At a time of restricted water resource availability due to low inflows as a result of climatic conditions and a major natural disaster, the maintenance of reasonable levels of water resources without significant impacts on water pricing has been a well managed effort by ACTEW.
- ▶ Significant additional investment is required to meet current and near-term future demand for water in the ACT and surrounding region in order to capture and store available water resources so as to bring service standards in terms of water restrictions more in line with community expectations.

## 5.5 Case Study

### Bushfire Effects on Water Storage and Water Quality

The bushfires in January 2003 left the ACT water catchment areas severely affected, with tree and vegetation losses allowing considerable inflow of sediment during heavy storm events. It is estimated that 65 percent of the catchment area was severely burned, creating ongoing risks for water quality and quantity.

The key impacts of the bushfire damage to the catchment are:

- ▶ An increase in the occurrence of highly turbid water.
- ▶ An increase in both manganese and iron elements in the water.
- ▶ A reduction in water harvested as the catchment recovers — predicted to increase to a reduction of 15 percent by 2020, with reduced inflows to storages in those affected catchments expected to remain until old growth forest is re-established (more than 50 years after the bushfire event)<sup>65</sup>.

The risks affecting water quantity and quality will reduce with time, particularly with the recovering vegetation decreasing sediment runoff, but the recovery process is expected to take more than a decade. The coinciding drought conditions have delayed the recovery of the vegetation in the catchment areas.

A number of research and monitoring projects were initiated by ACTEW to study the severity of the damage due to the bushfires, to evaluate the potential for longer term damage to water quantity and quality, and to therefore identify ways to reduce the risk of reduced water harvesting and diminished raw water quality.

Early results indicated that the higher water quality risks would continue to prevail while the catchment recovers. A key response to this risk has been the augmentation of water treatment facilities in the ACT, with the construction of a new water treatment facility at Mount Stromlo and expansion to the existing Googong water treatment plant. The new facility at Mount Stromlo was successfully completed using special contractual arrangements to fast track the design and construction process, with the facility being completed well ahead of schedule.

## 6. Wastewater

### 6.1 Overview

#### 6.1.1 System Description

Wastewater in the ACT is treated, primarily, at the Lower Molonglo Water Quality Control Centre (LMWQCC) prior to discharge to the Molonglo River 1 km upstream from its junction with the Murrumbidgee River.

The LMWQCC is the largest inland sewage treatment facility in Australia, treating almost 80 million litres of sewage per day, delivered from residential, commercial and industrial premises in the ACT via a collection network of sewers and pumping stations.

Treatment facilities at the LMWQCC are supplemented by a sewage treatment plant at Fyshwick that treats the industrial wastewater discharging from industries in and around Fyshwick and some of the adjacent suburbs. The wastewater from the treatment plant at Fyshwick is discharged into the sewerage network for further treatment at the LMWQCC. This is done to avoid higher doses of wastewater and chemicals that are contained in trade waste from entering and killing the bacteria used in the LMWQCC biological treatment processes.

The following table identifies the change in customer numbers of the past four-year period, as well as the quantity of sewerage treated and the decrease in daily treatment quantities.

**Table 18: ACTEW Customer Numbers and Services Provided**

Sewerage	2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004
Customers	121,618	123,641	125,784	128,446
Quantity of sewage treated (ML)	30,277	30,645	28,313	27,959
Maximum daily load (ML)	151.4	190.6	116	111.4
Sewage treated per person per annum (kL)	97	97.6	89.2	86.6

#### 6.1.2 Ownership

Similar to the potable water network, the ACT's sewerage system assets and all operating components are owned by ACTEW Corporation, with maintenance carried out by the joint venture ActewAGL.

#### 6.1.3 Governance

The sewerage network and its operations are primarily governed by the *Utilities Act 2000* and the *Environmental Protection Act 1997*. A range of other legislative requirements also applies to water and sewer infrastructure in the ACT, as illustrated in the following diagram.

Figure 18: Water and Sewerage Legislative Requirements



Additionally, the LMWQCC was the first Australian sewage treatment facility to gain certification to the International Standards:

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

These two management systems provide the management framework within which the operations at the LMWQCC are conducted.

#### 6.1.4 Sector Trends

Key sector trends include:

- ▶ Sewer mining

This involves extracting wastewater directly from a sewer, treating at that 'source' point, and using the treated water locally, such as for irrigating a golf course. It is a form of wastewater reuse that makes use of advanced treatment technology and water pricing that provides incentive for this form of activity. Further information on sewer mining is contained in the Sustainability section below.

- ▶ Wastewater reuse

Similarly, the idea is to make use of the discharge from the sewage treatment facility for other purposes. Instead of discharging a product already paid for when extracted from the water catchment, it is given a secondary use. Again, this is typically irrigating land but, when available in greater volumes such that the production of higher quality effluent is economically viable, the potential for other uses such as feeding residential areas for outdoor landscaping use becomes more viable.

Alternatively, the additional extraction of water upstream in the catchment may be offset by wastewater discharges from a sewage treatment plant. In order for this to be achieved it will be necessary for alternative demand for the discharge to be created such that the value of the discharge reflects its importance, either to the downstream receiving environment or to those seeking the wastewater for other reuse.

Wastewater reuse has been proposed for application in new housing estate developments 'downstream' from the LMWQCC, where the wastewater could be economically diverted and where additional piping systems to carry the water separate to the potable water supply could feasibly be established as the estate is developed and other reticulation piping is laid.

**6.1.5 Security**

The key issue in regard to the sewerage network is restricting access to members of the public due to the potential health risks that exposure to raw sewage can entail. Overall, the lack of redundancy in the sewage treatment function presents a potential risk, as evidenced by the loss of function during the 2003 bushfires.

**6.1.6 Sustainability**

During the sewage treatment process at the LMWQCC facility, all solid material ('sewage sludge') is removed and incinerated in a high temperature furnace, with the resulting ash ('Agri-Ash') sold to farmers as a soil conditioner.

ActewAGL also operates and maintains the Southwell Park Watermining® facility, a process to extract wastewater from the sewerage system, treat it to meet public health and environmental standards, and then use the treated effluent for irrigation. The solids separated during the treatment process are returned to the sewer.

**6.1.7 Existing Infrastructure**

The sewerage system for Canberra is made up of reticulation mains, service branch lines, maintenance holes (manholes), pump stations, trunk sewers and sewage treatment plants. Service branch lines from the customer's sewer tie to the mains are owned by ACTEW Corporation and maintained by ActewAGL.

Most sewers in Canberra flow under gravity, with these sewers designed so that there is sufficient slope to stop build-up that may lead to blockages.

The following table outlines the changes in infrastructure and sewage treatment as well as the increase in customer numbers from the year 2000 to 2004.

**Table 19: Existing Infrastructure**

Sewerage	2000 to 2001	2001 to 2002	2002 to 2003	2003 to 2004
Length of mains (km)	2,852	2,875	2,897	2,921
Number of pumping stations	28	28	28	26

**6.2 Evaluation**

**6.2.1 Capacity**

*Sewerage*

In assessing the capacity of the existing system in the ACT, it has been found that in older suburbs where development has outgrown predicted demand, and in areas where increased development density has resulted, there are some sewer reticulation assets that are close to, at, or above capacity.

Determining the capacity of the system to meet future requirements is reported to be difficult, with the issue not with future developments but rather with existing sewers that are already over capacity. A number of sewers that are over capacity are operating efficiently and performing to a satisfactory standard, which indicates that while some extra capacity was designed into the original system it is likely that capacity limits are close to being reached. Some sewers that are over 150 percent capacity need assessing to identify the need for augmentation works.

### *Sewage Treatment*

Information on the capacity (hydraulic and biological) and condition of the LMWQCC was not made available for this study. It is understood that the ACT is at or nearing the estimated population that was the basis for the original design loadings for the LMWQCC. Whether or not a significant upgrade to the LMWQCC will be required in the near future was not identified. However, as the planning for a major reconfiguration, augmentation or other enhancement to the LMWQCC will entail a long lead-time, the early planning will need to commence in the near future.

#### 6.2.2 Discharge Quality

The quality of the sewage discharged from the sewer network is an important indicator of the level of service provided. The sewerage network collects wastewater from around the ACT, with the final product measured being the discharge from treatment plants to local streams and rivers. Monitoring of these discharges is carried out to ensure that appropriate water quality standards are met, including ecological monitoring such as the Fish Monitoring Program, to ensure the health of the receiving waters is not unduly affected during treated water discharge.

The water treated by the LMWQCC, and discharged into the Molonglo River is vital to aquatic life, especially during dry periods, as the discharges help keep the river flowing. The treatment process also reduces the nutrient level within the water, a source of algae food, and inhibits their growth in these streams.

The *Environmental Protection Act 1997* sets strict licence conditions to protect the rivers into which treated water is discharged. The treatment process that is used at the LMWQCC aims to ensure that the water discharged to the Molonglo River won't compromise the environment and any downstream users of the water.

It is reported that the LMWQCC meets all the licence requirements set by the *Environment Protection Act*, including all biological, chemical and physical testing and monitoring. Performance results from these tests are reported monthly in order to identify any abnormalities in the treated water, and an indication of their performance for the 2003–2004 period is shown in the table below.

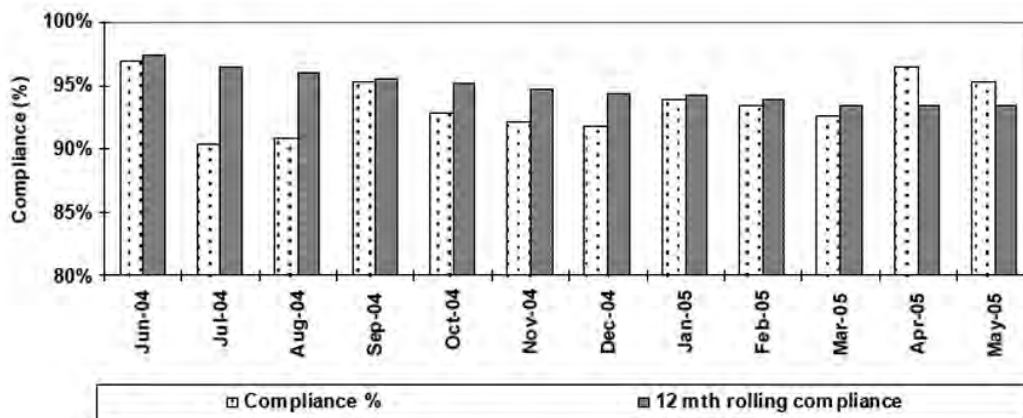
**Table 20: Licence Compliances<sup>66</sup>**

Performance Indicator	Level of Compliance (2003–04)
LMWQCC Effluent Discharge	99.5%
LMWQCC Furnace	99.1%
Googong Sludge Drying Bed Drainage Discharge	100%
LMWQCC Effluent Reuse	99.9%

#### 6.2.3 Sewer Blockages

When blockages occur in sewer pipes there are overflows at sewer access points and sewerage manholes. The target to clear blockages is 90 percent within 5 hours, and 100 percent within 24 hours. As seen from the figure below the compliance levels for sewer blockages is generally in excess of 90 percent, with a 12 month rolling compliance close to 95 percent.

Figure 19: Period of Sewerage Restoration – Monthly and 12 Monthly



### 6.2.4 Funding

#### Infrastructure Maintenance

Over 4.6 km of sewers throughout the ACT were replaced in the 2003–04 period with a total cost of \$1.82 million for the augmentations. This amounts to less than 0.2 percent of the total piped sewerage network, which suggests funding for sewerage pipe rehabilitation may not be at an appropriate level given the ageing sewerage assets.

Statistics on sewer pipe failure, particularly by location and by age and or type, were not available for this study. This information would have been useful in identifying patterns of failure that may be related to the pipes reaching the end of their life. Analysis of this data may indicate an increasing need for funding sewerage pipe rehabilitation in coming years.

It has been reported that continued redevelopment of the existing sewerage network is required in order to achieve desired levels of service.

### 6.3 Future Directions

A number of sewer mains around the ACT are reported to have reached the end of their effective service life, and are therefore at a point where they require rehabilitation to enable continued compliance with service standards.

Additionally, population growth is compounding the problem of a restricted capacity, both in terms of sewage transfer and treatment.

### 6.4 Report Card Rating

The rating for **wastewater** is considered to be **B**. That is, minor changes are required in terms of addressing the need for future investment in maintaining the sewerage network to ensure that wastewater infrastructure in the ACT is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- ▶ The sewage treatment facilities continue to provide high quality effluent and satisfactorily comply with discharge licensing.
- ▶ New initiatives to capture the economic value inherent in wastewater, such as sewer mining or wastewater discharge reuse, have been established in the ACT.
- ▶ It is reported that many sewerage pipes, including sewer mains, are operating at capacity levels and may restrict urban development in those areas, although the extent of the funding requirement to increase sewerage capacity was not identified.

- ▶ It is reported that many sewerage pipes, including sewer mains, are reaching the end of their service life and will need replacement, although the extent of this funding requirement was not identified.
- ▶ The LMWQCC is assumed to have adequate spare capacity to accommodate growth in demand for the next 5 to 10 years, and the programming of funds for a significant upgrade can be made. It was assumed that ACTEW are taking the necessary steps in what could be a long lead time for provision of additional capacity.

## 7. Stormwater

### 7.1 Overview

#### 7.1.1 System Description

Stormwater assets serving the ACT region comprise a combination of pipes, channels, floodways, wetlands, lakes, waterways, manholes, retardation basins and pollutant traps.

The design intent of the stormwater system is to provide adequate carrying capacity to remove surface stormwater runoff from properties, carriageways, footpaths, other paved areas and natural surfaces to a suitable outfall location.

The stormwater system will generally cater for “minor” and “major” rainfall events, through a combination of at source retention and detention, underground pipe and surface infrastructure (swales and natural channels, ponds and wetlands, lakes and pollution traps).

#### 7.1.2 System Development

Stormwater management has undergone significant change over the last 50 years, in relation to wider functions, science and technology and community partnership. In the early 1980s in the ACT, there was recognition of the multi-functional role of stormwater. Drainage corridors were designated as open space, recreation and conservation system and water supply (irrigation) systems.

In response to the *ACT Region Water Quality Study 1978*, findings indicate that stormwater discharges constituted a major impact on the water quality and ecology of lakes and the Murrumbidgee. A program of gross pollutant traps and pollution control ponds/wetland construction were integrated into the stormwater system.

In the 1980s and 1990s, there was a strong growth in land care and catchment management groups, which were focussed on restoration of open space and urban waterway values, in respect to restoration of wetlands and natural creek channels and their riparian vegetation.

#### 7.1.3 Ownership

Roads ACT are responsible for and own the majority of the hydraulic structural components within the ACT. Canberra Urban Parks and Places are responsible for and own the urban waterway corridors, ponds, wetlands and lakes. ACT Planning and Land Authority and Environment ACT have responsibility for managing, leasehold land and nature reserves surrounding the urban areas. Stormwater assets under the control of Roads ACT have a total replacement value of \$2.05 billion as at June 2004.<sup>67</sup>

The NCA also manage Federal Government owned stormwater assets within the Parliamentary Triangle, with a total replacement value of \$4.45 million.

#### 7.1.4 Governance

Stormwater services in the ACT are governed by the following policies:

- ▶ DUS Design Standards for Urban Infrastructure — Section 1 Urban Stormwater
- ▶ ACT Territory Plan — Department of the Environment, Land and Planning — October 1991
- ▶ *Land (Planning and Environment) Act 1997*
- ▶ ACT Code — Section 3 — Stormwater and Integrated Catchment Management
- ▶ Canberra Urban Lakes and Ponds: Plan of Management 2001
- ▶ *Environment Protection Act 1997*

- ▶ *Water Resources Act 1998*
- ▶ *Environmental Flow Guidelines*
- ▶ *Public Health Act 1997*

### 7.1.5 Sector Trends

The current key issue in regard to stormwater is the concept of water sensitive urban design, which aims to keep impervious paved areas to a minimum, and make use of the potential for on-site storage of stormwater, until it is absorbed into the ground, redirected to the stormwater system during periods of overflow, or even reused.

Recent guidance from the ACT Government in regard to planning for new housing developments, or in refurbishing existing homes, includes requirements for retaining some stormwater on site. This advice is in the context of the aim of reducing the number and intensity of stormwater flows from individual properties by between 20 and 50 percent<sup>68</sup>.

The suggestions include diverting stormwater so that it flows across lawns or garden beds (noting that ultimately any runoff from a property needs to be redirected into the stormwater pipe system to prevent erosion or water entering neighbouring properties) and using more porous surfaces that allow water to soak into the soil beneath.<sup>69</sup>

The ACT is close to completing the development of the *ACT Water Sensitive Urban Design: Guidelines* for sustainable development in Canberra, incorporating a comprehensive and integrated range of water sensitive urban design practices.

Recent research has highlighted a number of 'non-sustainable' features of current stormwater management practice, in particular:

- ▶ The detrimental impact on the environment
- ▶ The high hydraulic connectivity associated with concrete channel and pipe based system
- ▶ The failure to retain and recycle stormwater at the source

The industry is responding to this development in our understanding of stormwater in the landscape, in terms of new best management practices. The ACT Governments *Think water, act water 2004* clearly establishes these directions for stormwater management for the next 50 years.

Consequently, any assessment of the performance and health of infrastructure needs to build, primarily, on the capacity of infrastructure to deliver the conditions meeting changing community needs.

### 7.1.6 Water Quality

The major issue in regard to water quality is the problem stormwater poses for creeks, lakes and rivers the stormwater system discharges to. It is reported in the ACT Water Report for 2003–2004 that the water quality in Lakes Ginninderra and Tuggeranong was fair following an overall improvement in water quality conditions. However, water quality in Point Hut Pond and Gungahlin Pond are comparatively poor, reported to be most likely due to upstream new residential development<sup>70</sup>.

### 7.1.7 Security

Security in the context of stormwater relates to public safety, on the basis that access to the stormwater system can represent potential danger to members of the public, particularly during major storm events. Infrastructure issues in this context relate to the design of stormwater assets to eliminate or minimise the potential for people to be 'trapped' in the assets during wet weather.

Closing off stormwater assets to public access is not considered feasible from an economic perspective and not desirable in terms of Canberra's open approach to public spaces, particularly given Canberra's relatively low rainfall.

The safety of the public in regard to stormwater assets is therefore about education campaigns rather than infrastructure improvements.

### 7.1.8 Sustainability

#### *Economic*

Economically, the push to embracing water sensitive urban design has implications for the operation and maintenance of stormwater assets.

On the positive side, the reduction in water runoff ultimately leads to a slowing down in the ageing of stormwater assets, extending their useful life and therefore pushing back the time when they will need to be significantly refurbished or replaced. However, the configuration of the assets may be affected by the reduction in flows, which may result in the need for new capital works or a change in operating conditions.

Positive and negative changes are not expected to be significant in the short to medium term, with stormwater flows in recent times reported to have increased as a result of increased urban development.

Economically, the adoption of water sensitive urban design has implications for the operation and maintenance of stormwater assets.

On the positive side, the 'at-source' and in-system detention of stormwater will defer the timing of downstream stormwater capacity augmentation, and reduce the public sector capital cost of stormwater provision. From sustainability and 'restoration of urban waterways' perspectives, there will be a need to remove aging concrete channels and pipe system, bringing forward the timing of their replacement with water sensitive urban design initiatives.

water sensitive urban design is recognised by planning authorities and property developers to be an added value feature for the urban environment. Property values adjacent to stormwater systems featuring water sensitive urban design principles are reported to be higher than those adjacent to the concrete drain style of stormwater asset<sup>71</sup>.

#### *Environmental*

The nature of the urban environment, where stormwater assets are located, is one that consists of significant impervious areas that produce runoff during wet weather. The key issue in regard to sustainability and stormwater infrastructure is therefore in the opportunity for improving environmental outcomes by reducing stormwater discharges. If peak volumes can be reduced by temporary retardation of water on-site, pollution loads can be minimised and risks to public safety can be reduced.

The ACT Government's guidance on encouraging and introducing water sensitive urban design features into new and existing developments is therefore a significant initiative in terms of improving the environment, particularly that of natural watercourses and other wet landscapes. Setting a target of reducing stormwater discharges by 20 percent where the runoff enters a system of stormwater controls, such as detention basins, and by 50 percent in older residential areas where those controls do not exist, is a key step in reducing the negative environmental impacts associated with stormwater.

#### *Social*

There are community concerns over the water quality in the ACT's lakes, ponds and receiving waters, as identified in customer satisfaction surveys undertaken by Roads ACT.<sup>72</sup>

As noted previously, stormwater is now recognised as a valuable resource, in respect to the urban waterway and their corridor open space, recreation, environmental conservation and water supply values.

### 7.1.9 Existing Infrastructure

Roads ACT stormwater assets include the following:

- ▶ 3,090 km of stormwater pipes
- ▶ 55 km of lined channels
- ▶ 120 km of cut-off drains
- ▶ 157 km of grassed flood ways
- ▶ 60,000 stormwater sumps
- ▶ 25,900 manholes
- ▶ 2 dams
- ▶ 12 weir structures
- ▶ 88 gross pollutant traps
- ▶ 14 retardant basins

The NCA stormwater assets include the following:

- ▶ 24 km of stormwater pipes
- ▶ 1 km of lined channels
- ▶ 500 stormwater sumps
- ▶ 150 manholes
- ▶ Headwalls
- ▶ 1 urban lake
- ▶ Open drains
- ▶ Sub soil drains
- ▶ Gross pollutant traps

Canberra Urban Parks and Places assets include:

- ▶ 18 ponds or wetlands
- ▶ 2 urban lakes
- ▶ 82 km of urban stormwater corridors

## 7.2 Evaluation

### 7.2.1 Asset Management

Inspection of stormwater pipes across the system is an economically prohibitive activity and not normally undertaken except in areas with a relatively high incidence of blockages or other failure. Correspondingly, Roads ACT estimates that it has condition data on only 1 percent of its stormwater network.

While the age profile of the Roads ACT owned stormwater assets indicates a number of the systems are more than 80 years old, these are considered to be generally functioning satisfactorily, with Roads ACT not reporting any significant differences in the number of complaints between older and newer suburbs<sup>73</sup>.

Environment ACT maintains an ongoing program of water quality and ecological health monitoring of lakes and selected ponds.

#### *Urban Lakes*

These generally maintain a high water quality, meeting designated lake environmental and use values. Occasional incidence of blue green algae associated with stormwater discharges to the lakes.

#### *Ponds/wetlands*

These are generally performing well in stormwater pollutant interception. Occasional incidence of algal blooms associated with stormwater discharges. Ponds in catchments undergoing urban development are subject to elevated turbidity and algal levels, indicating limited effectiveness of at-source pollution control and role of stormwater in transmitting discharged pollutants directly to ponds.

The NCA reports that its stormwater assets are in 'sound structural condition' and 'free of blockages', and are 'operating within design capacity'. It is noted that blockages of stormwater pipes do occur, with blockages rectified as and when they occur.

**7.2.2 Levels of Service**

Achieving target service standards (based on Roads ACT asset management strategies) for stormwater assets in the ACT is affected by the age of the assets, and their capacity. Increased urbanisation has led to increased stormwater runoff levels from levels predicted in original designs. Surface water levels have been affected and this is the second highest fault reported to Roads ACT.

The other large fault problem with the stormwater assets is root intrusion and the pipe blockages they cause. This has accounted for 50 percent of faults reported between 1990 and 1999.

Current service standards are lower than the target service standard as indicated in the following table.

**Table 21: Service Standards for Stormwater Assets<sup>74</sup>**

Issue/Attribute	Service Standards	
	Current	Target
<b>Programmed Maintenance</b>		
Above-ground	Reactive and some planned based on routine inspections	Fully planned based on annual inspections
	Inspections Every 6–12 months based on asset type	
Below Ground	Reactive during and after storms to clear chokes	Pro-active using historical defect data
Dam Maintenance	Safety inspections annually	Safety inspections annually
	Comprehensive inspections every 5 years	Comprehensive inspections every 5 years
	Major event inspections after earthquakes and floods	Major event inspections after earthquakes and floods
Hydrology and Hydrometric	Continuous monitoring	Continuous monitoring
Gross Pollutant Traps	Clean twice yearly or when sediment > 50%	Clean twice yearly plus when sediment > 50%
	Empty trash racks when blocked more than 30%	Empty trash racks when blocked more than 30%
<b>Routine Maintenance</b>		
	Reactive based on complaints and reports of system failure	Based on surveillance and reaction to public complaints
Response Time		
Emergency	95% attend within 1 hour	99% within 1 hour
Minor Overflows	95% corrected within 14 days	Within 2 days
Major Overflows	95% corrected within 14 days	Within 1 day
Written Complaints	Within 10 working days	Within 10 working days

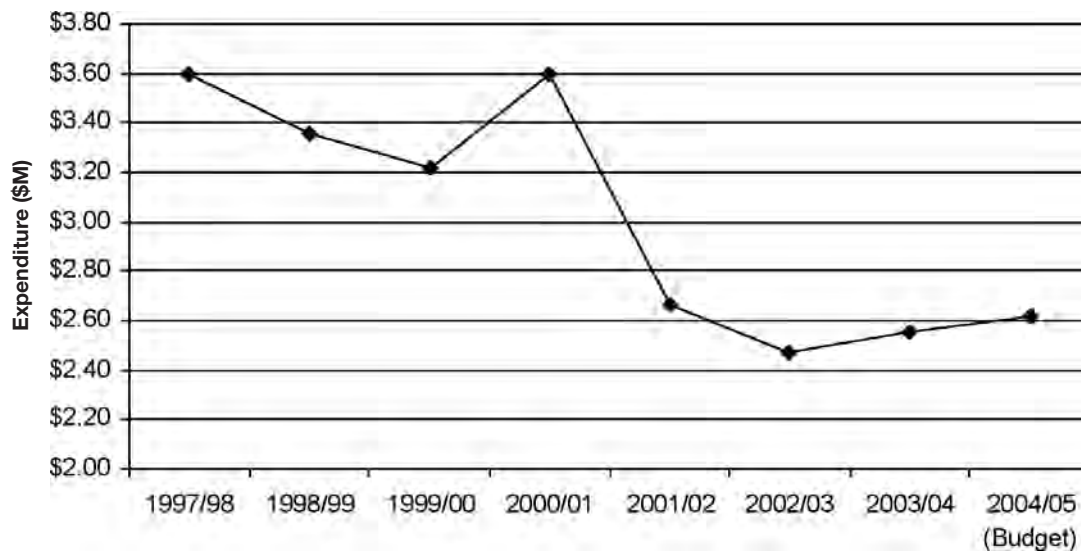
**Urban Lakes and ponds/wetlands**

The Canberra Urban Parks and Places ‘Canberra’s Urban Lakes and Ponds Plan of Management 2001’ incorporates comprehensive schedules of service delivery, including foreshore and aquatic plant management, water quality management, regulation of activities, monitoring, information services, rehabilitation programs and barbecue, picnic, playground and ablution facilities.

### 7.2.3 Expenditure

Stormwater funding has decreased<sup>75</sup> despite increasing demand on the assets, as well as their aging, as illustrated in the following diagram.

**Figure 20: Stormwater Maintenance Expenditure**



To reach the required targets for levels of service the current budget allowance per annum would need to be increased by \$4.34 million.

It was also estimated in 1999 that environmental works to improve water quality performance would cost \$1.8 million per annum over a 15-year period.

### 7.2.4 Capacity

The existing stormwater system in many areas of Canberra was originally developed 40 to 50 years ago, providing piped network for minor storms, while overland flow utilising roadways and laneways was used for major storm events. A number of these older areas were originally designed using lower standards, which contributes to current day capacity deficiencies. However, there are other issues such as the age of the assets and the increasing demand placed on the system through further urban development (eg. increasing areas of impervious surfaces), which are also leading to deficiencies in the capacity of the stormwater system in these areas. While the piping system ranges from 150 mm diameter ties to 1800 mm diameter trunk mains, capacity issues are increasing over time.

Increasing density of the urban environment in Canberra, along with a corresponding increase in the use of impervious surfaces, is driving the need to upgrade existing stormwater services, particularly if these trends continue. Upgrading works may include the replacement of the existing stormwater assets or augmentation of existing assets. Some augmentation works are currently being carried out, however this will need to increase as development trends continue. Overall, suitable urban infill is a better solution and will be more cost-effective for infrastructure than geographic spread to new development areas.

Many of the existing areas that have older infrastructure require significant upgrades in order to provide a level of service for forecasted future needs.<sup>76</sup> Some areas that have newer infrastructure, but are forecasted to have possibly larger development potential, also require works to be carried out in order to provide the required levels of service.<sup>77</sup>

### 7.3 Future Directions

As mentioned in section 7.2.4 there are a number of localities in the ACT flagged as areas for increased development. This increase will affect stormwater runoff and increase flows because of the increased catchment areas that impervious surfaces represent.

Some localities are predicted to have almost 50 percent growth in urban developments over the next 20 years, with the potential for a corresponding significant increase in stormwater flows. The trend for more apartment style living and the reduction in the number of persons living in a dwelling also increase the effects of these developments.

### 7.4 Report Card Rating

Major future investment is required to ensure that stormwater infrastructure in the ACT is maintained to meet growing demand while planning initiatives for more water sensitive urban design develop to offset some of that increased demand. This issue is significantly more important in older areas of Canberra where ageing assets face capacity constraints and there is a lack of localised stormwater retention.

Strategic planning is required to ensure that future investment in stormwater infrastructure in the ACT is managed and developed in a manner responding to changing community needs and urban growth, including sustainability and the recognition of stormwater as a valuable resource. This need for a strategic position is particularly critical in terms of capturing opportunities associated with urban renewal to put in place stormwater management arrangements appropriate to the future.

This strategic planning is lacking at this time. While the development of a water sensitive urban Design Guideline will bring the ACT up to other jurisdictions in respect to best management practice, its effective implementation will still require catchment based strategic planning.

The rating for **stormwater** infrastructure in the ACT is therefore considered to be **C**. The rating reflects the known condition of the current asset (albeit from a small sample) and current expenditure levels. It also takes into consideration the increasing density of the urban environment and associated greater potential for stormwater runoff, which is not sufficiently offset by other initiatives such as the installation of rainwater tanks or temporary storage of stormwater runoff on-site.

## 7.5 Case Study

The ACT Planning and Land Authority, along with Environment ACT, Roads ACT and Canberra Urban Parks and Places, have a number of initiatives in place to promote the use of Water Sensitive Urban Design practices.

Water sensitive urban design is based on the management of stormwater as a resource, including its retention at source as a source of supply, the retention or restoration of natural waterways and wetlands and associated vegetation and ecology, and the protection of downstream environmental values. The new practice calls for the deletion of minor flow pipe systems, but yields limited reduction in the need for the major flow pathway vegetated flood ways.

The application of these practices across residential blocks within new subdivisions requires shift to urban form. ACT Planning and Land Authority and the Land Development Agency are currently reviewing their practises in the light of this change in industry practice.

These initiatives by themselves are not expected to significantly offset urbanisation trends for increased use of impervious paved areas, particularly those resulting from denser urban developments and infill in older residential areas. The installation of rainwater tanks are also not expected to improve stormwater runoff issues as major storm events will typically greatly exceed their storage capacity.

In the context of urban stormwater runoff pollution one of the keys to improving water quality in the ACT's creeks, ponds and rivers is therefore in the development of control areas along the stormwater network, including features such as swale systems and detention basins. These are features of recent urban developments in the ACT, but need to be introduced into older urban areas.

Overall, water sensitive urban design in the ACT is an integrated activity that draws upon and coordinates resources from a number of ACT Government agencies.

# 8. Electricity

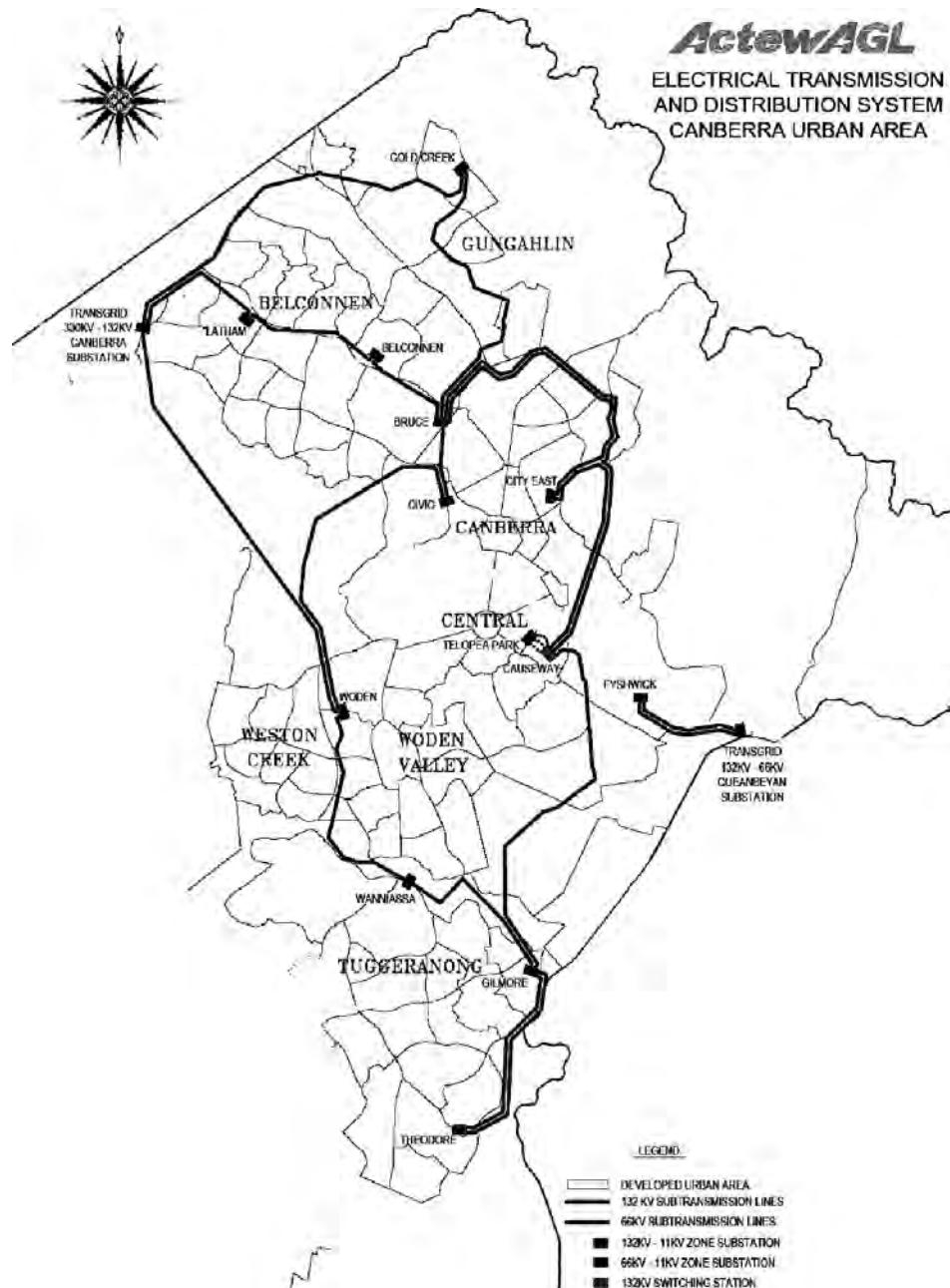
## 8.1 Overview

### 8.1.1 System Description

The electricity network in the ACT is primarily made up of underground and overhead high voltage sub transmission lines (132 kV and 66 kV), substations and transformers, and the distribution network servicing approximately 150,000 customers, or points of supply.

The majority of the ACT's electricity is bought from NSW electricity generators via the National Grid, with a small amount being produced within the ACT.

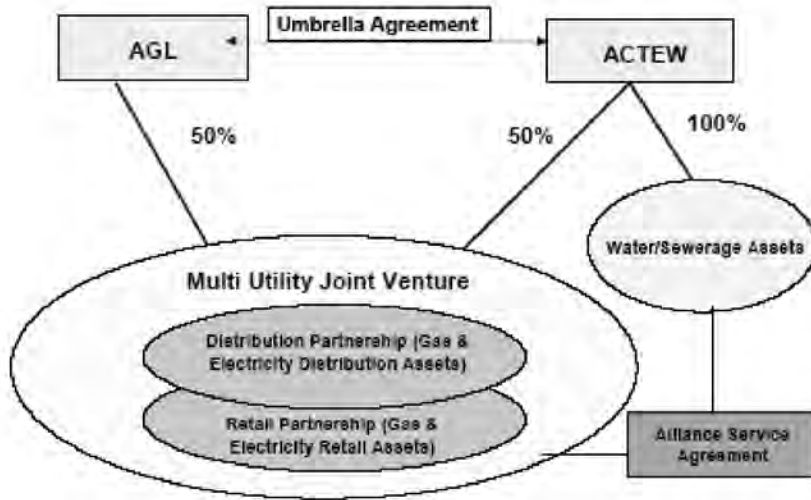
Figure 21: Electricity Transmission Overview



8.1.2 Ownership

The ACT’s electricity supply system assets and all operating components are jointly owned by ACTEW and AGL, with the planning, network development, operation and maintenance of the system carried out by ActewAGL.

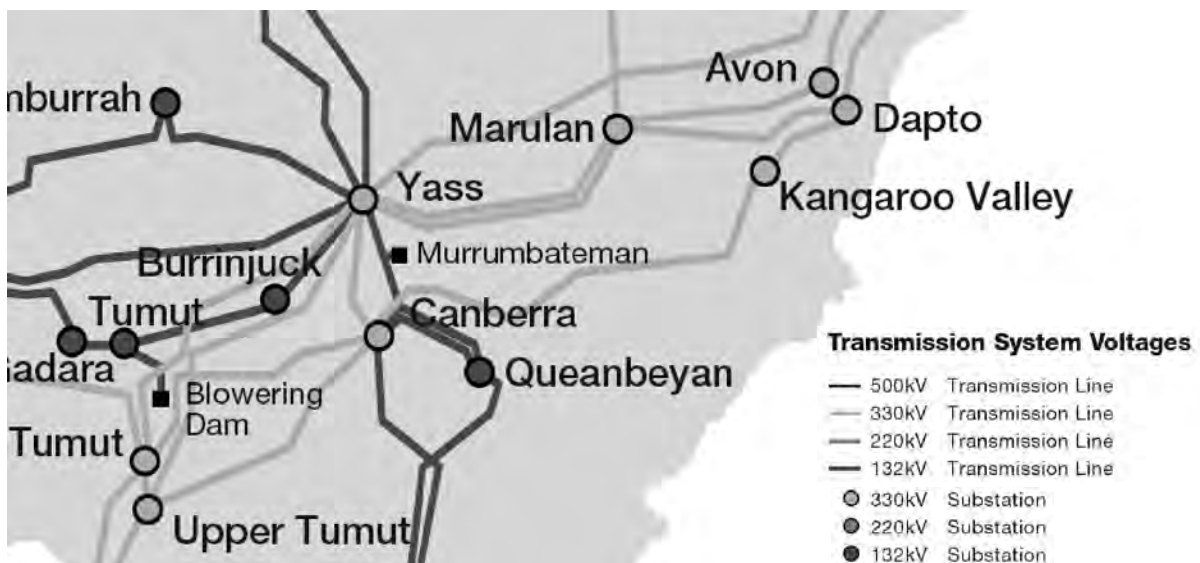
Figure 22: Ownership Structure – Electricity Supply Assets



The high voltage transmission lines and high voltage substations are owned and operated by TransGrid, a NSW state-owned high voltage transmission company. These transmission assets are separate to the lower voltage sub transmission network owned and operated by ActewAGL within the ACT. The following figure illustrates the total electricity system.

The following diagram illustrates the transmission line network leading to and around the ACT.

Figure 23: TransGRID Network Surrounding the ACT



### 8.1.3 Governance

The National Electricity Market defines four markets for electricity service provision, described in the context of the electricity system in the ACT as follows:

- ▶ **Generation** — with NSW generators, operating under NSW and national regulatory environments, the primary suppliers of electricity to the ACT.
- ▶ **Transmission** — with high voltage electricity delivered to the ACT by TransGrid.
- ▶ **Distribution** — with electricity supply within the ACT being via assets jointly owned by ACTEW and AGL, although under National Electricity Market rules, access to the distribution network to service retail customers is open to other parties.
- ▶ **Retail** — the service end of the market, it was opened to full retail contestability in 2003. However, ActewAGL remains the dominant player in the market.

The *Utilities Act* governs the distribution of electricity throughout the ACT. Under licence terms set by the *Utilities Act*, ActewAGL and other licensed electricity retailers must report each year to the Independent Competition and Regulatory Commission on their compliance performance. There were no known material breaches of its licence by ActewAGL during the year 2003–2004.

### 8.1.4 Sector Trends

There are three key sector trends in electricity supply to the ACT market:

- ▶ **Full retail contestability:** This entails the introduction of competition to small electricity consumers in the ACT since 2003.

It is understood that the churn rate, that is, the number customers switching from one electricity retailer to another, remains low in the ACT market.

As the major electricity retailers with the potential and capability to supply electricity into the ACT market are primarily State owned enterprises, full retail contestability is yet to be completely established in the ACT.

- ▶ **Renewable energy:** Electricity consumers in the ACT are encouraged to purchase 'green energy', which is effectively the purchase of a proportion of the electricity being generated by 'renewable' sources.

There is a cost penalty in doing so, with the higher price acting as a disincentive for consumers to purchase the 'greener' electricity. Charging consumers the same price for electricity, no matter the source, but providing consumers to choose by which means they would prefer their electricity to be generated, will offer real alternatives to smaller electricity consumers and deliver incentives to the renewable energy production section of the market.

- ▶ **Underground cabling:** New subdivisions are using underground reticulation to both increase the amenity of the new areas and to reduce the risk of damage to the assets. This cabling is now also being installed in a shared trench arrangement with other utilities.

### 8.1.5 Security

The Australian Competition and Consumer Commission recently approved capital expenditure for TransGrid to develop a second supply point for the ACT to improve the security of supply of electricity to the ACT.

Identifying other points of criticality or where there is low redundancy within the ACT electricity system will be an important step in working to secure the electricity supply and distribution. For example, alternative connectivity was an issue during the 2003 bushfires.

### 8.1.6 Sustainability

#### *Economic*

National competition policy is concerned with improving productivity, with the understanding that competition leads to greater productivity<sup>78</sup>, hence the introduction of full retail contestability into the ACT electricity supply market.

The Independent Competition and Regulatory Commission has reported that *'Clause 5 of the Competition Principles Agreement implicitly commits the ACT to implementing...[full retail contestability] if it cannot identify substantial benefits in maintaining the current level of restrictions on competition'*<sup>79</sup>.

Full retail contestability in the electricity sector has been introduced in the ACT. This is expected to lead to better pricing for customers.

The Independent Competition and Regulatory Commission has also recommended in a separate report that competition in undertaking electricity infrastructure works be introduced in the ACT, expecting there to be a net benefit to the community in doing so. This was to be partially implemented no later than 1 July 2005, and fully implemented no later than 12 months after that<sup>80</sup>.

#### *Environmental*

The development of wind generation projects in the region that may service the ACT is taking place, with the Mount Spring and Woodlawn sites currently at feasibility and planning stages, and a number of other sites monitored for the quality of the wind resource.

Additionally, mini hydro electricity facilities are progressively being established in the ACT with the development of electricity generation at the Mt Stromlo Water Treatment Facility and a number of other projects in construction or being evaluated:

- ▶ Mini hydro electricity generation capacity under construction at Googong Dam
- ▶ Mini hydro electricity generation capacity to be developed at Bendora Dam
- ▶ A review of the economic feasibility of a mini hydro electricity generation facility at Corin Dam has been commissioned
- ▶ A mini hydro electricity generation facility for the Lower Molonglo Water Quality Control Centre is in the planning phase

The primary electricity supply retailer in the ACT, ActewAGL, offers customers a renewable energy product, GreenChoice, accredited under the National Green Power Accreditation Program. It provides customers with an opportunity to share in the procurement of electricity generation capacity, generated by a number of renewable energy sources such as biomass, wind and hydro facilities.

ActewAGL reports 13 percent growth in customers purchasing electricity using the GreenChoice option. ActewAGL also reports supplying around 100 GWh of renewable energy, equivalent to around 4 percent of electricity supplied to the ACT annually.

It is understood the demand component of network charges more accurately reflects distribution costs, and that ActewAGL has introduced a number of price reforms aimed at improving demand management and network utilisation. These initiatives include:

- ▶ Tariff structures based on the times of day when network costs are incurred
- ▶ A 'Home Saver' network charge
- ▶ A capacity charge for the high voltage distribution network<sup>81</sup>

### Social

In introducing full retail contestability into the ACT market the Independent Competition and Regulatory Commission concluded that there is some evidence that the cost of electricity to smaller electricity users will increase marginally. It recommended that the ACT government 'should examine the possible need for additional support measures for relevant customers who may suffer particular hardship as a result of the introduction of full retail contestability'<sup>82</sup>.

The electricity supply market in the ACT can therefore be expected to achieve greater productivity once real competition at the retail end is established, although this may lead to higher costs to consumers in the short term.

#### 8.1.7 Existing Infrastructure

The following table identifies the assets involved in the distribution of electricity throughout the ACT. The table compares changes in assets over a period of 2000 to 2004, and also indicates the increase in customer numbers over the same period.

**Table 22: Electricity Infrastructure for the ACT<sup>83</sup>**

	2000–2001	2001–2002	2002–2003	2003–2004
<i>Customers</i>	136,377	138,978	146,503	<b>149,201</b>
<i>Mains in service (km)</i>				
Overhead				
132 kV	160	160	159	<b>159</b>
66 kV	8	8	7	<b>7</b>
22 kV	24	24	34	<b>34</b>
11 kV	1,355	1,355	^1,034	<b>1,029</b>
Low voltage **	1,300	1,300	^1,262	<b>1,245</b>
Underground				
132 kV	3	3	3	<b>3</b>
66 kV	-	-	-	-
22 kV	2	2	2	<b>2</b>
11 kV	1,310	1,333	^1,189	<b>1,199</b>
Low voltage **	950	989	922	<b>945</b>
<i>Electricity substations</i>	4,014	4,014	^4,339	<b>4,379</b>

<sup>^</sup> Implementation of new asset recording and management systems resulted in more accurate data, hence the significant variations for 2002–03.

\*\* Lengths of low voltage mains do not include LV service cables and conductors.

There are three transmission nodes serving the ACT and Queanbeyan<sup>84</sup>, with the two serving Queanbeyan owned by ACTEW and Country Energy.

## 8.2 Evaluation

### 8.2.1 Levels of Service

There are a number of levels of service for the supply of electricity to the ACT region, with the capacity and reliability of supply being the main indicators.

Other identified levels of service include the quality of the supply to households and commercial/industrial areas, measured in a number of ways including suppression of electrical spikes or surges.

ActewAGL uses a number of preventive maintenance initiatives towards ensuring the reliability of the electricity distribution network. These include pole inspections to ensure the structural integrity of power poles, an initiative enhanced after the January 2003 bushfires.

Proactive maintenance is carried out by ActewAGL to ensure the electricity network achieves required target levels, and includes replacement of joints in 11 kV underground cables and the replacement of low voltage overhead service cables. Oil refurbishment of substation transformers and replacement of magnetic transformers has been carried out in previous years, with the potential for more proactive maintenance to be carried out on other transformers in future periods.

Vegetation management around overhead assets is carried out and continues to be a significant issue for overhead cables. An accredited tree surgeon scheme to remove trees near assets is being carried out to improve this proactive maintenance.

### 8.2.2 Condition

While a number of inspections of electricity assets are taking place, eg. pole inspections, information on the condition of poles, conductors, transformers and substations, was not made available for this report.

### 8.2.3 Supply

ActewAGL have set a number of targets for supply levels of service for their customers<sup>85</sup>. The targets relate to reliability of supply, and outages and durations. ActewAGL aim to deliver to these standards, which are:

- ▶ Customer outage time no greater than 74.6 minutes. This is defined as the average duration that a customer is without power when affected by an interruption to supply.
- ▶ System outage frequency no greater than 1.2 per annum. This is defined as the average number of interruptions that a customer experiences each year.
- ▶ System outage duration no greater than 91.0 minutes. This is defined as the average duration that customers are without power each year.

Information on performance against these standards was not available.

The ACT Electricity Distribution (Supply Standards) Code indicates that these target levels do not include interruptions less than one minute or events that affect more than 10 percent of customers (storm events).

## 8.3 Future Directions

### 8.3.1 Growth

As with all services throughout the ACT, the demand for power is rising with the increase in population, residential developments and any new commercial and industrial developments. Inevitably, this development will demand more of the electricity network and require the upgrade/augmentation of the existing system to service these developments.

Another impact of the increased demand for electricity in the ACT is the need for alternative power sources, both the normal supply and in the case of failure of other sources.

### 8.3.2 Infrastructure Development

ActewAGL is planning infrastructure development in the electricity network in a number of areas in the near future, including the following.

#### *Green energy sources*

The pursuit of a 'green' energy source is a desirable target for ActewAGL, with research currently underway on the potential for wind generation in the region. An option for wind power generation capacity could be developed through a series of joint ventures with experienced wind development partners.

### *Residential land development*

New residential estate developments require electrical connections, and as part of the future need, they will be part of the expansion of existing infrastructure. Recent new infrastructure includes electrical and street lighting distribution for new residential estates in Banks, Conder, Belconnen, Dunlop, Gungahlin and McKellar.

As well as new residential developments, the renewal of infrastructure in older suburbs and in new developments within built up areas such as North Lyneham, O'Connor, Turner and Braddon is occurring as part of urban renewal projects.

### *Commercial development*

Commercial developments are also part of the ongoing development of the electricity network, and similar to residential developments, any new developments are part of ongoing infrastructure development. Significant commercial projects that were upgraded in recent years include the ANU, Canberra International Airport, Southern Cross Club, Resource Recovery Centre and the former RAAF Base.

## 8.4 Report Card Rating

The rating for **electricity** is considered to be **B**. That is, the electricity supply infrastructure is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- ▶ No material failures in the delivery of electricity supply services, as reported by the Independent Competition and Regulatory Commission.
- ▶ Investment in preventive maintenance and new capital works to maintain current service standards and increase capacity appears appropriate to meet demand.
- ▶ Demand management initiatives and the development of renewable energy sources are contributing to the overall sustainability of electricity in the ACT.
- ▶ It is assumed that the condition of electricity assets is such that no significant spikes in maintenance investment or infrastructure upgrades are expected in the foreseeable future.



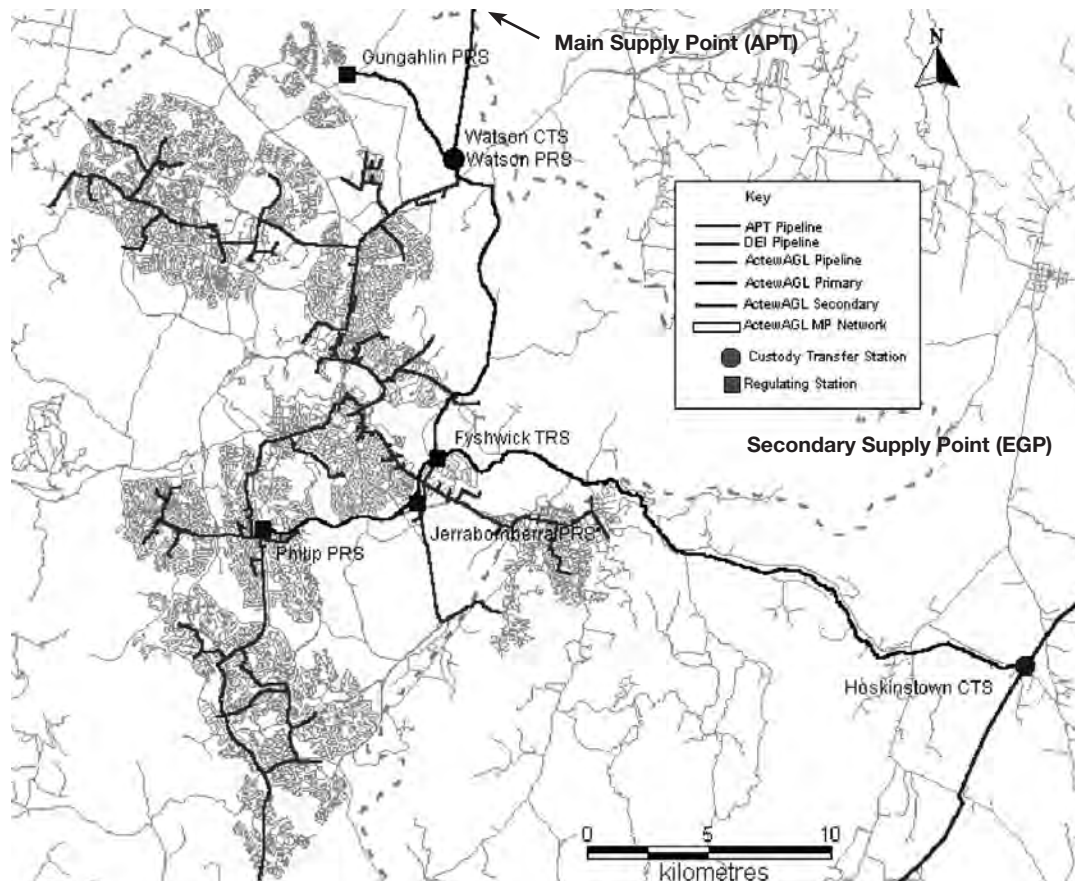
# 9. Gas

## 9.1 Overview

### 9.1.1 System Description

The gas network in Canberra consists of primary and secondary mains. The main source of gas comes from a connection to the Australian Pipeline Trust pipeline, as part of the Moomba to Sydney link. The secondary supply point comes from the Eastern Gas Pipeline.<sup>86</sup> The following diagram indicates the high-pressure steel mains and the two connection points to the ACT.

**Figure 24: ActewAGL High Pressure Gas Reticulation Network**



Gas is supplied to the ACT and Queanbeyan area to around 100,000 customers. The total capital cost base of gas assets is \$240M as at 2005–06.

### 9.1.2 Ownership

AGL Gas Company (ACT) Limited (AGL) was the monopoly supplier of gas in the ACT, until November 2000 when AGL and ACTEW formed a joint venture<sup>87</sup>. The joint venture merged the ownership of both the gas and electricity supply networks and their accompanying retail arms.

ActewAGL, the joint venture enterprise, currently contracts the operation and maintenance of the network to Agility, a subsidiary of AGL.

### 9.1.3 Governance

Regulatory governance of the gas supply network in the ACT is contained in the *National Third Party Access Code for Natural Gas Pipeline Systems*, which provides for third parties to access the services provided by the system.

The access arrangements and other operational issues associated with the gas supply network are regulated by the Independent Competition and Regulatory Commission using the following legislation:

- ▶ *Independent Competition and Regulatory Commission Act 1997*
- ▶ *Utilities Act 2000*
- ▶ *Gas Pipelines Access Act 1998*

The current ownership arrangement of the gas supply network in the ACT was enabled by the *ACTEW/AGL Partnership Facilitation 2000* legislation, passed in March 2000.

### 9.1.4 Sector Trends

The main trends in the gas infrastructure sector are:

- Improving the connectivity and efficiency of supply in the interconnected national network, which should improve the reliability of supply to the ACT provided any failure of the main distributors occurs upstream of any redundancy. To this end, the ACT is already supplied from two independent sources.
- Changing the ACT market access arrangements to enable third party access to the gas infrastructure network in the ACT. That is, permitting other gas retailers to use ActewAGL gas assets for the delivery of gas to their customers.
- Urban infill and higher density residential development increasing in some established suburbs, leading to increased demand on existing infrastructure.
- New appliance types, such as the use of instantaneous hot water units, are expected to impact on the pattern of demand.

### 9.1.5 Security

Security in infrastructure associated with gas relates to maintaining the reliability of supply. Critical points, therefore, are major junctions, particularly those on the main distributor lines. These areas require protection from advertent and inadvertent events that may occur because of inadequate attention to security.

Other potential risks include security of supply at the source for the ACT. That is the Moomba gas fields.

It is noted that ActewAGL's supply during a peak winter month for gas could survive 24 hours without the main north (Australian Pipeline Trust) connection, utilising storage within the pipes, as well as pressurised storage in the Eastern Gas Pipeline. As the consumers of natural gas in the ACT are generally residential, heavy industrial consumption (as in the other States) could not be interrupted in order to balance the demand over the system in a time of short supply from the main pipeline. However, appeal to the public would have a significant reduction potential.

If the secondary eastern (Eastern Gas Pipeline) connection were taken off-line, the system would handle the demand, however if the demand was at peak for a number of days, the system would only meet approximately 90 percent of demand. The risk in this instance is low given the relatively minor impact, and the low probability of the maximum peak day occurring consecutively.

### 9.1.6 Sustainability

#### *Economic*

Full retail contestability was introduced into the ACT in January 2002, although not all areas were reported to be included, such as meter data services<sup>88</sup>.

#### *Environmental*

The basis for the gas demand forecasts in the growth section below includes three assumptions related to sustainability, energy use and climate<sup>89</sup>. These are:

- ▶ The quantity of gas consumed by newer residential customers is predicted to decline over the period 2002–03 and 2009–10, with customers connecting in 2009–10 expected to use 10 percent less than customers connecting in 2002–03.
- ▶ Climate change is expected to bring about an annual weather-warming effect. The critical issue is the effect during the winter period. This is not yet clear.
- ▶ Improved energy efficiency programs are targeted to drive down gas consumption by contract customers.

### 9.1.7 Existing Infrastructure

ActewAGL's gas network in the ACT consists of approximately 3,800 km of mains, which supply approximately 100,000 domestic, commercial and industrial customers. This network consists of primary, secondary and reticulation mains that provide natural gas to the ACT and the greater Queanbeyan area.

The network consists only of high and medium pressure mains (i.e. no low pressure mains) of steel, plastic and nylon construction.

There are two receipt points for the natural gas supply for the ACT. These are:

- ▶ From the north via the Australian Pipeline Trust main which branches off the Moomba — Sydney transmission pipeline.
- ▶ From the east connecting to Fyshwick via the Eastern Gas Pipeline, branching off from Hoskinstown. This line also transports natural gas from Longford, Victoria to Sydney.

The main connection point that supplies Canberra during normal operating demand is from the Australian Pipeline Trust connection to the north. During high demand times in the winter, the system is also served by the Eastern Gas Pipeline.

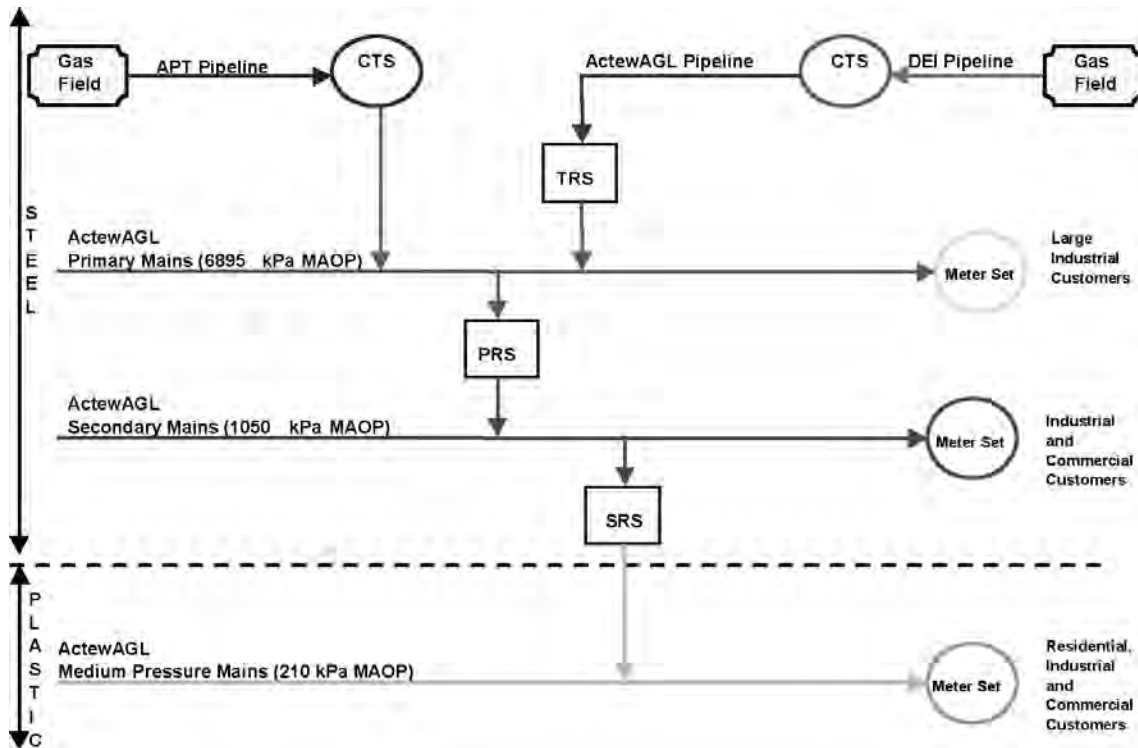
After pressure is reduced from the receiving point via regulator stations and trunk receiving stations, the primary main (at 3–4 MPa) distributes high-pressure gas from Watson to Gungahlin, and from Watson through Jerrabomberra to Phillip. The secondary mains (at ~1MPa) branch off from additional regulating stations throughout the suburbs to distribute high-pressure gas to the local system. After this, the local reticulation (at 210 kPa) feeds individual consumers via plastic pipes at medium pressure. The following figure identifies the two connection points, custody transfer stations, trunk receiving stations, primary and secondary receiving stations, and the pressurised mains.

Some of the higher volume users, such as commercial and industrial areas can be fed from the higher-pressure secondary network depending on location and demand.

The secondary distribution network is generally not a 'looped' system that allows for multiple supply points. However, the local reticulation network would normally be connected to more than one secondary main, allowing for gas to be 're-routed' if a supply point is not available.

The infrastructure for gas reticulation throughout the ACT began development in 1979-1980 leading to the oldest assets in the system being only 25 years old. This compares to the regulatory life of the assets in the order of 80 years for steel mains and 50 years for regulation stations.

Figure 25: ActewAGL Pressurised Mains Schematic



## 9.2 Levels of Service

Agility has advised that 100 percent of outages of gas supply to customers are rectified within 4 hours.

## 9.3 Future Directions

According to ActewAGL, growth forecasts for gas demand in the ACT are as follows.

Table 23: Gas Demand Forecasts, 2005–10<sup>90</sup>

Year ending	2005	2006	2007	2008	2009	2010
<b>30 June 2004</b>						
<b>Customers</b>						
Tariff Customers	100,007	103,573	106,937	110,181	113,319	116,362
Contract Customers	39	39	39	39	39	39
Total Customers	100,612	103,612	106,976	110,220	113,358	116,401
<b>Volumes</b>						
Tariff (TJ)	6,151	6,310	6,462	6,611	6,756	6,896
Contract (TJ)	5,711	5,628	5,546	5,487	5,405	5,347

It can be seen that an increase of 16,000 customers is predicted for the next 5 years period, with increases in volumes following this trend. As discussed previously the increase in demand arises from increased urban infill and new developments occurring around the ACT resulting from increased population growth and a reduction in average household occupancy levels.

### Funding

Expenditure for the gas network is approximately 0.6 percent per year of the total replacement cost of the ActewAGL gas network (Review of ActewAGL Gas Network Operating Expenditure, June 2004). This report suggested that an increase to 2 percent expenditure may be required in order to provide secure and reliable gas infrastructure to the ACT in the future.

Capital expenditure for the gas network is \$10M pa, and includes market expansion, growth capacity development and stay in business expenditure. As can be seen from the following tables, the figure of capacity development expenditure has risen slightly from the 2004 report suggesting 0.7 percent expenditure. This figure is due to rise over the coming years from the trends identified in Agility's and ActewAGL's predictions.

**Table 24: Forecast Capital Expenditure<sup>91</sup>**

Year Ended June 30	\$ Million, real 2004–05					
	2005	2006	2007	2008	2009	2010
<b>Distribution System Capex</b>						
Growth market expansion	6.40	5.52	5.41	5.31	5.34	5.36
Growth capacity development	1.71	2.88	2.33	1.77	4.42	0.82
Stay in business	2.39	1.19	1.27	1.21	1.33	1.01
Total distribution system	10.51	9.59	9.01	8.29	11.09	7.10
<b>Non-system Capex</b>						
Gas networks GIS system	0.50	0.00	0.00	0.00	0.00	0.00
Capitalisation of regulatory costs	1.60	0.00	0.00	0.00	0.00	0.00
Total Non-system capex	2.10	0.00	0.00	0.00	0.00	0.00
<b>Total Capex</b>	<b>12.61</b>	<b>9.59</b>	<b>9.01</b>	<b>8.29</b>	<b>11.09</b>	<b>7.10</b>

The following table indicates the capital base roll-forward predictions. From this capital figure, and the capital expenditure costs, the 2005 figure of capacity development expenditure as a function of total capital cost is approximately at 0.7 percent.

**Table 25: Forecast capital base roll forward<sup>92</sup>**

Year Ended June 30	\$ Million, nominal					
	2005	2006	2007	2008	2009	2010
Opening Value	225.9	236.8	244.5	252.2	260.4	272.0
Plus capital expenditure	12.6	9.8	9.4	8.9	12.3	8.1
Less depreciation	7.4	8.1	8.6	8.4	8.7	9.0
Less disposals	0.05	0.05	0.05	0.06	0.06	0.06
Plus indexation	5.8	6.0	7.0	7.7	8.0	8.3
<b>Roll-forward Amount</b>	<b>236.8</b>	<b>244.5</b>	<b>252.2</b>	<b>260.4</b>	<b>272.0</b>	<b>279.3</b>

## 9.4 Report Card Rating

The rating for **gas** is considered to be **A-**. That is, the gas supply infrastructure is fit for its current and anticipated purpose.

The key elements contributing to this rating are:

- The age of the assets compared to regulatory life being low;
- Security and reliability of supply is backed up with a second gas connection point. However, there is potential to cause inconvenience if supply is lost for an extended period of time given the limited supply from the secondary connection.
- The gas supply system is reported to meet customer expectations, and levels of service are met and are appropriate (as reported by the Independent Competition and Regulatory Commission).
- Well-developed asset management systems, and draft long-term capital works programs.

## 9.5 Case Study

The two supply points for the ACT enable the current demand to be met during the peak demand period of winter. The peak demand occurs during winter when there is an increased use of hot water and heating at households and commercial/industrial properties.

The second link supplying the ACT is capable of maintaining the ACT's supply for a period of 24 hours if there was a problem with the main link from the Australian Pipeline Trust system.

The risk to supply of natural gas in the ACT is greatest if the main Australian Pipeline Trust connection is severed from the supply network. If this connection were cut for longer than the 24 hours the secondary supply could maintain the network, but there would be consequences involving loss of heating and hot water.

The risk in losing the Eastern Gas Pipeline secondary connection is minimal, with the Australian Pipeline Trust capable of supplying up to 90 percent of the maximum peak over an extended period.

If peak demand occurred while the secondary source was offline for an extended period, the system could be managed more effectively than a loss of the main source. Commercial/industrial users could be requested to decrease usage allowing residential customers adequate supply. The 10 percent shortfall could be made up through the commercial users, as opposed to a 90 percent shortfall for loss of the main supply point.

# 10. Telecommunications

## 10.1 Overview

### 10.1.1 System Description

Telecommunications infrastructure in the ACT is complex, and rapidly evolving. Connection to broadband internet services is now readily available throughout most of Canberra, although there have been some delays in implementing services in some areas.

Australia's major telecommunications carrier, Telstra, through its historical position as a Government owned entity, has built an extensive Australia-wide network based primarily on copper cabling.

The long distance and main backbone infrastructure is optic fibre. The customer access network infrastructure for the delivery of voice and data services is almost entirely copper cabling.

Government utilities and other carriers have also constructed trunk networks utilising optic fibre in the ACT, the primary one being TransACT.

In recent years, the advent of mobile telecommunication services for voice and data has provided an additional demand for services and infrastructure. All major mobile carriers have established in the ACT either mobile telephone network towers and or offer mobile telephone services through other carriers' network infrastructure.

### 10.1.2 Ownership

#### *Telstra*

Telstra is 51 percent owned by the Federal Government, operates under a Board of Charter and is subject to corporate governance laws.

#### *TransACT*

TransACT Communications commenced operations on 25 February 2000. Subsequently subsidiary companies were established in order to conduct specific operations of the parent company.

A wholly owned subsidiary, TransACT Capital Communications Pty Ltd (TransACT Capital) was established to deploy and operate the broadband network in the ACT. TransACT Capital began operations on 31 July 2000.

#### *Other Service Providers*

A number of other service providers operate in the ACT market, including Optus and Vodafone.

### 10.1.3 Governance<sup>93</sup>

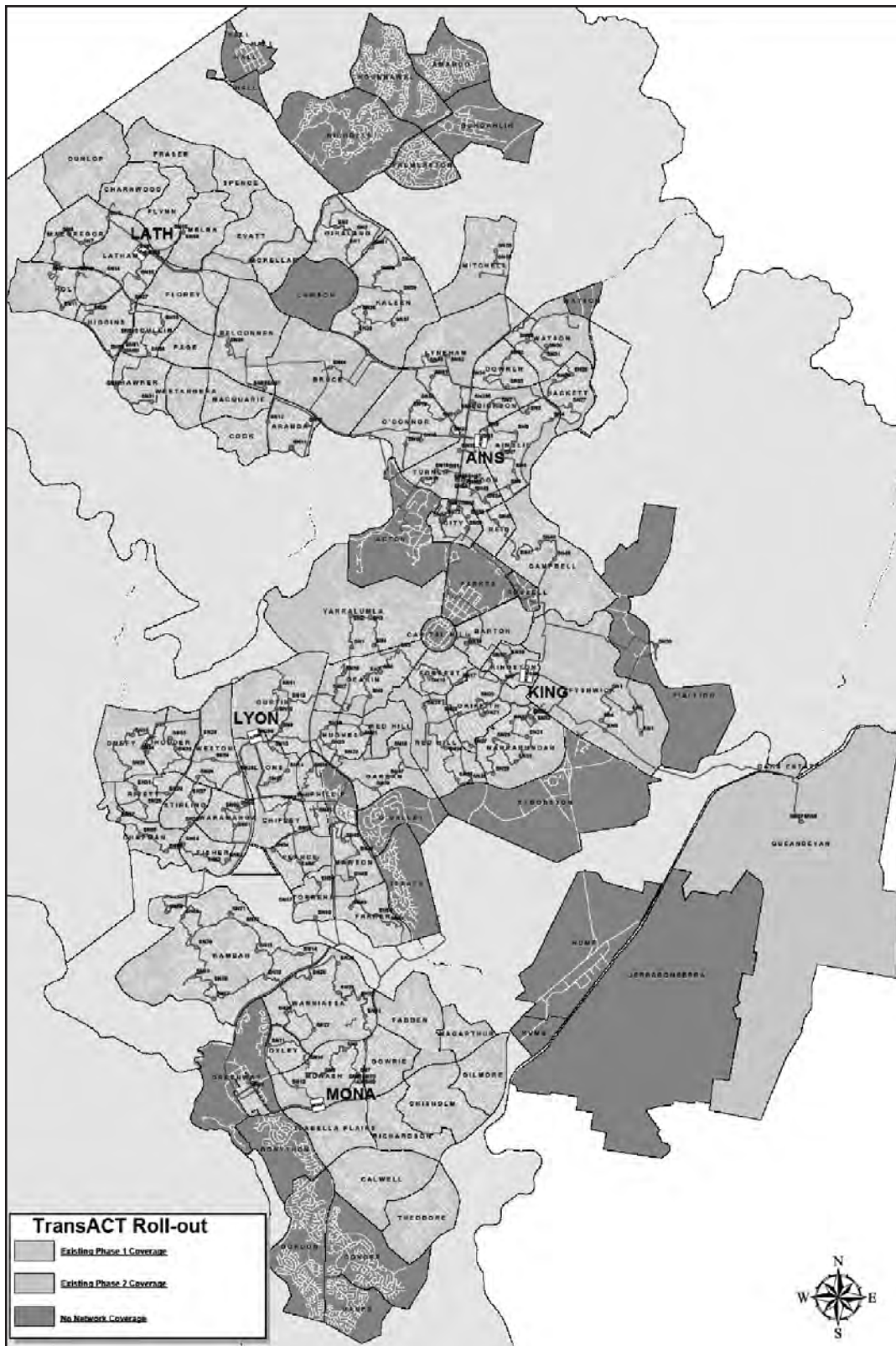
Telecommunication companies provide services in Australia in a largely financially deregulated market. However, the conduct of the carriers, particularly Telstra, is heavily regulated. Government authorities regulate the cost of calls and line rentals.

### 10.1.4 Existing Infrastructure

#### *TransACT*

TransACT's broadband cable has only been included in the first phase of its rollout, with the second phase seeing the use of other carrier infrastructure to provide TransACT telephony services. The following diagram indicates those areas in the ACT where there are no current service offerings by TransACT.

Figure 26: TransACT Service Coverage in the ACT



*Other Service Providers*

Information in regard to the existing assets with other service providers could not be located during the course of this study. There is a need for better publicly available information on the ownership and extent of telecommunications assets in the ACT.

## 10.2 Levels of Service<sup>94</sup>

An indicator of the level of service provided by communications assets throughout the ACT (all providers) is the level of customer satisfaction with services provided. A number of surveys have been conducted over past years to determine the levels of customer satisfaction with fixed line, mobile telephone and Internet services provided by the communications assets in the ACT. The survey findings are summarised below.

### *Household*

#### *Overall*

- ▶ Results were mixed in satisfaction with telecommunications services. Satisfaction among household respondents increased in some areas and decreased in others.
- ▶ For residential users satisfaction with fault repair and connection for fixed line telephone services increased.

#### *Areas of satisfaction*

- ▶ Satisfaction with overall fixed line service connection was the highest recorded at 82 percent.
- ▶ Satisfaction remained very high (92 percent) with the overall reliability of fixed line services.

#### *Areas of dissatisfaction*

- ▶ Dissatisfaction with fault repair for fixed line services declined but remained high at 23 percent.

### *Small business*

#### *Overall*

- ▶ There was a marked decrease in general satisfaction among small business respondents.
- ▶ Dissatisfaction with the technical quality of mobile phone services remained high (26 percent).
- ▶ For small business users, dissatisfaction with fixed line service connection and fault repair remained high or very high.
- ▶ Satisfaction with overall fault repair for fixed line services increased from 53 percent in 2003 to 62 percent in 2004.
- ▶ Satisfaction with timeliness of fault repair for fixed line services decreased from 78 to 63 percent.

## 10.3 Future Directions

The Information and Communications Technology sector is an important one for the ACT's economy. It is a primary industrial sector, and is seen as an area where the ACT Government can encourage a strategic advantage for the business community.

An efficient and reasonably priced high-speed broadband network is therefore a critical element in the success or otherwise of small to medium enterprises operating out of the ACT.

As the ACT has the highest population density of any State or Territory in Australia, investment in infrastructure for this sector will be more effective in the ACT.

#### 10.4 Report Card Rating

Information on infrastructure assets in this sector was sought but was not available for this review. This highly complex area of infrastructure, its market volatility, and the importance of information and communications technology for the ACT economy, means this is an area where greater transparency of infrastructure information and service provision performance is desirable. Regulatory organisations such as the Australian Communications Authority are encouraged to provide this information.

As limited information on telecommunications infrastructure in the ACT has been made available for this study, no rating has been given in this report.

## Appendix A – Rating Methodology

To enable comparisons to be made, the following scoring criteria have been adopted. This is the same basis that was used for the 2000 Infrastructure Report Card. It follows a similar format to those used in the United States of America and the United Kingdom for similar report cards.

The overall grades are based on the consolidation of the asset condition, asset availability and reliability, asset management, sustainability including economic, environmental, social and community issues.

Published Rating		Review Criteria
<b>A</b>	Very Good	Infrastructure is fit for its current and anticipated purpose in terms of infrastructure condition, committed investment, regulatory regime and planning processes.
<b>B</b>	Good	Minor changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current anticipated purpose.
<b>C</b>	Adequate	Major changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current anticipated purpose.
<b>D</b>	Poor	Critical changes required in one or more of the infrastructure condition, committed investment, regulatory regime and planning processes to enable infrastructure to be fit for its current anticipated purpose.
<b>F</b>	Inadequate	Totally inadequate for all current and future needs.

The ratings are based on consideration of the following five factors:

### ***Asset Condition***

Asset condition measures the condition of the asset on the basis of fitness of purpose. That is, the condition element of the rating indicates if it is adequate for its intended use.

### ***Asset Availability and Reliability***

Asset availability and reliability measures the asset's ability to meet the customers' satisfaction levels.

### ***Asset Management***

Asset management measures the level of active strategic management undertaken to ensure that the infrastructure assets are being maintained for today and future generations in an efficient manner. It also measures the impact and nature of regulation and legislation on the efficient management of the asset.

### ***Sustainability***

Sustainability measures the long-term sustainability of the asset and considers the following issues:

**Economic:** Economics measures the total expenditure on the infrastructure compared with the expected levels based on the current degradation rates of the infrastructure. It also takes into account whether sufficient funds are available to provide the infrastructure to an appropriate level for today and the future.

**Environmental:** Environmental measures the active management of likely environmental impacts and the level of environmental assessments undertaken during the planning for infrastructure renewals and new construction. It also takes into account the issues associated with the current and future care of the environment.

**Social and community:** Social and community measures include the distribution of infrastructure, equitable provision of infrastructure, the levels of support to customer service obligations, employment opportunities, and staff and customer safety.

### *Security*

Security measures the issues associated with security of the asset and considers the following issues:

**All-hazards approach:** Infrastructure assets face a series of hazards which can all be a source of potential harm. These include natural hazards such as cyclones, floods and earthquakes, and man-made hazards such as vandalism, arson and terrorism. While every hazard is different and requires specific counter-measures, they should all be treated under a single set of management arrangements so that resources are allocated on a comparative hazard basis that reflects the risk, probability and consequences of each hazard. This is called an all-hazards approach.

**Risk management:** Risk management is the systematic application of management policies, procedures and practices to the tasks of identifying, analysing, evaluating, treating and monitoring risk. It provides a standardised way to address all hazards and determine risk mitigation treatment based on a comparative analysis.

**Comprehensive approach:** A security strategy must address all aspects of security including physical and cyber security as well as security policy, practices and procedures. It must also address the four elements of security consisting of prevention, preparedness, response and recovery.

**Internal and external integration:** Security strategies will be effective if they are integrated into all other activities of an infrastructure organisation, and integrated with the activities of external stakeholders. Internally, the development of a security culture that permeates throughout the organisation is required. Externally, a partnership with government, industry and the community so that all partners can mutually support the others is needed.

**Security best practice:** Best practice in security is rapidly evolving as security experiences increase and practices adapt to new threats. Due to the speed of these changes, documented best practice embodied in codes and standards invariably lag behind practitioners' best practice. This means that infrastructure organisations need to do more than simply implement relevant security codes and standards. Instead, they need to continually improve their security by identifying and implementing relevant world best practice.

## Appendix B – Acronyms

ACTPLA	ACT Planning and Land Authority
ADWG	Australian Drinking Water Guidelines
AGL	Australian Gas Light
ARRB	Australian Road Research Board
AS	Australian Standard
CBD	Central Business District
CIA	Canberra International Airport
DUS	Department of Urban Services
GDE	Gungahlin Drive Extension
GL	Gigalitre – 10 <sup>9</sup> Litres
ICRC	Independent Competition and Regulatory Commission
IPT	Inter-town Public Transport
ISO	International Standard Organisation
LDA	Land Development Agency
LED	Light Emitting Diode
LMWQCC	Lower Molonglo Water Quality Control Centre
ML	Megalitre – 10 <sup>6</sup> Litres
NCA	National Capital Authority
NZS	New Zealand Standard
RAAF	Royal Australian Air Force
SARS	Severe Acute Respiratory Syndrome
SCADA	Supervisory Control And Data Acquisition
VIP	Very Important Person

## Appendix C – Endnotes

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