

2003

New South Wales
Infrastructure
Report Card



ENGINEERS AUSTRALIA

2003

NSW Infrastructure

Report Card

www.InfrastructureReportCard.org.au



ISBN 0858 2572 54

© Engineers Australia, August, 2003

All rights reserved. Other than brief extracts, no part of this publication may be produced in any form without the written consent of the publisher.

This report can be downloaded from www.engineersaustralia.org.au

Consultant: GHD Pty Ltd

Acknowledgments

This publication was only possible with the support of members of Engineers Australia, other building and infrastructure professionals, and representatives from government departments, industry, and business and professional associations.

Significant contributors included: Laurie Dowling, Louise Howells, Philip Laird, Ian Pedersen, Martin Thomas

Engineers Australia

11 National Circuit

Barton ACT 2600

tel 02 6270 6555

fax 02 6273 2257

web <http://www.engineersaustralia.org.au>

email policy@ieaust.org.au



Communiqué

Infrastructure is vital to the Australian economy. It underpins the delivery of essential services and drives economic growth. Given that Australia's infrastructure affects every Australian every day, it is of paramount importance that it meets today's needs and through careful planning, maintenance and construction, tomorrow's needs as well.

Below are the ratings for NSW's infrastructure alongside the ratings from the 2001 Australian Infrastructure Reportcard.

Category	2003 NSW Grade	2001 Australian Grade	Category	2003 NSW Grade	2001 Australian Grade
National Roads	C+	C	Metropolitan Urban Potable Water	B-	not rated
State Roads	C+	C-	Non Metropolitan Urban Potable Water	C-	not rated
Local Roads	C-	D	Metropolitan Urban Wastewater	C-	not rated
Rail	D	D-	Non Metropolitan Urban Wastewater	C-	not rated
Electricity	B	B-	Stormwater	D	D

For those sectors that have scored a D or lower, the infrastructure is in a disturbing state and requires immediate attention. While NSW infrastructure is generally in a better state than the average for Australia, NSW should not be complacent. All sectors required significant enhancement before it actually meets NSW's current and future needs. The only way that this will occur is if infrastructure planning, maintenance and development become a priority for the State and Local Governments. The major impediments to this are a lack of co-ordination between spheres of Government, a failure to plan for infrastructure which has a life of up to 100 years or more, and the low priority given to infrastructure provision. All spheres of government should also work co-operatively and closely with the private sector, to encourage and facilitate private sector investment and development of infrastructure.

Recommendations

Engineers Australia recommend the following to ensure that NSW's infrastructure meets the requirements of the community and business.

1. The planning and provision of infrastructure should become a true partnership between the three spheres of government, business and the community.
2. The planning and provision of infrastructure should be based on integrated land use planning and cost-reflective pricing.
3. The Commonwealth government should directly support the funding and planning of urban infrastructure.
4. Infrastructure owners and operators must incorporate the threat of malicious attack into their management approach to dealing with other hazards and risks, and a biannual *State of NSW*

Infrastructure Security Report should be produced to report to the people of NSW on the security of their infrastructure.

5. The NSW government should reconstitute the Infrastructure Advisory Council so that it can provide detailed infrastructure research, assessments, prioritisation and funding recommendations. It should report directly to Cabinet.
6. The quantum of funding on infrastructure should increase to overcome the backlog of maintenance and new infrastructure. A commission of inquiry should examine the optimal sources of the new funding including hypothecated taxes, user charges and infrastructure bonds.
7. Substantial reform of infrastructure policy, regulation and taxation must occur in all spheres of government to maximise the effectiveness of planning and provision of infrastructure.

Ratings Summary

Category	Grade	Comment
National Roads	C+	Major upgrade works have been carried out and the overall quality of National Roads is improving. A lack of Commonwealth funding commitment casts doubt on the sustainability of the rating. The AusLink proposal is likely to reduce road funding but will significantly benefit planning and coordination of National Roads.
State Roads	C+	The condition of State Roads is adequate and generally improving, particularly in urban areas. State government funding initiatives, such as the Timber Bridge Replacement Program, have had positive results. There is the need for a longer term NSW network planning strategy and commitment to funding. Growing private motor vehicle use and resulting urban congestion and greenhouse emissions are of concern.
Local Roads	C-	The <i>Roads to Recovery</i> program has improved Local Roads, however there is still a significant backlog of work. The overall rating for Local Roads is below adequate. There is a need for a regional approach, rather than a council-centric one, to road management in order to improve efficiencies. The lack of short, medium and long term capital and maintenance funding is an issue.
Rail	D	<p>While there have been a number of recent initiatives which are reforming rail management and increasing investment, the future of NSW rail remains uncertain. Inadequate funding and capacity problems of the Metropolitan Network are major issues.</p> <p>The delay in resolution of the Australian Rail Track Corporation proposal and the consequential delay in improving the Sydney-Melbourne interstate line is of concern.</p> <p>The provision of public transport infrastructure to service NSW's growth areas remains unresolved.</p>
Metropolitan Urban Potable Water	B-	Existing impoundments provide a relatively secure source of supply, and water treatment facilities provide high quality water. Areas of concern include the limited progress in utilising demand management, the low uptake by consumers of alternative sources of water for non-potable uses, and the low level of expenditure on rehabilitating aged infrastructure.
Non Metropolitan Urban Potable Water	C-	<p>Significant improvements are required by the 20% of non-metropolitan urban utilities which are not producing high quality potable water.</p> <p>Areas of concern include the limited progress in utilising demand management, the low uptake by consumers of alternative sources</p>

		of water for non-potable uses, and the complete lack of expenditure by 80% of non-metropolitan urban utilities on rehabilitating aged infrastructure.
Metropolitan Urban Wastewater	C-	<p>Effluent reuse in major urban areas is poor. The high level of stormwater inflow and infiltration into sewerage systems during wet weather is unacceptable and requires attention.</p> <p>Major rehabilitation of ocean outfall sewers is yet to be carried out.</p>
Non Metropolitan Urban Wastewater	C-	The worst performing 20% of non-metropolitan urban utilities need to improve their effluent quality significantly. Other areas of concern include the need to increase effluent reuse as it is almost non-existent in 80% of non-metropolitan urban utilities, and to review the complete lack of expenditure by 80% of non-metropolitan urban utilities on rehabilitating or renewing aged infrastructure.
Stormwater	D	Much of NSW's stormwater infrastructure is old and does not meet current requirements. Consequently, not only does it not have the capacity to cope with major rain events, it does not meet desirable water quality and pollution standards. The diversity of ownership and responsibilities for stormwater assets, and their different management arrangements, create significant complexity and inefficiency.
Electricity	B	While NSW's transmission and distribution systems place the State in the top 3 of the Australian States, generation availability for the last 2 years has been below the national average. The state of the electricity infrastructure is adequate for current and short term needs. However, there is a concern that the infrastructure may not meet demands in the medium and longer terms due to capacity and reliability issues.

Contents

Communiqué	iii
Ratings Summary	v
1. Overview	1
1.1 Background	1
1.2 Process	1
1.3 Policy Initiatives and Constraints	2
1.4 Significant Issues	2
1.4.1 Strategic Planning, Co-ordination and Integration	3
1.4.2 Funding	4
1.4.3 Sustainability	7
1.4.4 Level of Service	8
1.4.5 Security	10
1.5 Future Directions	11
2. Roads	12
2.1 Overview	12
2.1.1 System description	12
2.1.2 Governance	12
2.1.3 Sector trends	13
2.2 Level of service	16
2.2.1 Safety performance	16
2.2.2 Convenience of travel	16
2.2.3 Road condition	17
2.2.4 Community expectations	19
2.3 Existing infrastructure	19
2.3.1 Funding/investment	19
2.3.2 Asset management	21
2.3.3 Environment	21
2.3.4 Social	22
2.4 Future needs	22
2.5 Report Card Rating	24
Case study	25
3. Rail	27
3.1 Overview	27
3.1.1 System Description	28
3.1.2 Governance	29
3.1.3 Sector Trends	30
3.2 Level of Service	32
3.2.1 Passenger Services	32
3.2.2 Freight Services	33
3.3 Existing Infrastructure	33
3.3.1 Metropolitan Network	34
3.3.2 Defined Interstate Rail Network	34
3.3.3 Country Network	34
3.3.4 Hunter Valley Network	34
3.3.5 Bridges	35
3.4 Future Needs	35
3.4.1 Rail Reform	35
3.4.2 Growth Investment	36
3.4.3 Security	38

3.5	Report Card Rating	38
	Case Study	39
4.	Water – Potable and Wastewater	40
4.1	Introduction	40
	4.1.1 Governance	41
	4.1.2 Fitness for purpose / Level of service	44
4.2	Wastewater	46
	4.2.1 Overview	46
	4.2.2 Existing Infrastructure	47
	4.2.3 Operational Data	48
4.3	Water	52
	4.3.1 Overview	52
	4.3.2 Existing Infrastructure	53
	4.3.3 Operational Data	54
4.4	Report Card Rating	58
	4.4.1 Trends / Future Directions	58
	4.4.2 Potable Water and Wastewater Issues	60
	4.4.3 Ratings	62
	Case Study	62
5.	Stormwater	64
5.1	Overview	64
	5.1.1 System Description	64
	5.1.2 Governance	65
	5.1.3 Sector Trends	67
5.2	Level of Service	70
5.3	Existing Infrastructure	71
5.4	Future Needs	72
5.5	Report Card Rating	72
	Case Study	73
6.	Electricity	74
6.1	Overview	74
	6.1.1 Generation	74
	6.1.2 Transmission	75
	6.1.3 Distribution	75
	6.1.4 Major Trends	75
6.2	Level of Service	77
6.3	Existing Infrastructure	79
6.4	Future Needs	80
	6.4.1 Capacity	80
	6.4.2 Future Policy and Regulation	80
	6.4.3 Greenhouse Gases	81
	6.4.4 Social and Community Issues	81
	6.4.5 Asset Capability	82
6.5	Report Card Rating	82
	Case Study	83
	Appendix 1: References	84
	Appendix 2: Acronyms	88
	Appendix 3: Rating Methodology	90

1. Overview

1.1 Background

In 2000, Engineers Australia published A Report Card on the Nation's Infrastructure, examining roads, bridges, railways, water and wastewater.

In 2001, an expanded review, the 2001 Australian Infrastructure Report Card was published. Both documents highlighted issues relating to Australia's physical or economic infrastructure. Subsequently, Engineers Australia decided to undertake a more detailed, State-based review and in late 2002 commissioned GHD Pty Ltd to carry out the research and to produce this report for NSW.

The purposes of the NSW 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 and demand management;
- Identifying the state of the infrastructure sectors and the challenges facing infrastructure providers.

This report provides a strategic overview of NSW infrastructure that other organisations can use when they undertake detailed analysis of particular infrastructures. It also provides a benchmark which the community can use to identify need and evaluate alternative infrastructure priorities over time

1.2 Process

The general objective of the Report Card is to rate the quality of roads, railways, water, wastewater, stormwater and electricity infrastructure at a State level.

Ratings have been based on the consideration 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. Generally, interviews were held with relevant stakeholders, various 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; identify 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, focussed on strategic issues, supplemented by quantitative performance measures where these were readily available. A number of industry associations such as the NRMA, IPWEA, ESAA and AusCID, were consulted and Engineers Australia provided assistance through its expert panels and groups.

This report, together with the previous Report Cards and associated information, is available electronically on the website www.InfrastructureReportCard.org.au

1.3 Policy Initiatives and Constraints

Following the March 2003 NSW State election there has been a significant restructuring of NSW Government ministries. This, together with a number of policy initiatives, is expected to result in significant improvements to infrastructure planning, management and delivery.

At the time of writing, changes are still occurring, however those of particular significance are:

- The creation of a new Department of Infrastructure, Planning and Natural Resources, which concentrates land use planning, transport planning and the infrastructure coordination unit under the one ministry.
- The transfer of State Water and Country Towns Water Supply and Sewerage Groups to the Ministry of Utilities and Energy, thus concentrating rural and urban water and sewerage organisations under one ministry.
- Reorganisation of rail sector through changes to the State Rail Authority, Rail Infrastructure Corporation and Transport NSW.
- Centralising all infrastructure budget proposals through the one Ministry (Infrastructure and Planning) thus providing the opportunity for improved coordination and prioritisation.

1.4 Significant Issues

In undertaking the investigation, a number of major issues were identified.

As Australia’s oldest and most populous State, NSW contains a significant amount of Australia’s infrastructure. It was not surprising that many of the issues identified in the 2001 Australian Infrastructure Report Card also relate to NSW.

1.4.1 Strategic Planning, Co-ordination and Integration

The provision of infrastructure in Australia requires better coordination and long term planning. This is evident across all infrastructure sectors and across all spheres of Government. Unfortunately Australia's three spheres of Government and the inbuilt political pressure works against coordination and integration.

Integrated and coordinated strategic planning of infrastructure is particularly important as it affects efficient allocation of funds, prioritisation and future land use planning. To be effective, such strategic planning (ie land use and infrastructure) needs to incorporate updates to accommodate changes in strategies and include long term (at least 20 year) schedules of works and budgets. As noted in Section 3: Rail, and elsewhere in this report, it is essential to have longer term strategic plans to ensure that infrastructure requirements (eg public transport corridors) are provided for early in the land use planning cycle.

Although plans are available in NSW for many infrastructure sectors, these are generally government sector based (ie do not cover infrastructure across private sector and all tiers of government), are often incomplete (ie do not cover the full range of needs), do not necessarily have the same bases (ie population forecasts, planning horizon), are not necessarily committed to by government and are often not regularly updated.

In recent years, there have been some commendable improvements. Examples include the development of Stormwater Catchment Management Plans, which assess stormwater needs on a catchment wide basis, and the publication of the Central Coast Transport Action Plan (TNSW 2002) which sets out a programme to improve transport. It is understood that strategic plans for State Roads and railways are being prepared but these were not available at the time of writing the report.

Three significant initiatives which are advancing strategic planning and integration are:

- The NSW State Infrastructure Strategic Plan (NSW ICU 2002), which contains the State Government's priorities for major (>\$20million) infrastructure over the next ten years. It is proposed to be updated annually.
- The Commonwealth Green Paper, AusLink: Towards the National Land Transport Plan (DoTRS 2002), which aims to develop a National Land Transport Plan covering twenty years.
- The "whole of government" approach to land use planning and infrastructure provision for western Sydney growth. State and local government have committed to a new planning framework to manage Sydney's urban growth to achieve more desirable physical, social and environmental outcomes.

Greater cooperation between Councils offers to significantly improve infrastructure provision. While in NSW there are Regional Organisations of Councils, which generally coordinate policy and put forward a regional viewpoint on issues, there are examples in other States of greater cooperation leading to a more regional approach to funding, prioritisation and resource sharing. An example is the Queensland Strategic Roads Network Alliance. NSW Councils should consider expansion beyond regional planning into shared funding and shared resources to maximise the effectiveness of limited funds. The suggested amalgamation of Councils by Premier Carr (SMH June 2003) may assist with this.

Notwithstanding the above initiatives, a gap remains in developing a NSW statewide long term infrastructure strategy which considers all infrastructure across all private and public sectors. There are examples of both longer term planning or infrastructure wide plans in other States such as The Queensland State Infrastructure Plan, the Victorian Infrastructure Planning Council Final Report and the Melbourne 2030, 30 year strategic plan. This need was recognised in the Warren Centre's Sustainable Transport in Sustainable Cities report which urged the NSW Government to *"introduce a rolling long term integrated transport plan for Sydney linked to short term plans and work programs."* (Warren 2002)

A key recommendation of the NSW Auditor-General's Report on the Millennium Train Project was that the Department of Urban and Transport Planning should *"in coordination with rail entities compile as a matter of priority a long term (meaning at least 20-30 year horizon) strategic plan for the Sydney rail network."* (AG NSW 2003)

The complexities resulting from numerous jurisdictions are highlighted in the Commonwealth Senate Inquiry into Australia's Management of Urban Water, 2002. It identified lack of coordination and management fragmentation as major problems and identified seven areas of fragmentation ie water cycle, jurisdictional, agency, vertical, planning, social and industry. NSW examples figured prominently in the assessment. It concluded *"that the extent of the fragmentation in Australia's urban water industry, is undermining the capacity of Australia to achieve genuine reform and sustainable urban water use"*. (Senate 2003)

The Committee considered that there was a need for a National Water Policy which *"clearly establishes goals and objectives for achieving ecologically sustainable water use in Australia"* and that *"Importantly, this policy should not be restricted to urban water policy, but should address the complex but still unresolved relationships between competing water uses across all Australian landscapes: rural, urban and industrial."*

The need for a unified approach has also been promoted by the Urban Development Institute of Australia which have called for action for One Plan for Sydney. It has commented that *"Sydney suffers the huge handicap of too many governments and too many government authorities without common agreement on goals or a level of consistency. Federal, State and Local authorities pursue their limited individual goals with little consciousness of or regard for the goals or plans of others. Consistent, integrated strategies linking and cross-referencing the multitude of authorities and their plans are almost non-existent."* There is thus *"a critical need right now for a single, unified plan for the Region that anticipates Sydney's population growth and change, and is designed to strategically manage the resulting pressures and impacts."* (UDIA 2003)

1.4.2 Funding

Lack of funding has been identified as a major issue. Difficulties with funding include:

- only short-term budgetary commitments to critical infrastructure elements which can affect overall planning (eg no long term strategic plans for roads and railways)
- need for increased funding for maintenance and renewals (eg ageing water and sewerage)
- provision for changing community needs and levels of service (eg effluent reuse and environmental flows in creeks and rivers)

- restrictions on Councils funding mechanisms through IPART and rate pegging
- competing priorities for limited funds
- the provision of grants for capital works only, with no allowance for ongoing maintenance (eg AusLink proposal)

Infrastructure renewal studies invariably find that re-investment in infrastructure in terms of renewal and maintenance is not sufficient to maintain service level standards or achieve the best lifecycle cost outcomes.

For example, the recent Victorian Auditor General's report, *Management of Roads by Local Government* (AGVic 2002) has estimated that there could be a gap of between \$1.4 billion and \$2.75 billion (covering a period of 5 years) between the actual and required level of spending on infrastructure asset renewal and maintenance. No such study has been undertaken in NSW, however, as described elsewhere in this report, a funding gap is evident for all infrastructure sectors.

In April 2002, AusCID estimated *"that the cost of completing the five most pressing infrastructure projects in each council area in NSW"* was \$9.6 billion. The estimate was based on a survey of Councils. (AusCID 2002). The NRMA has estimated that *"current required roadworks (including upgrades and new construction) in NSW total around \$4.4 billion"* (Allen 2003). The report on the Federal Government's \$1.2 billion Roads to Recovery programme states that the funding did not eliminate the backlog of works on local roads and that funding would need to be continued at twice its current level. (DoTARS 2003).

The NSW Government has recently announced a Ministerial Inquiry into Public Passenger Transport. The Inquiry is to review and report on *"the likely future needs of CityRail and STA Bus and Ferry operations, with regard to efficient operating and capital costs"* with a particular focus on funding issues and service needs.

The need for greater funding for maintenance across all infrastructure sectors has been highlighted. The Association of Consulting Engineers Australia, Engineers Australia, and the NSW Government all identified this need for roads and rail in their submissions to the AusLink green paper. The NSW transport agencies' submission stated that underfunding for National Highway maintenance and capital renewal "has resulted in an accumulated maintenance liability estimated at \$250 million" (NSW 2003).

The Senate Urban Water Inquiry has identified a looming problem with new Water Sensitive Urban Design (WSUD) systems for stormwater drainage and the fact that Commonwealth capital grants do not cover ongoing maintenance costs and comments that *"without proper maintenance many of these facilities not only become ineffective, but may even exacerbate the problem. The Commonwealth must therefore ensure that when making grants, adequate checks are made to ensure that provision has been made for long term maintenance funding"*. (Senate 2002)

Most Councils have recognised the issues relating to funding. For example, Wyong Shire Council stated in its 2002-2003 Management Plan that it *"is preparing to allocate substantial funding to new initiatives aimed at addressing the key social, economic and environmental needs. However it is clear, that if growth is to continue, then the NSW Government must allocate substantial additional ongoing funding to the area."* (Wyong 2002)

In NSW there has been significant private sector investment in transport projects, particularly for urban motorways. Opportunities exist for increased use of private sector funding for infrastructure. The NSW Government has recently released its Guidelines for Privately Financed Projects. This is a significant step forward in opening up opportunities private/public partnerships. The State Infrastructure Strategic Plan (SISP) identifies a number of projects which could be funded by the private sector.

In recent years governments have not supported debt funding of infrastructure. Two recent papers have promoted alternate views.

- In the Issues Paper “Public investment in infrastructure: Justified and Effective”. Ian McAuley argues the economic case for public investment in infrastructure including the use of public debt. He concludes by stating: *“There is a pressing need for public investment in infrastructure. This will not occur while public policy is dominated by naïve beliefs that the market can provide for most economic needs, that public debt and increased taxes are always undesirable, and that public investment is intrinsically less productive than private investment.”* and he calls for *“public leadership in infrastructure provision – a government role in allowing and encouraging Australians to invest in their future productive capacity”*. (Engineers Australia 2002)
- In the AAA paper “Benefits of Public Investment in the Nation’s Road Infrastructure” Allen Consulting comments *“On the contrary, there are good grounds for concluding that a substantial public investment program funded in substantial part by borrowing is feasible at present”*. (Allen 2003)

The link between investment in transport infrastructure and economic growth was the subject of a recent paper by National Economics on behalf of AusCID. It found that there was a direct link and that *“Australia has failed to exploit transport infrastructure investment to its fullest potential as a driver for economic growth and there are consequences such as greater regional inequalities.”* (NIER 2002)

Some significant pressures have arisen for the funding of municipal infrastructure over the past 5 years. These include an increase in awareness of public liability associated with the ownership, management and operation of infrastructure, the introduction of regulation for service pricing, (through the introduction of IPART regulation of water and wastewater services), combined with increased customer expectations.

Local Government has responded by increasing the number of user-pays services, encouraging private sector provision and management of facilities, and removing infrastructure that exposes local government to a risk that is deemed too great to bear.

The change in public liability exposure is a significant issue for local government. As well as the impact of increased insurance premiums and payouts, there is potentially the need for increased funding to upgrade and repair assets (eg footpaths, recreational facilities), the requirement to close facilities thus reducing level of service, to increase the number of staff undertaking risk management activities, and for a higher standard of management and care to be applied. The recent NSW Local Government and Shires Association submission, Local Government and the Affordability and Accessibility of Public Liability Insurance, provides a good summary of the issues.

1.4.3 Sustainability

Most infrastructure organisations now incorporate sustainability objectives in their plans. Of the many definitions of sustainability, one of the simplest is from one of the original reports that defined development as sustainable *‘if it meets the needs of the present without compromising the ability of future generations to meet their own needs’* (Brundtland Report, 1987).

Within this context, the following issues need to be considered in developing infrastructure strategies for NSW:

- Infrastructure assets are characterised by their longevity and by the major effect they have on quality of life in economic, environmental and social terms.
- Resources (particularly water and energy) are limited and need to be managed through conservation, reuse and renewable strategies.
- Land use policies must be sustainable in how they impact on resources, community and social well being and accessibility. This is particularly important in reducing travel demand.
- Specific actions relating to infrastructure should include:
 - water management and reuse
 - improved public transport and opportunities for cycling and walking
 - evaluation of priorities using economic, environmental and social criteria
 - greater use of renewable energy sources
- Equity is a significant issue either with respect to service levels between new and old areas or between generations.
- Lack of long term planning and inadequate funding of maintenance and renewals will create significant problems for future generations.

There have been some significant achievements and policy initiatives such as:

- Policies to reduce water use such as Wyong Shire Council’s Development Control Plan 100, which requires all new residences to incorporate rainwater tanks and water saving devices and Sydney Water’s rebate scheme for rainwater tanks and water saving devices.
- The NSW State Draft Planning Policy, Integrating Land Use and Transport (SEPP 66) which sets out land use and transport principles, guidelines and initiatives for reducing travel demand and increasing accessibility.
- December 2002 NSW legislation which sets mandatory greenhouse benchmarks for NSW electricity retailers.
- The implementation of the Northern Shoalhaven Reclaimed Water management Scheme which will ultimately utilise reclaimed water from six wastewater treatment plants for irrigation purposes.
- Planning NSW’s Building Sustainability Index (BASIX) proposal for a tool to assess sustainability components of residential developments.

But there are still some significant problems to be overcome such as:

- The continuing increase in car use in urban areas is unsustainable, giving rise to congestion and pollution.
- Our waterway systems continue to degrade, with salinity at the forefront of concerns. In addition, water pollution due to inadequate stormwater and sewerage systems is at unacceptable levels.
- Despite its extensive water demand management programme, Sydney Water appears unlikely to achieve its demand targets. (IPART 2003)
- Only 20% of non metropolitan water authorities undertake the reuse of water and Sydney Water currently only reuses 1.9% of its effluent.
- Overcoming social inequities particularly relating to accessibility to public transport and differences between older urban, fringe urban and rural areas.

The considerable underspending in public transport infrastructure over many years is an example of the current generation reaping the benefits of the past but not adequately providing for the future. The majority of passenger rail infrastructure was provided more than three generations ago. Recent studies have identified needs to cater for population growth in western Sydney, Gosford/Wyong and Illawarra and major upgrades of overloaded existing systems. (OCG 2002, Warren 2002)

Extracts from two recent reports highlight some of these sustainability issues:

- The recent IPART Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services comments on the benefits of reducing demand and comments *“it is the Tribunal’s strong view that there is significant untapped potential for efficient demand management. To a large extent, one of the major obstacles continues to be a culture which favours traditional “build” engineering solutions and which pays little more than lip service to alternative options. The foreshadowed capital expenditure by the electricity networks of \$5 billion over the next decade highlights the importance of demand management.”* (IPART 2002)
- In its media release concerning the Community Survey undertaken as part of the its Sustainable Transport for Sustainable Cities project, the Warren Centre commented that *“The survey found 90% of Sydney residents surveyed believe traffic congestion is a serious problem facing Sydney. The survey also showed decision-makers underestimate the public support for demand management or traffic reduction as opposed to building more freeways. But almost three-quarters of those surveyed felt that not enough funding is being invested in Sydney’s public transport system”.* (Warren 2002)

1.4.4 Level of Service

In order to assess fit for purpose, it has been necessary to consider the relationship between level of service, community expectations, performance measurement and benchmarking. Generally most asset management systems are focussed on performance measurement related to benchmarks. There is not a clear trail which links this to level of service nor community expectations.

The NSW Council on the Cost and Quality of Government (CCQG) has been developing performance indicators which clarify the core activities of government and which over time will allow for better benchmarking of government service delivery. These are not

infrastructure focussed nor has the CCQG assessed all infrastructure agencies. However, CCQG, in its Overview of NSW Government Services 1995 – 2000 report, has provided “a broad summary of what government does with the resources it manages, the quantity and quality of services produced, and what the results are for the New South Wales community.” (CCQG 2001)

The availability and quality of data is variable. For some infrastructure there is good data and well developed asset management systems which link performance measures and benchmarks. There are also examples of community involvement such as Sydney Water’s Customer Contract and RTA’s Community Attitudes Surveys. Many Councils also regularly survey their residents. For example, the relative importance between services has been established in the Gosford local government area through comprehensive customer satisfaction and importance surveys. Gosford Council also has identified various levels of service parameters as part of its City Management Plan. The linkage between asset management and performance with level of service and community expectations though is not well developed.

Linking service levels to cost has been a key requirement in Victoria following the passing of Best Value legislation, which requires that a consultative approach be taken to Asset Management Planning and the prioritisation of investment in infrastructure. There is a clear need to understand from the community’s perspective what improvements are required, how those improvements will impact other services, and their relative priority and criticality in terms of achieving strategic objectives.

There is often a difference between community expectation and level of service. It could be expected that current levels of service would probably lag behind changing community standards. It is difficult to determine relative community priorities as those issues which generate considerable community debate are usually treated in isolation and no consideration is given to relative demands or the opportunity cost of addressing one problem. Issues also are often influenced by media headlines, talk back radio, and political influence.

The following current issues highlight the difficulties of determining an appropriate level of service which meets changing community standards and expectations.

- Northside storage tunnel: The tunnel was designed to reduce and control sewage overflows into Sydney Harbour. As with any such infrastructure it was designed to satisfy a design requirement namely a 95% (1 in 20 year) storm occurrence. Despite performing as designed in recent major storms and reducing overflows by 1800 megalitres, the media comment sensationalised the situation with headlines such as “Sewage emptying into harbour by the pool-full as tunnel fails” (SMH 17 May 2003).
- Road tunnel ventilation: In recent years sections of the community have raised concerns with RTA tunnel ventilation requirements for M5 East Tunnel, Cross City Tunnel and Lane Cove Tunnel projects. In response RTA has undertaken reviews of world’s best practice and held a major community forum. The issues have been debated in NSW parliament and various experts have been consulted. There is still a significant difference between what the RTA considers is appropriate and what sections of the community consider is appropriate.

- Environmental flows: Water sharing plans under the Water Management Act require the allocation of environmental flows to creeks and rivers. Consequently, this has reduced the security of supply for Sydney Water and Gosford-Wyong Water and could result in a reduction of available water. Both agencies are currently examining options to overcome these shortages.

All of these demonstrate the importance of community involvement and the need for greater transparency by the infrastructure organisations. They also highlight the need for community education and information to assist in assessing relative priorities and preferences, as well as need for leadership in informing the community of the reasons why certain actions are or are not taken.

These concerns were identified in the Auditor-General's report on the Millennium Train Project when he recommended that the Transport Co-ordination Authority should "*require State Rail to expand the level of public reporting of the outcomes and results achieved against the City Rail (Community) Service Agreement in order to increase accountability, transparency and openness about the rail network's performance.*" (AG NSW 2003)

1.4.5 Security

Following the 11 September 2001 attacks in the US and the October 2002 Bali attacks, addressing terrorist risks has become a priority for infrastructure owners and operators. The formation of the NSW Critical Infrastructure Review Group (CIRG) in 2002 by the Premier has assisted considerably in identifying and treating risks in critical infrastructure and icons. Phase 1 of the CIRG's Security Strategy has been completed; the work involved the reviewing of international practice, the undertaking of risk assessments and the production of generic template formatted security risk assessments. However, areas outside the critical infrastructure areas, there has been inadequate State and Federal assistance in terms of vulnerability and threat information, and of best practice mitigation practices.

Some sectors are more advanced than others in mitigating terrorist risks, such as by improving protective security, and forming information sharing networks. Sectors most advanced include electricity, telecommunication and water supply. The security issues facing infrastructure are comprehensively covered in the report by Engineers Australia "*Engineering a Safer Australia: Securing Critical Infrastructure and the Built Environment*", June 2003.

Priorities for enhancing infrastructure security include:

- developing a whole of NSW security strategy which encompasses all infrastructure and is based on a true partnership between the Commonwealth, State/Territory and local governments, industry and the professions.
- producing a *State of NSW Security Report* which ensures a focus on strategic issues and provides a benchmark to measure performance.
- infrastructure owners and operators incorporating the threat of malicious attack into their management approach to dealing with other hazards and risks.
- knowledge sharing networks should be established to facilitate the rapid dissemination of infrastructure security best practice between governments, industry and the professions

1.5 Future Directions

The NSW Infrastructure Report Card has highlighted a number of areas that need to be improved. It has also identified and acknowledged some significant successes and policy initiatives.

As with the 2001 Australian Infrastructure Report Card, a major objective of the NSW Report Card is to provide a baseline for future analysis and benchmarking so that progress can be assessed. The assessment process is also expected to raise awareness and enhance the level of debate. In this way, it is hoped that the Report Card can contribute to achieving a statewide focus, overcoming sectoral interests and leading to improvements.

The provision of adequate infrastructure underpins the Australian economy and the standard of living of all. As the current generation greatly benefits from the vision and commitment of those from the past, it is incumbent on them now to provide at least an equal legacy for future generations.

In particular the following broad areas require attention:

- There needs to be a greater focus and commitment to sustainability. This includes reducing demand, reusing and recycling resources and incorporating a balanced social, environmental and economic assessment process to determine priorities
- There needs to be a coordinated approach to the provision of infrastructure across all spheres of government which incorporates long term strategic planning and funding commitment.
- The collection, allocation, and analysis of data need improvement. This requires the establishment of appropriate standards or templates and the commitment by all infrastructure owners to providing quality data.
- Future works, their maintenance and management, require long term planning and a link to changing community expectations and standards. Level of service needs to be defined. Asset management strategies need expansion to incorporate overall needs, funding, level of service and community involvement
- Security issues need to be given higher profile by infrastructure owners and operators.
- Amalgamation of local government services into regional corporations to better utilise available resources, funding, management and prioritisation of projects.
- Timeframe should be included with approved programs of work.

2. Roads

2.1 Overview

2.1.1 System description

There are approximately 182,000 km of roads in NSW, providing access across the State for commuters, travellers, business and freight.

The road system is divided into National, State, Arterial (or Regional) and Local categories, detailed as follows (RTA 2002):

- 3,106 km of National Highways funded by the Federal Government and managed by the Roads and Traffic Authority of NSW (RTA).
- 14,564 km State Roads managed by the RTA.
- 18,448 km of Arterial / Regional Roads managed by Local Government. The State government contributes significant grant funding through the RTA.
- 142,922 km of local roads managed by Local Government, funded by both local ratepayers and Federal road assistance grants.

The RTA also manages 2,887 km of Regional Roads and Local Roads in the unincorporated area of NSW where there are no Councils. Roads in which the RTA has an interest include 4,588 bridges, including major culverts and tunnels, and nine vehicular ferries. Note that in NSW, a bridge is defined as a “Structurewith a clear length of 6m or more, measured between faces of abutments”. The other States mostly define a bridge as a structure with a span of 1.8m or a waterway area of 3 sq m or more. As a consequence, the RTA has a lower number of bridges than if it used the more widely used definition.

The Council managed local road network is further divided as follows:

- Urban network 29,838 km
- Non urban network (sealed) 30,126 km
- Non urban network (unsealed) 82,958 km

The local road network also includes 3,820 concrete/steel bridges and 2,598 timber bridges.

2.1.2 Governance

Funding for overall management of roads, including planning, design, construction, maintenance and operation is the responsibility of Federal, State, and Local Government authorities, and to a much lesser extent, the private sector.

The Federal Government has sole financial responsibility for the National Highway System. It also funds:

- road safety improvements throughout the whole road network through the Black Spot program.
- Roads of National Importance (RONI) program jointly with the States.
- provides untied funds to State and Local Government authorities.

The Federal Government does not have direct road management responsibility. The RTA therefore manages National Highways in NSW with funding provided by the Federal Government.

The RTA is responsible for the funding and management of State Highways, and is either fully responsible for or shares with Local Government funding and management responsibility for Arterial / Regional roads.

Local Governments are generally fully responsible for the funding and management of local roads. In some circumstances, Councils also undertake maintenance and rehabilitation works on State Roads within the framework of single invitation maintenance contracts to create a contractual relationship between the RTA and Council maintenance providers.

In the unincorporated regions of NSW, the RTA is responsible for the management of Regional and Local Roads.

The areas of responsibility are complicated for State Roads in built up areas as to which agency is responsible for what aspect of the road. The RTA is responsible for the construction and maintenance of:

- the central median and carriageway sections/lanes designated as “through” traffic lanes including pavement markings;
- transverse or cross drainage systems;
- on-road bicycle lanes (100%) / off-road cycleways (50% contribution from RTA for commuter links);
- traffic signals; and
- directional signs.

The Local Council is responsible for the construction and maintenance of:

- kerb side parking lanes;
- kerb and gutter;
- longitudinal drainage systems and kerb inlets;
- footpaths (100%) / off-road cycleways (50%);
- Regulatory signs and street furniture;
- Most street lighting; and
- Most landscaping (eg street trees).

In addition to the road pavement infrastructure, dedicated cycleways are designated transport thoroughfares and fall under the umbrella of roads assets. Special cycleway projects have specific construction grants allocated towards them on a shared arrangement between RTA and Council, generally 50/50.

In NSW, private sector consortia have total responsibility for major toll road links in the road network, constructed under Build, Own, Operate, Transfer (BOOT) arrangements. The RTA has also included maintenance for up to 10 years in some construction contracts.

2.1.3 Sector trends

Commonwealth funding

The 2001 Australian Infrastructure Report Card called for a national framework for the planning of road funding, with a more sophisticated approach to allocation of priorities. Since then, the Federal Government has released its green paper on fundamental land

transport infrastructure reform, *AusLink: Towards the National Land Transport Plan (AusLink)*.

Under *AusLink*, the Federal Government proposes to amalgamate its land transport funding programmes into a single programme by bringing together in the proposed initial year of operation (2004/05), National Highway funding, the Roads of National Importance Programme and rail funding after outstanding firm project commitments are met. The plan proposes that current funding commitments for the identified local roads component of the financial assistance grants to local government, the Roads to Recovery Programme grants to 2005 and the current Black Spot Programme to 2005/06, will be retained.

The NSW transport agencies, however, in their response to *AusLink* (February 2003), note that current funding for the National Highway network, on a per km basis, has decreased substantially in real terms from 1995-96 due to Commonwealth funding cutbacks. They also feel that the Commonwealth's commitment to responsibility for maintenance and renewal of the National Highway network appears to be waning under the proposed *AusLink* framework in the Green Paper.

Spending on Local Government road infrastructure

The recently released *2001-2002 National Report on Local Government* (National Office of Local Government, 2003) recognises that Local Government capacity to fund infrastructure is constrained by its general revenue raising capacity. Most revenue comes from rates and user charges, supplemented by Federal Government financial assistance grants.

The report reiterates the findings of the Commonwealth Grants Commission review of Local Government that a number of factors have contributed to downgrading the importance of maintaining local road infrastructure including community pressure to broaden the range of local government services and revenue-raising restrictions such as rate pegging and fee capping. Local Government is increasingly providing social welfare type services at the expense of traditional property-based services, particularly roads. Although road expenditure remains the largest function, the Commission found its importance has declined from about half of total expenditure in the 1960s to a little more than a quarter in the 1990s.

Freight task in NSW

Roads are currently the predominant mode for all interstate freight movement and it is estimated that NSW roads are used in approximately 80% of all interstate road freight movements. Work by Bureau of Transport and Regional Economics (BTRE) shows that since 1984, interstate road freight flows have increased at a rate 1.5 times the growth rate of the Australian economy. Assuming that past trends continue, the freight task in NSW will more than double by 2020 in terms of tonnes carried (NSW Transport Agencies Response to *AusLink*, February 2003).

Community expectations for levels of service

Improving the amenity of existing local roads is a significant issue for local communities. This primarily derives from community expectations for levels of service, safety and amenity comparable with newer development areas. Improvements generally include the provision of kerb and guttering, street lighting, formal footpaths and cycleways and streetscape and landscape. In rural areas, this also includes increasing pressures to seal

unsealed roads. It should be noted, however, that these higher standard facilities not only incur the initial cost of provision of the infrastructure but ongoing higher maintenance costs which must come from local government general revenue, hence reducing fund availability to Councils for the provision of other services.

Demand reduction

The cost of congestion in Sydney was estimated to be \$6 billion in 1995 and is expected to be up to \$8.8 billion in 2015 if measures are not taken to avert this result (BTE 1999). BTE (now BTRE) notes that to be effective in addressing congestion and the environmental impacts from traffic, policies designed to affect city transport must target road travel directly.

The community has indicated clearly that transport and traffic issues are high on its agenda. Recent research summarised in the report *Towards a City of Cities* (Warren Centre July 2002) found that the community rated traffic congestion as its major concern when asked to identify key urban issues. In its strategies for action, the report recommends that transport pricing be investigated with a view to adopting a consistent national transport pricing regime as one of the options available for changing transport behaviour. The report canvasses changes to the fuel excise regime, real-time road congestion pricing and emission trading as measures to be developed on a nation-wide basis, while at a State or local government level, measures such as parking charges or cordon tolls can be introduced.

Recent developments overseas have shown that some of these measures may be implemented sooner than later. The Brisbane City Council's "*Transport Plan for Brisbane 2002-2016*" canvasses the idea of introducing a series of cordon tolls throughout specific areas of the city to manage peak demand and provide additional revenue for transport investment. Cordon tolls, which are currently in operation throughout several major cities in Asia and Europe, charge road users a premium for entering specific areas (generally areas that suffer extreme congestion in peak periods) during specific times.

Alliancing

With increasing demand on the road system coupled with limited funding, NSW Local government is showing keen interest in the Queensland DMR/LGAQ Alliance. The Alliance is a plan to make road building and funding decisions based on agreed priority projects, rather than on the basis of local authority boundaries. It encourages Councils to work with each other and with the State government in order to achieve benefits for all concerned.

The Alliance will involve establishment of regional road groups, identification of local roads of regional significance, improved asset management practices, prioritisation processes and funds allocations, and investigation of enhanced joint purchasing arrangements and resource sharing opportunities and joint capability development.

Tourism

The NSW transport agencies response to AusLink (February 2003) quotes research by the Bureau of Tourism Research and Tourism NSW that shows for the year ended June 2000, 59% of all international visitors to Australia visited NSW and about 40% of these visitors also travelled by road based transport in NSW. NSW also has 34% of overnight domestic visitors, about 80% of whom travel by road based transport.

NSW Tourism forecasts that the high growth areas for tourism in NSW up to 2020 will be the North Coast, South Coast, the Snowy/Canberra regions and the Sydney Metropolitan area. The agencies response notes that it will be imperative to develop efficient road connections to these regions, particularly the Pacific and Princes Highways, in order to support this nationally significant growth.

Provision of safe cycleways

In addition to the provision of suitable road systems, the provision of safe cycleways is now a standard policy requirement in any development and in association with road upgrade works. Bicycle Plans are developed to connect major hubs of activity, tourist areas and community centres and transport nodes. The use of bicycles is seen as an alternative private transport mode to not only alleviate the reliance on private vehicles but also to have health and environmental benefits.

2.2 Level of service

In general, “Level of Service” is a term used to describe the quality of services provided by the asset under consideration. For a road network, Level of Service can refer to safety performance, the convenience of travel, and condition of the network.

Depending upon various factors such as usage and strategic importance, higher Levels of Service will be required for some parts of the network compared to others.

Published data on Levels of Service for the NSW road system is mostly limited to averages, and in some cases is split to show National Highways separately from other State Roads.

2.2.1 Safety performance

In the three years to 31 December 2002, the average number of fatalities on NSW roads was 566. This compares with an average of 703 each year in the three years to 31 December 1992. In the 10 year period to 30 June 2001, the three year average number of fatalities per 100,000 population reduced from 13.8 to 8.8.

The NSW Government’s strategy for road safety is to halve the number of fatalities from 1999 to 2010, a target of less than 300 by 2010.

2.2.2 Convenience of travel

Despite significant increases in traffic volumes, travel times in peak periods on major routes in Sydney have reduced in the 10 year period to 2002. Surveys conducted by RTA NSW on 7 major routes show that average peak travel speeds have increased by approximately 10% while traffic volumes on these routes increased by about 40%. The difference between average travel speeds in the morning and afternoon peaks has not changed significantly, with average afternoon peak travel about 5 km/h faster than morning peak travel on the 7 major routes.

Improvements in travel times in Sydney are also evident from values published by Austroads for Actual Travel Speed (ATS), which is one of the Austroads series of National Performance Indicators (NPIs). ATS was first published for 1998/99. For morning urban peak travel, the NSW value of ATS rose consistently from 35.5 km/h in 1998/89 to 38.3 km/h in 2000/01. In the period from 1997/98 to 2000/01, the Austroads Congestion

Indicator (an Austroads NPI) for urban peak travel in NSW fell from 0.78 to 0.71 minutes/km.

For some years, the NSW Government's target has been to maintain average peak travel speeds in Sydney at existing levels. This target has been achieved for a number of years.

2.2.3 Road condition

RTA measures the roughness of National Highways and other State Roads each year. Roughness is accepted around the world as an indication of ride comfort and of the general condition of the road surface.

RTA also measures cracking in the surfaces of sealed National Highways and other State Roads each year. Surface cracking is detrimental to the durability of most road pavements, and is a useful indicator of pavement durability. Durability indicates the capacity of road pavements to resist premature deterioration.

For Regional/Arterial and Local Roads in NSW, aggregated statewide data on condition is not available. However, in early 2003, the IPWEA circulated a letter to NSW Councils requesting data on the condition of Local and Regional Roads. Of the 174 Councils approached, 42 responded. The methods used by individual Councils to rate their roads varied and therefore an overall assessment of the responses can only be qualitative. The responses suggest that the condition of Local and Regional roads is no more than adequate.

Road roughness and ride quality

For National Highways in NSW, over the 10 year period to 2002, the proportion of the length with roughness rated good by RTA has increased to 97% from just under 92%.

For State Roads other than National Highways over the same 10 year period, the proportion of the length with roughness rated good by RTA has increased to 90% from 84%.

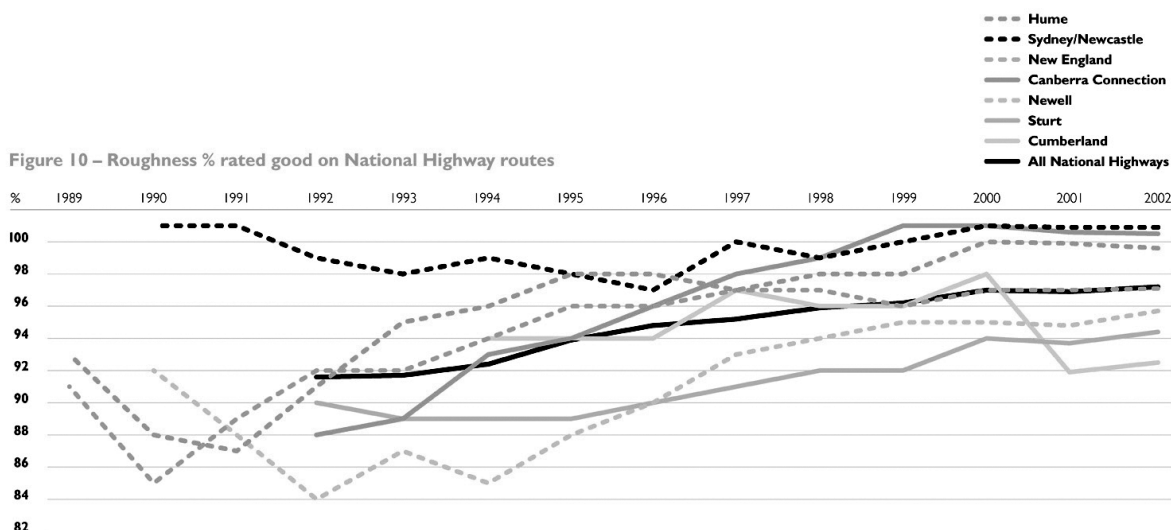
Roughness is more critical where speeds are higher, such as in rural areas. On major rural State roads other than National Highways (the Pacific, Princes, Western and Mitchell Highways), around 95% of the length is rated good in terms of roughness, up from around 90% ten years earlier.

RTA also reports "ride quality" for its network each year. Ride quality is a combination of roughness and traffic volume and is an expression of roughness of travel (as distinct from roughness of road length). RTA reports similar improvements in ride quality over the ten year period to 2002 as for roughness.

Improvements in roughness and ride quality on National Highways and other State Roads in NSW are also evident from values published by Austroads for Smooth Travel Exposure (STE), which is an Austroads NPI. STE was first published for 1995/96. The NSW value has risen steadily from 87% in 1995/96 to 90% in 2000/01. STE has been consistently higher on rural roads, rising from 90% in 1995/96 to 92% in 2000/01.

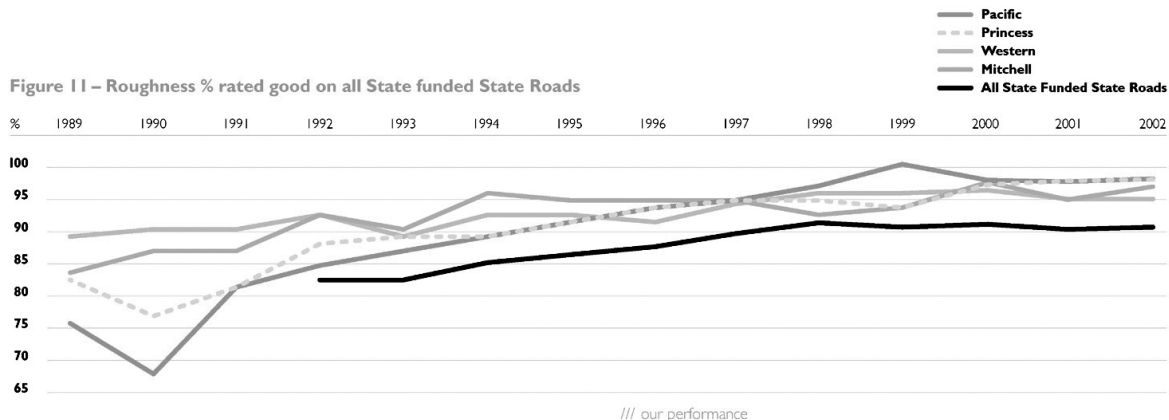
The NSW Government's target for ride quality is a 'good or better' rating for 88% of State Roads. This target was achieved in 2000, and has been held since then.

Figure 10 – Roughness % rated good on National Highway routes



Note: Change in 'Cumberland' due to Sept 2000 redefinition of National Highway

Figure 11 – Roughness % rated good on all State funded State Roads



/// our performance

Annual Report, Road Traffic Authority, 2002

Road pavement durability

RTA regularly reports the proportions of the total length of sealed country National Highways and other State Roads with durability rated as good, fair and poor.

In the 10 year period to 2002, the proportion of the length with durability rated good by RTA has increased to almost 80% from less than 60%. Most of this improvement occurred in the periods from 1992 to 1995 and from 1999 to 2002.

The Government has not published a target for pavement durability.

Deficient bridges

In the 10 year period to 2002, RTA has reported a reduction in the number of deficient bridges on National Highways and other State Roads to less than 5, from a peak of 34 in 1997. Deficient bridges are bridges that are sidetracked, or have load or speed restrictions, or temporary strengthening.

2.2.4 Community expectations

At June 2002, RTA had conducted five surveys of community attitudes to the RTA since commencing the current survey series in 1994. AC Nielsen Research conducted the most recently reported survey in September and October 2001.

The RTA reports that since 1994 the surveys have shown a steady upward trend in customer satisfaction across all of the authority's core functions and that the areas of greatest improvement were expansion and maintenance of the road network and traffic flow management. Those surveyed believed safety should be the RTA's top future priority.

The surveys indicate that the following three aspects of road infrastructure are among the top seven current community priorities:

- Reducing accident prone areas or 'black spots';
- Clear road markings; and
- Reducing rough road surfaces such as potholes, bumps and cracks.

Aspects of infrastructure where the RTA's performance was rated strongest were:

- Rest areas along major country roads;
- Maintaining Sydney's freeways, tollways and major roads; and
- Keeping traffic lights, road markings and road signs in good condition.

With respect to infrastructure, survey respondents thought the RTA could do better in:

- Reducing rough road surfaces; and
- Building and improving country freeways.

2.3 Existing infrastructure

2.3.1 Funding/investment

The Federal, State and Local governments share responsibility for funding and management of the 180,000 km of roads in NSW. Essentially, the Commonwealth funds the National Highways and provides contributions to selected projects in the RONI program, while the State funds the major arterial road system. Local government is responsible for the balance of the road system, amounting to 80% of the length of the network.

The written down value (that is, the value in its present condition) of the road, bridge and traffic infrastructure the RTA manages is more than \$50 billion, including the value of land under roads (RTA 2002).

The Auditor-General's Report to Parliament (2002 Volume Six) states that 11% of the NSW road network is fully depreciated (statistically at the end of their useful lives) and that the estimated replacement cost is \$3.4 billion. However, useful life for fully depreciated roads and bridges is being reassessed by the RTA and an adjustment will be made in the 2003-04 revaluation of the road network.

The *2001-2002 National Report on Local Government* (National Office of Local Government, 2003) quotes an analysis of 2001-02 Council annual reports by the NSW Department of Local Government that puts the value of NSW local government transport infrastructure at \$30.8 billion and the cost to bring this infrastructure to a satisfactory condition at \$3.7

billion. The analysis showed Councils need to spend \$579 million a year on infrastructure maintenance but are only spending \$423 million a year, leaving a shortfall of \$156 million a year. The report also states the department estimates that the average NSW Council, with transport assets worth \$173 million, faces an annual \$0.9 million shortfall in asset maintenance funding.

Total funding for roads in NSW in 2001-02 was about \$2.6 billion. The RTA received \$2,398 million, consisting of \$2,039 million from State sources and \$359 million from the Commonwealth (RTA 2002 Annual Report). The majority of the Federal funding was supplied under the National Highways program, the RONI program and the Black Spot program.

The State government has also recently announced that \$105 million will be spent to replace or restore 369 timber bridges on Council managed regional roads. The government will commit \$105 million over seven years to modernise the bridges, with the funding to be provided on a 50:50 basis with local governments from July 2004. The government expects all the bridges to be upgraded within a seven-year period. The program is an extension of the timber bridge program started in 1998, which has already resulted in the upgrading of 115 State managed timber crossings.

Local government received funding of \$179 million from the Federal government in 2001-02, consisting of approximately \$124 million from the roads component of Federal Assistance Grants (FAGs) and approximately \$50 million from the Roads to Recovery program.

There is an ongoing debate concerning both the amount and allocation of road funding. Local government is concerned that there is no certainty that the Roads to Recovery program will be continued after June 2005 (ALGA Feb 2003). There is also concern that the Federal Government has cut Roads to Recovery Program funding for 2002-03 by \$100 million, leaving Councils without financial assistance for committed roadwork projects.

Groups representing local government also see the potential for a reduction in the level of funding for roads from Commonwealth sources. While the release of the AusLink Green paper was applauded by local government groups for the Commonwealth's approach to a more integrated and strategic approach to land transport funding, concern was expressed that the scheme may divert funds from existing programs such as Roads to Recovery or even FAGs (Lgov NSW Nov 2002, ALGA Feb 2003).

Although the Australian Automobile Association (AAA) submission on Green Paper, Feb 2003 also supports the concept of a more integrated and strategic approach to land transport funding, it is concerned that the AusLink Green Paper does not indicate how the existing backlog of road projects will be funded. Based on unpublished figures (NRMA 2002), the AAA estimates (roughly) that the current required road works in NSW, including upgrades and new construction, total around \$4.4 billion.

The NSW transport agencies in their response to AusLink (NSW Transport Agencies Response to the Commonwealth Green Paper, February 2003) also welcome the initiative to develop a national transport plan. However, they believe that while AusLink's increased focus on rail infrastructure and inter-modal facilities is critical for the national economy, it should not be at the expense of road infrastructure. They also see the possibility of the Commonwealth withdrawing from its responsibilities to fund the National Highway system

in NSW and other parts of Australia if accountabilities between the three tiers of government are not clearly defined.

Private sector funding has been used to construct some major high volume roads in Sydney, including the M4 and M2 Motorways, the Eastern Distributor and Sydney Harbour Tunnel. Construction has started on the Cross City Tunnel and the Western Sydney Orbital and tenders have closed for the Lane Cove Tunnel project.

2.3.2 Asset management

The NSW RTA has good data and is well advanced in implementing strategic asset management systems for roads. The RTA annually publishes data on quality of roads and bridges (RTA 2002). The major features of performance on the RTA's arterial roads are Ride Quality, assessed by measurements of roughness and Pavement Durability, assessed by measurements of surface cracking.

All NSW Councils have asset management systems of one form or another and extensive data on local roads does exist. NSW had an early start to collecting condition data through requirements of the *Local Government Act 1993*. However, the lack of consistent, consolidated data and the lack of standardised asset management systems have reduced the value of the data. The Victorian Infrastructure Study (Victorian 1998) examined these issues for Local Government in Victoria. The Study's recommendations emphasised that asset management be recognized as a corporate, not a technical responsibility and the need for good information.

A statewide (and national) effort is required to harmonise collection and assessment of data so that local governments and funding authorities can better understand the requirements of local roads over their economic life and the likely future funding liability as they mature in age. The availability (and cost) of staff to collect and analyse the data is an immediate problem for many Councils and would be exacerbated with the introduction of a standardised asset management system. Additional funding would be required for training in and maintenance of any new system.

The 2001 Australian Infrastructure Report Card noted the lack of a regional approach which has been recognized, as limiting, by rural Councils in particular, and that various actions have been proposed. It was noted that roads are linear and cross local government boundaries and that this can result in differing priorities and inefficient utilisation of resources between local government areas. A report commissioned by the ALGA (Dockrill 2000) identified a number of options for resource sharing.

The 2001 Report Card also noted that the use of Regional Road Groups to improve planning and co-ordination has been successful in Western Australia. The IPWEA (NSW Division Conference 2002) considers that Councils should move to a regional focus in order to make the strongest case for Commonwealth funding.

2.3.3 Environment

The design, construction and operation of environmentally benign roads is a major challenge. In recent years there has been a significant change in approach by the proponents of new roads. Fuller consideration is now being given to environmental issues. This has generally resulted in better outcomes through the environmental impact assessment process.

However, a number of significant environmental issues remain, including:

- Vehicle emissions and greenhouse gases;
- Noise;
- Alienation of land; and
- Traffic congestion.

Congestion is a major contribution to vehicle emissions. BTE (now BTRE) estimates suggest that 40% of fuel usage in major Australian cities is due to traffic interruptions (BTE May 2000).

Greenhouse gas emissions from the transport sector are the fastest growing and represent 16% of Australia's total emissions. About 89% comes from road transport. Of this, trucks and commercial vehicles account for about one third of road transport emissions. (AGO 2001).

Important initiatives in recent years to improve road traffic have included Sydney's "bus only" lanes and proposed bus transit ways have increased availability and efficiency of buses. Other initiatives included:

- Improving road infrastructure, eg Western Sydney Orbital.
- Improving efficiencies, eg use of Intelligent Transport Systems.
- Reducing demand, eg land use policies that reduce need for private vehicles.

2.3.4 Social

Significant suffering results from motor vehicle deaths and injuries. Road safety programs and initiatives such as speed cameras and school zones seek to reduce this suffering and ease pressure on health and community services and facilities. Funding of road safety improvement projects such as the Black Spot program has also been demonstrated to return substantial benefits (BTRE July 2001). The RTA notes that 2001/2 recorded the third lowest financial year road toll (570 fatalities) since 1949–50.

In many areas, roads provide the only convenient means of transport between home and employment for the majority of Australia's work force, as well as the only viable transport mode for many social and recreational activities.

The detrimental impact of poor access to public and community transport was highlighted by ACOSS in its recent Federal Budget submission (ACOSS 2003).

In non-urban areas, public transport is not a viable solution to most accessibility issues.

Rural roads support the social fabric of rural communities and regions. This has been emphasised by rural women who rate an adequate rural road system as high priority (Moree 2000). The 2001 Report Card noted that the Moree results also showed there was a significant loss of schooling due to poor access in wet weather. The net result is that poor rural roads contribute to a reduction in educational opportunities for rural children.

2.4 Future needs

The *AusLink* green paper aims to address major transport challenges at a national level. The green paper canvasses:

- The establishment of an integrated National Land Transport Network.
- The development of a National Land Transport Plan.
- The establishment of a national advisory body of public and private sector experts to provide transport ministers with strategic analysis and advice on priorities for national infrastructure investment, reforms to support intermodal integration and infrastructure pricing.

AusLink proposes that the integrated transport network is to consist of transport links of strategic national importance, such as rail and road connections between cities and to major ports and airports and that the National Land Transport Plan is to involve the participation of the community, industry and all spheres of government.

While AusLink has been generally welcomed as a first step towards meeting the major transport challenges at a national level (albeit tempered with concern at its affect on Commonwealth funding for roads), a more coordinated approach at regional level is also required in NSW. Local government has already made considerable progress on developing a regional focus through the formation of Voluntary Regional Organisations of Councils. There is scope to build on these developments in future to bring about a greater focus on regional strategic planning.

There is also keen interest in the progress of the Queensland DMR/LGAQ Alliance. The alliance is in response to the increasing demand on the road system and the need to better use the existing limited funding. Efficiencies are sought by working in partnership. Under the alliance, the State government also funds the development of asset management capability, an initiative that is needed in NSW.¹

At the local network level, Councils still have areas of need for future improvement works such as urban road improvements to cater for traffic growth, arterial and sub-arterial roads to service future residential and industrial developments, rural road improvement works and extension of the sealed road network. These network improvements can only be achieved with additional financial resources.

The NSW State Government's priorities for major infrastructure (above \$20M) for the next ten years are contained in the State Infrastructure Strategic Plan (SISP), released in December 2002. Among other outcomes, the Government hopes the plan will improve opportunities for collaboration between NSW agencies on future infrastructure planning and delivery and also enable the private sector to gauge the opportunities for future investment. The SISP draws directly on agencies' service delivery strategies and capital investment plans. In the case of the RTA, which currently does not have a published long-term road network planning strategy, this means that the planning and delivery of road infrastructure is guided by Action for Transport 2010.

The lack of a longer-term RTA road network planning strategy is a concern and should be addressed. It is acknowledged that the RTA is currently developing a State Road Network Strategy but it is not known at this stage if and when the span and content of the strategy will be made public. An example of the need for longer term planning is the lack of committed funding for the Pacific Highway. Although the NSW Government has stated it

¹ Interestingly, the RTA did initiate this in NSW in 1993 but support for it was discontinued as part of organisational restructuring.

will continue its commitment to the current Pacific Highway Reconstruction Program beyond 2006, the lack of Federal Government commitment to continue the current joint funding arrangements beyond 2006 means it is uncertain that the aim of developing the entire length of the Highway to dual carriageway standard by 2012 will be achieved.

Plans are also being developed to address future needs of growth regions. The Central Coast Transport Action Plan includes projects ranging from traffic management to bus priority, from pedestrian facilities to cycleways, and from upgraded railway stations to new bus and rail interchanges. A key feature of the plan is for roads funding to increase from about \$147 million spent on Central Coast roads in the past 10 years, to about \$225 million to be spent over the next 10 years. A Hunter Transport Action Plan is also being developed but is yet to be released.

Initiatives to reduce private vehicle usage and congestion and reduce greenhouse gases (including demand management, mode shifts and more efficient road infrastructure) are necessary. New research by the NRMA has shown that almost 50 per cent of Sydney-siders support charging motorists to enter the most congested parts of the city if the money is used to fund transport improvements that alleviate congestion.

2.5 Report Card Rating

Ratings have been based on the consideration of asset condition, asset availability and reliability, asset management, sustainability (including economic, environmental and social issues) and security.

Based on improvements in **condition**, a rating of **B** can be justified for National Highways and State Roads. For Regional/Arterial and Local Roads, an overall condition rating of **C** is appropriate.

Availability and reliability relate to community expectations in Level of Service. A rating of **B** for National Highways and State Roads is appropriate while **C** is appropriate for Regional/Arterial and Local Roads.

The rating for **asset management**, is rapidly improving. Initiatives such as the State Government's Country Bridge Replacement Program (recently extended to cover bridges on Regional Roads over the next few years), and the contract and benchmarking arrangements with Local Government are positive. The RTA's approach to detailed asset management planning is based on risk. Increasingly it is a structured approach, but at present, it is not all that transparent. Based on the methodology in the 2001 report Card, a **B** rating is appropriate for National and State Roads. For Regional/Arterial and Local Roads, it varies widely among Councils and a **C** rating is warranted. The major action necessary to improve this rating is to produce more consistent data collection, analysis and reporting, which is fundamental to more effective strategic management.

For **sustainability**, the rating for environmental aspects is improving. However, a number of significant issues remain, notably vehicle emissions and greenhouse gasses and traffic congestion. Social/community aspects vary with a reducing road toll a significant plus however, poor access to public and community transport is still a problem in many areas. The major area of doubt relates to the adequacy of funds to provide infrastructure to an appropriate level for the future. For high traffic routes, the recent trend to private sector

funding (Eg Western Sydney Orbital) is positive. However, future adequacy of major routes such as the Western Highway and the Melbourne / Brisbane route (in terms of pavement strength as much as width for traffic capacity) are in question. Except for specific projects, the Commonwealth Government appears to have not made any advanced commitments about National Highway funding for NSW. Major concerns about Commonwealth funding include ongoing support for the Pacific Highway and F3, expected reduction of road funds in the AusLink proposal and inadequate or zero funding for the maintenance of public transport. Due to the lack of commitment to funding by both the State and Federal governments, a sustainability rating of C- is appropriate for all classes of road.

For **security**, the rating reflects the fact that risk management and an all-hazards approach has been widely accepted as the basis for identifying risks. However areas of improvement include the need to allocate resources on the basis of risk identification rather than short-term priorities, and to implement a comprehensive approach to the treatment of security threats. Another area of improvement is the need to apply best security practice as distinct from common practice. A security rating of C+ is appropriate for all classes of road.

Overall rating for road infrastructure

The overall rating was developed by a consolidation of each of the above issues.

National roads C+	The lack of commitment to funding reduces the overall rating from B- to C+.
State roads C+	The lack of commitment to funding and sustainability issues reduces the overall rating from B- to C+.
Regional / Arterial roads C-	Lack of aggregated statewide data on condition, availability/reliability and other aspects of asset management as well as sustainability issues do not allow a rating of more than C- (less than adequate).
Local Roads C-	Lack of aggregated statewide data condition, availability/reliability and asset management do not allow a rating of more than C- (less than adequate).

Case study

Road safety benefits directly from improved roads

The road safety benefits accrued by improving the standard of roads have been demonstrated by statistics.

A recent NRMA audit of the Newell Highway has found major improvements to the road's safety performance, with crash rates down 10 per cent and casualty rates down 25 per cent since 1994¹.

Key infrastructure upgrades which have improved the highway's condition since 1994 include an increase in the number of overtaking lanes, improved linemarking, improved roadside shoulders and improved pavement condition.

Feature	1994	2002
Number of lanes	97% 2 lane 1% 3 lane	93% 2 lane 3% 3 lane
Speed zoning	41% 110 km/h 50% 100 km/h 3% 80 km/h	70% 110 km/h 19% 100 km/h 6% 80 km/h
Overtaking restrictions	19% effectively prohibited	24% effectively prohibited
Horizontal alignment	46 curves signposted	42 curves signposted
Pavement condition	31% good condition 9% poor	88% good condition 0% poor
Roadside shoulders	33% good 3% poor	65% good 0% poor
Crash rate (crashes per 100M VKT)	19	17
Casualty rate (casualties per 100M VKT)	17	13

The NRMA's July 2002 audit of the New England Highway confirmed that improvements made since 1996 continue to make a real difference to the safety and condition of the road with crash rates down 11 percent and casualty rates down six percent².

¹ NRMA Media Release 28 August 2002

http://www.mynrma.com.au/member_centre/corporate_profile/media_centre/releases2002/020828.shtml

² NRMA Media Release 15 August 2002

http://www.mynrma.com.au/member_centre/corporate_profile/media_centre/releases2002/020815.shtml

3. Rail

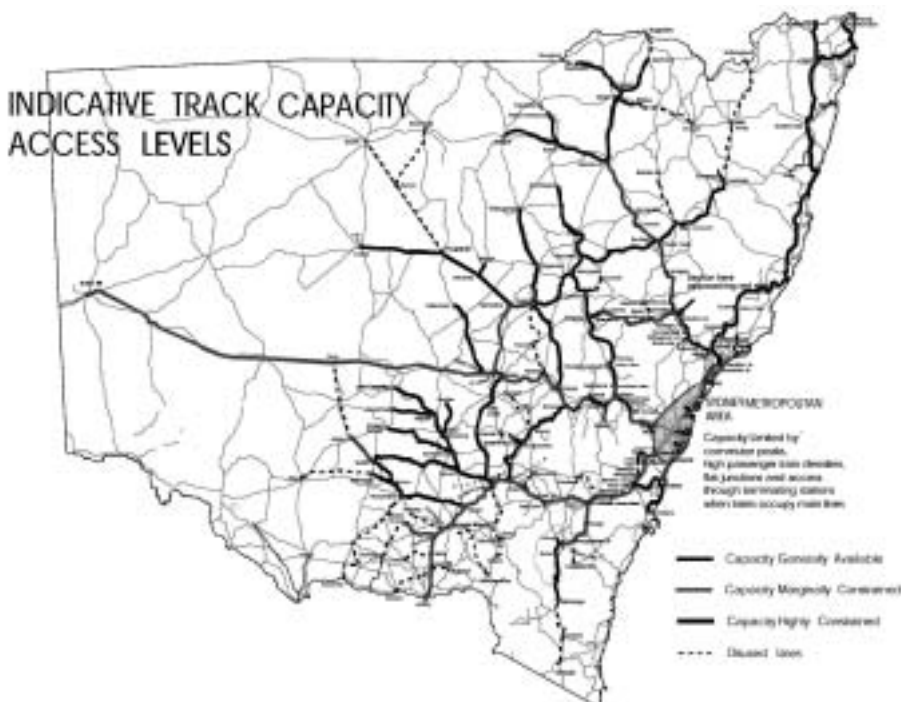
3.1 Overview

The railway infrastructure in NSW supports the provision of both passenger and freight rail services. These services are vital to the prosperity of the community and are subject to intense and ongoing political debate. There is a long history of instability in the political, technical and financial support of rail services in NSW.

Accidents in recent years on the rail network have raised public concern over safety and it has highlighted the quality of infrastructure, its management and the adequacy of the funds.

Since 1996, the NSW rail system has undergone significant recent structural reforms. On 1 July 1996, the system was separated into the a passenger operator (State Rail Authority (SRA)), an infrastructure owner (Rail Access Corporation (RAC)) a maintenance provider (Rail Services Australia), and a freight operator (Freight Corp). On 1 January 2001, RAC and RSA were combined to form an integrated asset owner and maintainer, Rail Infrastructure Corporation (RIC). The government has recently announced that the metropolitan network portion of RIC will be remerged with SRA to form a vertically integrated urban railway. A decision on the future structure of the remainder of the network is pending.

The instability in rail is not unique to NSW. A similar situation can be found in Victoria, USA and the United Kingdom to name only three. It reflects the difficulties that governments have in trying to reconcile the role of railways in the changing community. It reflects the difficulty in governments finding sufficient capital and recurrent funds, as well as developing long-term planning, both of which are essential to sustaining rail's relevance in a climate of changing transport demand.



3.1.1 System Description

The rail infrastructure in NSW is dominated by the standard gauge heavy rail network but also includes the Sydney Light Rail system and the alpine railway in the Snowy Mountains. This report focuses on the heavy rail network which is under State Government control. The network consists of approximately 7,700 kilometres of operational rail track, more than 5,000 bridges, and a signalling and telecommunications system that combines satellite and land based technology.

The rail network in NSW was at its largest from 1948 to 1957 with 10,380 route kilometres, when many branch lines were in use. However, with the improvement in road networks, many lines have been closed due to falling demand.

The rail network in NSW is comprised of the following sub-networks:

- Sydney Metropolitan Network;
- Defined Interstate Rail Network
- Hunter Valley Coal Network;
- Country Network;
- Light Rail Networks.

The rail networks in NSW support some 900,000 passenger journeys and 220,000 tonnes of freight daily.

Metropolitan Network

The State Government, through the Ministry of Transport is responsible for passenger transport over the Metropolitan Network, which extends north to Broadmeadow (Newcastle), south to Bomaderry (Nowra), southwest to Macarthur and west to Lithgow. The network infrastructure is owned and maintained by Rail Infrastructure Corporation and the passenger services are operated by State Rail Authority (through CityRail). The Sydney Metropolitan Network is Australia's largest, with 1,700 kilometres of electrified track.

Although the Metropolitan Network caters predominately for passenger services, there are significant freight movements over the network. Plans are being promoted to separate freight from passenger operations within the Greater Sydney region. This will improve reliability and allow both freight and passenger operations to be expanded. There is no timetable for the implementation of the plans.

Defined Interstate Rail Network (DIRN)

The main rail lines which link Sydney with the other State capitals form part of the Defined Interstate Rail Network and totals approximately 8,000 track kilometres. This network was established in 1999 under an agreement between the Commonwealth and the States to facilitate freight operations improvements.

The Infrastructure making up the DIRN in NSW is currently owned, managed and maintained by RIC, however the Australian Rail Track Corporation (ARTC) has, consistent with the 1997 intergovernmental agreement, sought to lease the infrastructure within this network for a period of 60 years. The NSW Government is currently evaluating the lease proposal.

While passenger services operate on the DIRN, regional and interstate freight dominates the traffic on the network.

Hunter Valley Coal Network

The coal network consists of approximately 680 kilometres of track. It is part of the RIC owned and maintained infrastructure. ARTC have included this part of the NSW network in their lease proposal.

Country Network

The remainder of the NSW network consists of feeder and branch lines. The network principally provides services to the grain industry, with some regional freight and passenger services. The continued funding for the maintenance and operation of these lines depends on the complex issue of Community Service payments provided by the Ministry of Transport. This is a sensitive issue in the rural community and in the agricultural industry and illustrates the complex policy issues that underpin the provision of rail services to the NSW community.

Light Rail Networks

The Light Rail Networks consists of the Metro Light Rail (Lilyfield to Central) and the Metro Monorail. both are owned by the private Australian company, Metro Transport Sydney. They are currently under a 7 year management contract to the European transport operator, Connex. These light rail networks carry passengers only. Metro Light Rail carrying 4 million passengers in 2001/2 over 7 km of track. In the same period, Metro Monorail carried 3 million passengers over 4 km of track. (ARA 2003)

3.1.2 Governance

The NSW rail network is State owned and until recently has been managed by the Department of Transport acting on behalf of the NSW Government. The infrastructure is managed and maintained by RIC providing access to third party operators of passenger and freight services under a vertically separated rail operating structure. Since being elected in March 2003, the NSW Government has implemented significant change in the administration of the transport and planning portfolios.

State planning powers are being centralised under the Minister for Infrastructure Planning and Natural Resources which will result in a coordinated approach to land use and transport planning.

The new Ministry of Transport will be responsible for transport policy and the existing Transport Safety Bureau is being transformed into a more powerful Transport Safety and Reliability Regulator (TSSR), reporting direct to the Minister for Transport Services. The TSSR will have responsibility for the regulation and monitoring of public transport safety and service quality across public transport, ports and railways and in compliance with the Railway Safety Act 2002.

The metropolitan sector of RIC will be amalgamated with SRA to form a vertically integrated urban rail network. The future of the DIRN, the Hunter Valley Coal Network and the Country Network is yet to be revealed.

The Office of the Co-ordinator General of Rail, established in June 2000, has the responsibility for monitoring the performance of the NSW railway and coordinating the

functions of the rail agencies. The Office was originally intended to cease operations towards the end of 2001 and be replaced by an Office of the Rail Regulator, which would drive continued performance improvements against agreed performance standards. However, in announcing its response to the Final Report of the Glenbrook Inquiry, the Government, in November 2001 decided to extend the term of the Office of the Co-ordinator General to December 2003. After that time, responsibility for setting and monitoring performance standards for the industry will transfer to the Department of Transport.

Access Pricing and Competition Policy

The Independent Pricing and Regulatory Tribunal (IPART) regulates the pricing and access structures of the rail access provider (RIC) in NSW. A critical function of IPART is determining the maximum price the access provider may charge for access to the rail network in NSW. IPART also approves the fares for the passenger services in NSW.

The National Competition Council has set out a series of goals to promote the competitive and efficient use of Australian rail networks. The first of these, the NSW Rail Access Regime, sets out a negotiation and dispute resolution framework for those seeking access to rail track.

The Commonwealth Government through the Australian Transport Council (ATC) has signalled its intention to take up a more pro-active role in the planning of the national rail infrastructure via its AusLink proposal. This plus the ARTC proposal points to an increasing Commonwealth involvement in rail issues.

3.1.3 Sector Trends

Public to Private Operators

The concept of vertical separation of the railways was pursued in NSW during the 1990s with Government retaining ownership of the infrastructure and creating an open access regime for above rail operators. Privatisation of Freight Corp (and concurrently, National Rail) signalled a significant shift in focus toward private sector freight operation. These policies are consistent with the Commonwealth position on the ownership and management of the DIRN through ARTC.

Planning

Rail infrastructure planning requires better coordination and agreement between Federal and State governments. This has been noted by the Australasian Railway Association (ARA) which stated that a lack of planning, a lack of leadership and the absence of a national transport planning strategy has constrained investment by Governments and the private sector.

The Deputy Prime Minister and Federal Minister for Transport, John Anderson highlighted these issues at an Australian Transport Council meeting in September 2002. *“There is absolutely no doubt that if we don’t plan better, inefficiencies in the transport infrastructure will hold back economic growth, as well as inhibit the lifestyle and amenity for a lot of Australians and have quite a deleterious effect on the environment, including greenhouse emissions.”* (Australian Financial Review, 16 September 2002)

The failure to link land-use policies, and the long-term lack of investment to modernise and expand public transport, including urban rail system within NSW, has been identified as one of the most serious issues facing cities (Warren Centre 2001). The NSW Government has recognised this and the new planning initiatives are expected to address this issue.

Investment in Urban Rail

Urban Rail is considered to be the most efficient form of mass transport, however in the last 40 years, 400km of urban freeways have been constructed in the nations cities compared with just 80km of rail. A lack of rail provided to residents in the outer metropolitan areas perpetuates car-based urban sprawl. Residents in the fringes of our cities are becoming increasingly marginalised because of poor public transport infrastructure.

The NSW Government has recognised the need for public transport to support current and emerging land release areas in western Sydney. The North West Rail Link project and the South West Transportation and Land Use Studies have highlighted the need for the establishment of transport corridors. Identification of these and their funding is vital to ensure the functionality and sustainability of the new urban areas.

Funding for urban rail remains the responsibility of the State Government. The Commonwealth Government has historically provided little funding for planning, policy and funding of vital urban facilities and has viewed funding of urban rail infrastructure as a state responsibility. This policy is inconsistent with the Commonwealth's policy of funding urban freeways, many of which are provided for local commuters rather than to achieve national objectives.

It remains to be seen whether the Commonwealth's AusLink initiative will provide a more flexible approach to the Commonwealth providing funds for urban public transport projects.

The Sydney Metropolitan Network has benefited in recent years through major investment in the following projects, which are now underway or complete:

- Parramatta Rail Link Stage 1 (Chatswood to Epping).
- Airport Rail Link.
- Dapto to Kiama Electrification.
- East Hills Amplification Stage 1 and 2.
- Port Botany Duplication Stage 1.

However further investment is needed to complete all of the projects identified in the NSW Government's 1998 statement, Action for Transport 2010. In particular, improved transportation is required for growth areas in the Newcastle/Gosford, Illawarra and the Blue Mountains regions.

Investment in Freight Infrastructure

The infrastructure audit carried out by the ARTC in 2001 identified that an investment of \$507 million would lead to a significant improvement in market share by rail, at an optimised benefit cost ratio of 3.2. The majority of the investment would be within NSW, along the East Coast corridor between Melbourne and Brisbane. Works proposed under the

investment package included the removal of temporary and permanent speed restrictions, lengthening of crossing loops, improvement in turnout speeds and the construction of a dedicated freight line through South Western Sydney.

The ARTC proposal to lease rail track in NSW includes the works identified in this audit. The proposal includes a total combined investment within NSW of \$870 million over the first 5 years of the Lease. As the ARTC proposal has not been completed, the work has not yet occurred.

The private sector proposal for an inland rail link between Melbourne, Brisbane and Gladstone, the Australian Inland Rail Expressway (AIRE), has yet to progress significantly. Whether it can attract sufficient private funds and the level of government contribution required is yet to be seen.

Country Rail Network

The NSW country rail network principally services the agricultural industry through grain and cotton transportation while also providing general freight and some limited passenger service to rural NSW. The network has been curtailed in the past decades as road transport became more cost effective.

Rural and regional Councils face an ongoing battle to retain country branch lines. Such groups are concerned at the damage caused to local roads by road freight and highlight the potential tourism benefits of passenger rail services.

A Grain Industry Advisory Committee has recently been established to review the future of 15 branch lines throughout NSW. Whilst such a committee facilitates discussion between the Government and the Grain Industry directly, the views of the country communities appear to be not well represented in this forum.

The report of the NSW Legislative Council's General Purpose Standing Committee No 4 'Privatisation of Freight Corp' released in December 2000 included a recommendation that 50% of the proceeds from the sale of Freight Corp should be directed to upgrading of rail infrastructure in rural and regional areas to enable rail to better compete with road freight travel times. These funds are yet to be committed.

3.2 Level of Service

The levels of service for railways are mostly defined in terms of the above rail operations against published or contracted reliability. The contribution of infrastructure to these outcomes is determined by track quality (compliance of track to specified standards) and track standard (the configuration of the infrastructure and the speed, loads and capacity that it will support). While RIC measures performance, it does not issue publicly a set of infrastructure service levels nor performance measures.

3.2.1 Passenger Services

RIC and SRA use a number of indicators to measure the current performance of the rail system. However the key indicator is On Time Running. The target is to have 92% of services arriving at destinations within 3 minutes of the scheduled arrival time for suburban services or 5 minutes for inter-urban services. The measure is a valuable indicator of how the system is performing, both in terms of infrastructure and operations.

The Long-Term Strategic Plan for Rail (OCG 2001) includes a number of service level indicators such as:

- 92% On Time Running (comparable with world standards).
- Service frequencies of at least one train every 15 minutes for any station used by more than 1,000 passengers per hour during peak periods.
- CityRail train loadings not to exceed 135% of seated capacity (preferably average train loadings should not be more than 110% during peak periods), and where possible passengers should not have to stand on any train for more than 20 minutes.
- Availability of CityRail rollingstock be at least 90%.

The infrastructure performance requirements for urban rail in NSW are defined in the RIC's rail standards and are comparable with government practice world standards. It should be noted that rolling stock and operations in addition to rail infrastructure may impact on performance.

3.2.2 Freight Services

The Australian Transport Council (ATC), a Ministerial forum for Commonwealth, State and Territories, has issued national performance targets for freight operation on the DIRN. The targets relate specifically to transit times, line speeds and axle loads and are promoted as a key factor in the infrastructure investment process. The ARTC Rail Audit investment scenarios were structured toward achieving compliance with the ATC objectives.

The current RIC standards are prescriptive and based on line classifications, which take into account the function and importance of the line and the annual gross tonnage the line carries. There is flexibility within the RIC standards to opt for lower or higher standards where appropriate based on consideration of factors such as safety, economic feasibility and line management policy.

3.3 Existing Infrastructure

The existing rail infrastructure within NSW varies greatly in its configuration and current condition. The Rail Technical Society of Australasia in its paper, "Rail in the next decade: where to and how?" (RTSA 2002) identified the deficiency in investment in rail infrastructure in the last 50 years. It stated, "Rail has progressed technically within the limitations of long-distance low-volume operations, but at a rate that has not kept up with the competition. This is particularly the case with infrastructure, which essentially remains as early 20th century alignments with mid-century track." RTSA, using the same gradings as developed for the 2001 Australian Infrastructure Report Card, gave the following grades to some NSW sectors.

- Sydney: C-. Although the track performed well during the Olympics, track upgrades have not kept pace with passenger growth and signal upgrades are needed.
- DIRN: F. The network is in need of rehabilitation.
- Hunter valley coal lines: B.

The quality of the NSW rail infrastructure has been the subject of considerable adverse media comment in recent months. (eg Daily Telegraph May 20, 2003, Daily Telegraph May 19, 2003, Civil Engineers Australia, May 2003.)

3.3.1 Metropolitan Network

The Sydney Metropolitan Network is a 1500V DC electrified system. Tracks are all equal to or of a higher standard than Class 1 (minimum 53kg rail on Timber Sleepers). Overhead wiring is mostly regulated (weight tensioned), although some sections such as the North Shore Line remain fixed (variable tension).

There is a backlog in maintenance of the infrastructure resulting from a reduction in funding over recent years. The reliability and safety of the system has been maintained through increased spending on Routine Maintenance at the expense of Major Periodic Maintenance. However, RIC has now received an increase in funding to arrest the deterioration in asset condition across the Metropolitan Network.

3.3.2 Defined Interstate Rail Network

The infrastructure on the DIRN ranges in classification generally from Class 1XC track (for parts of the North Coast Line) to Class 2 and Class 3 (for parts of the Network in Western NSW).

The condition of the rail infrastructure is generally serviceable, although sections of the DIRN between Broken Hill and Cootamundra which have received increased tonnages over recent years are in a deteriorating condition. The condition may well be considered close to 'Fit for Purpose', however to induce an increased market share a uniform improvement in the current infrastructure condition is necessary.

The configuration of the network is poor, with significant horizontal and vertical alignment constraints restricting achievable speeds. The North Coast Line is particularly inadequate with a considerable proportion of its alignment on tightly curved track. The Main South Line also suffers from extensive curvature. The DIRN is predominantly a single line and the limited number of long crossing loops constrains track capacity and restricts future freight expansion.

3.3.3 Country Network

The infrastructure within the NSW Country Network ranges in classification and condition from Class 1XC track to Class 5 track for branch lines in Western NSW. The condition of the assets on the Country Network, which fall outside of the DIRN are generally maintained only to meet current operational usage. These lines receive limited funding for upgrade.

Revenue from these lines falls well short of the required funding to keep the lines operational however the lines receive Community Service Payments.

3.3.4 Hunter Valley Network

The infrastructure in the NSW Hunter Valley Network is generally Class 1 or better, which is necessary to support the high tonnages and the operation of high axle load coal trains (up to 30T axle loads). Frequent inspection and maintenance is required to ensure the condition of the infrastructure within the Hunter is fit for purpose considering the high annual tonnages, which are in excess of 80 Million Gross Tonnes pa on some sections of the Network.

RIC in conjunction with the Hunter Valley coal companies and operators has over recent years identified a suite of capital improvements, which are generally focused at improving

capacity and removing existing operational constraints on the Network. To date there has been limited progress made on the identified projects.

3.3.5 Bridges

The closure of the Menangle Bridge and the impact on Main South rail services has raised awareness of inadequate bridge repair and replacement strategies.

The Minister for Transport Services has criticised the management of rail bridges when commenting on the results of an audit of the 9 other wrought-iron structures still in service in NSW. *“Poor asset management I think has been confirmed by this report.”* (The Australian, 31 May 2003)

3.4 Future Needs

3.4.1 Rail Reform

Variation in rail regulations between States is considered to be one of the biggest barriers against cost-efficient interstate freight rail operation. Rail operators around Australia face different training, licensing, registration, safety inspections, communications equipment and pricing regimes in each State. According to Robert Jeremy, Pacific National’s Commercial Director *‘There is no legitimate issues that stand in the way of a national system’* (Australasian Transport News, 27 November 2002). He proposes a common planning and funding framework for the interstate corridors, the intrastate mainlines and the branch lines, irrespective of gauge and ownership.

The key initiatives, which are targeted toward achieving rail reform in NSW, are outlined below:

AusLink

The AusLink Green Paper is a discussion paper outlining the Federal Government’s approach to planning, developing and managing Australia’s national land transport infrastructure. Under AusLink the Commonwealth Government working in corporation with the State Governments and other stakeholders intends to take the lead role to ensure that the national interest is represented in land transport development and to establish a National Land Transport Plan.

AusLink will establish a long term planning and funding framework, with the inclusion and co-operation of both State and local governments. The AusLink plan envisages changes to the separate funding arrangements for road, rail and intermodal investments to ensure the development of an integrated national land transport network that can support future logistics growth.

The NSW Transport Agencies in their submission to the Green Paper welcomed the initiative.

Australian Transport Council

The Australian Transport Council (ATC) is a Ministerial forum for Commonwealth, State and Territory consultations and provides advice to governments on the coordination and integration of all transport issues at a national level. ATC has announced that the National Road Transport Commission is to take responsibility for rail and intermodal operations from

1 July 2003. This combined transport responsibility will be assumed by the National Transport Commission (NTC) on completion of the legislation for this new body.

In an effort to progress the national agenda on rail reform, the ATC has issued national performance targets and developed a National Code of Practice for Railways. The ownership of this code is to be transferred to an industry rail code management company.

ATC has also announced a Transport Regulatory Reform Work Program and the development of a national rail accreditation system.

ARTC Proposal to Lease Track in NSW

In August 2001, a Heads of Agreement was signed between the Federal and NSW Government in relation to a proposal by the Australian Rail Track Corporation (ARTC) to lease rail track in NSW.

In September 2002 the Deputy Prime Minister and Federal Minister for Transport, John Anderson stated that the Federal Government was within weeks of signing an historic agreement with NSW to take a 60 year lease over the state's mainline track, which would then be managed by the ARTC. The proposal however is still under consideration.

The delay in completing the lease agreement is a significant stumbling block for the Federal Government's AusLink proposal, which calls for an integrated national transport plan to meet the burgeoning freight task.

ARTC manage track in Victoria, South Australia and Western Australia, and the Commonwealth Government believe that passing control of the interstate mainlines in NSW to ARTC would facilitate a more effective implementation of national transport objectives.

3.4.2 Growth Investment

There is an urgent need to invest in rail in Australia and particularly in NSW. As the Federal Minister for Transport, John Anderson has stated *'By 2020 this nation will see a doubling of freight and a 50% increase in passenger movements (referring particularly to the Sydney Metropolitan Network) and we just don't have the infrastructure to handle it. No country is more dependant on it's transport network than Australia because of the distances internally and the distances from our export markets.'* (Australian Financial Review, 16 September 2002).

The key initiatives, which have been targeted toward investment in expansion of rail in NSW, are highlighted below:

Action for Transport 2010

In 1998, the NSW Government released Action for Transport 2010. While a number of the projects identified in Action for Transport 2010 have progressed, there are a significant number projects such as those listed below which are still being reviewed:

- Parramatta Rail Link Stage 2 (Epping to Parramatta).
- Newcastle to Sydney high speed rail link (Stage 1 Hornsby to Warnervale) proposed by 2007.
- Waterfall to Thirroul high speed rail link proposed by 2010.

- North West Rail Link proposed by 2010 (studies are progressing).
- Priority Freight Line from Macarthur to Chullora and to Cowan.

Long Term Strategic Plan for Rail

The Long-term Strategic Plan for Rail highlighted the deficiencies in Sydney's rail network. The report has never been publicly released but was extensively quoted in the Sydney Morning Herald in February 2002. According to these reports:

- new lines estimated to cost \$10 to \$20 billion are required by 2020.
- \$20 billion is needed for urgent maintenance over the next decade.
- the system is rapidly approaching gridlock.
- there is an urgent need to protect future rail corridors.
- in the last 50 years there have been almost no track duplication.

There has been no public acceptance of these recommendations by government, however it is understood that an updated version of the report is being prepared.

State Infrastructure Strategic Plan 2002

The State Infrastructure Strategic Plan (SISP) is a ten-year plan for renewing the State's capital base. The SISP establishes the policy framework for transport planning in NSW and assigns planning responsibilities. The SISP, launched in December 2002, includes a number of works identified in both Action for Transport 2010 and the Long Term Strategic Plan for Rail and nominates funding for further investigation into the North West Rail Link, and High Speed Rail Links between Sydney and Newcastle and Sydney and Wollongong.

Investment in Urban Rail

There is a major need for increased investment in public transport infrastructure. Significant population growth is predicted in Western Sydney, Gosford/Wyong and the Illawarra regions, all of which require public transport. A combination of both heavy rail and light rail systems will be required.

funding need has been worsened by the lack of long term planning which has meant that public transport corridors have not been reserved in future residential areas.

Investment in Rail Freight

Investment in rail freight in NSW continues to be a major focus of industry lobby groups. Such investment is necessary in order to arrest the decline in market share for this essential transport mode. The ARTC Interstate Rail Network audit of 2001 remains a minimum benchmark for the infrastructure investment required on the interstate Main Lines.

Investment in Intercity and Regional Fast Rail Services

The Federal Government's East Coast Very High Speed Train study has effectively ruled out a future in Australia for a Speedrail type train or a Maglev train. However, as argued by the Warren Centre in its Sustainable Transport for Sustainable Cities report, (Warren 2002) NSW should again look at faster trains linking Newcastle, Sydney and Canberra (possibly tilt trains).

Investment in an Inland Route for both Passenger and Freight:

Promoters of the Inland Route (Melbourne to Darwin, via Parkes, Moree and Toowoomba) Australian Transport and Energy Corridor (ATEC), expect the freight task in Australia to double over the next 10 years, although the ATC believe that this will occur over the next 20 years. According to the ATEC Chairman, the existing coastal route north south corridor will not cope with this additional freight task.

3.4.3 Security

Rail networks have a relatively high vulnerability to attack from persons wishing to cause disruption to services through damage to the infrastructure. By their nature, the assets are dispersed and in many cases isolated and difficult to secure. Signalling, power and control systems have little redundancy and although modern communication systems have more redundancy, significant damage to installations would cause major disruption to services. Fixed infrastructure such as track, bridges and structures are difficult to secure, have little redundancy, and damage to significant structures would have long-term impact.

Hazardous materials are not carried on rail in large volumes but would be vulnerable to attack. Passenger services are vulnerable, particularly at underground stations.

The relatively low reliance on rail service for freight movement in Australia, except for the mineral railways, probably means that economic and social disruption would be greatest through targeting of central metropolitan passenger services.

3.5 Report Card Rating

Whilst there have been a number of recent rail improvement initiatives, including rail reform and increased investment, the climate remains uncertain and more stable political direction and management of the system will be necessary to restore confidence and achieve significant progress. In particular, uncertainty over the ARTC lease proposal and the future of the remainder of the network need to be resolved.

The creation of Pacific National through the sale of Freight Corp and National Rail has provided a significant opportunity for injection of private sector skills and finance. However with the continued uncertainty over the lack of government investment in the network, capacity and reliability improvements have not followed the sale. Consequently the decline in rail freight's market share within NSW has not been arrested.

The inadequacy of current funding levels within the Metropolitan Network is highlighted in the Long-Term Strategic Plan for Rail as are the significant capacity problems.

Funding for extensions to the road network within the Greater Sydney region has far exceeded investment for new rail lines in recent times. This trend needs to be corrected if the predicted increases in patronage over the next 20 years are to be catered for.

There has been some significant recent investment in maintenance and renewal of the urban infrastructure and system expansion is occurring through construction of the Parramatta Rail Link. However, there remains the need to improve consistency in management of the infrastructure assets and to implement the other projects contained in the Transport 2010 plan.

NSW rail infrastructure has been given a rating of D.

Case Study

Menangle Bridge

This case study has been chosen not to emphasise the political issues that brought it to prominence in the Sydney press, but because it illustrates the complex set of issues that influence the maintenance and replacement of major assets such as bridges. There are 9 other wrought iron structures beside the Menangle Bridge still in service in NSW.

The Menangle Bridge was constructed in 1863 and comprises cellular wrought iron girders originally constructed continuously over three 49.4m continuous spans with metal cross girders, timber stringers and transoms that support the rails. The bridge was the subject of a NSW Royal Commission into wrought iron bridges 1884, and in 1907 intermediate pier supports were added, effectively halving the girder spans to cater for increased axle loads. Also in 1907, 17 steel approach spans replaced the original timber structures.

This bridge carries the double Main Southern Line track over the Nepean River at Menangle on the southern outskirts of the Sydney metropolitan area.

During its service life the bridge has been subject to varying programs of inspection, maintenance and design checks.

On the 27 March 2003, the bridge was closed due to concerns relating to its structural integrity, and it remained closed for nearly a month resulting in serious disruption to private and public, freight and passenger rail operators.

The closure of the bridge and the controversial circumstances surrounding the decision brought to the public's attention the current condition of rail assets and the mechanisms in place to manage these assets within NSW. The bridge closure sparked media reports relating to numerous other structures within NSW that were reportedly in danger of collapse. Although generally exaggerated, these reports highlighted that reconditioning and/or renewal of long-life rail assets may not be occurring at the levels expected by operators and the travelling public.

As the Government balances the demands for services and asset provision across all of the requirements of the community, the asset managers must make informed decisions on the treatment necessary to ensure assets are meeting current and emerging demands. The management of structural performance through load reduction (by operating speed restriction in this case) may be an appropriate solution as it is unlikely that funds will be available for renewal of all structures to contemporary standard quickly. There are many examples where public infrastructure is not brought to modern standard due to restricted funding availability as the investment cannot be sustained under a commercial evaluation.

Management of the large timber bridges on the Murwillumbah Line is another example where the high cost of replacement may limit the quality of the line.

The case for renewal of assets to meet the demands of higher services standards (speed, loadings etc) is too often confused with the age and the safety of the structure under a well-managed maintenance regime. Management of the public perception of safe operation is also important if such public debates are to be constructive and not emotional. Safety concerns aside, the apparent decline in asset renewals across the network can impact significantly on the reliability and availability of the network, as evidenced at Menangle.

The Menangle Bridge affair has to an extent paved the way for the Government to continue an agenda of rail reform in NSW. It was no surprise therefore that an announcement made by the new Minister for Transport Services to fund the rebuilding of the Menangle Bridge came in conjunction with an announcement confirming that the Rail Infrastructure Corporation and the State Rail Authority would be merged as of 1 January 2003.

4. Water – Potable and Wastewater

4.1 Introduction

Throughout 2002, the drought dominated news from the rural sector. In many areas there has been insufficient rain to warrant the planting of crops, and where planted many of the crops have failed. Stock was being hand fed. The dry conditions contributed to bush fires including the loss of over 500 homes in Canberra in January 2003. The result today is significant water shortages and restrictions in many areas.

At the same time in major urban areas there is increasing pressure to release land on the urban fringe for housing. The development of these areas will not only increase the demand for water but will increase the volume of wastewater to be treated and the runoff of stormwater.

It is with this background that the Infrastructure Report Card for NSW has been prepared for water and wastewater.

Major Urban Areas

The major urban areas in NSW are provided water and wastewater services by one of four large utilities listed below.

Utility	Population Served 2000/01	
	Water	Sewerage
Sydney Water Corporation	4,029,000	3,904,000
Hunter Water Corporation	467,000	448,000
Gosford City Council	143,000	141,000

It is to be noted that Sydney Water's area of operations includes the Blue Mountains to the west, Pittwater to the north, and the Illawarra region to the south.

With the exception of Sydney Water Corporation, these utilities provide wholesale and retail water to their customers. Sydney Water Corporation is provided bulk water by the Sydney Catchment Authority, which is responsible for the storage and transfer of the water.

A water service is available to virtually all potential customers in the major urban areas. Of the customers provided with water, 97% of Sydney Water customers are also provided with sewerage. For Hunter Water and Gosford / Wyong, the comparative figures are 96% and 98.6%. The major utilities continue to implement backlog sewerage programs to narrow the gap between water services and sewerage services.

Non-Metropolitan Urban NSW

Some 125 utilities provide water and wastewater services to 1.7 million people in non-metropolitan NSW (DLWC 2000/01). Of these, 107 provide both water and wastewater services, seven provide water services only and 10 provide only wastewater services. 93.7% of these people receive a reticulated sewerage service.

4.1.1 Governance

Commonwealth Government

The Commonwealth Government's responsibility is to provide overall policy direction for the provision of water services by the States. This direction is provided on two fronts: water quality and the environment, and the reform of the water industry in Australia.

Water Quality and the Environment

Water quality goals are provided by the National Water Quality Management Strategy, which is a joint strategy of two ministerial councils, Australian and New Zealand Environment Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ). The two councils represent environment and water resources interests respectively.

The current Australian Drinking Water Standards were developed by ANZECC, ARMCANZ and the National Health and Medical Research Council. A rolling review of these standards is carried out to ensure that their currency and relevance are maintained. The Australian Water Quality Guidelines for Fresh and Marine Waters is currently under review by ANZECC.

Protection of the environment is overseen by the National Environment Protection Council, a Ministerial Council of Commonwealth and State Ministers. The Council has the power to issue National Environment Protection Measures to protect the environment.

Reform of the Australian Water Industry

In February 1994, the Council of Australian Governments issued a Communiqué for reforms required in the water industry. From this framework, a set of generic national indicators were developed as the basis for negotiation of specific objectives for each State and Territory. As a reward for achieving these milestones, the Commonwealth makes substantial payments to the States. Payments are made under the Competition Policy Reform Act 1995, which provides the framework of National Competition Policy.

The reforms under National Competition Policy focus on ensuring the water industry is economically viable and ecologically sustainable. Specific objectives of the reforms include:

- The industry becomes efficient, flexible, sustainable and capable of delivering a higher quality of water with greater security of supply.
- Water is priced in recognition that it is a finite resource.

These reforms are having a direct impact on rural customers (non-urban) through the allocation and trading of sustainable water entitlements. A number of economic gains will emerge from water trading.

For urban water supply, significant impacts include:

- Water pricing and surveillance.
- Performance monitoring and best practice for the delivery of water services.
- Allocation of water for the environment.

In NSW water pricing and surveillance and customer service is controlled at the State level by the Independent Pricing and Regulatory Tribunal (IPART), a NSW State operated entity which is discussed further in the following section.

Efficient delivery and meeting best practice standards normally results from competition within an industry. However, utilities within the water industry are in most instances monopolies and therefore competitor pressures are not a driver. Consequently the best approach to set the standards of performance and levels of customer service is to use inter-agency comparisons, ie benchmarking. The Water Services Association of Australia (WSAA) compiles comparative information for Australia. The WSAA is the peak body of the Australian water industry, and its 22 members provide water and wastewater services to approximately 13 million people. Annually since 1995, the WSAA has compiled comparative information on the major urban water industry and the industry's achievements with regards to the requirements of National Competitive Policy. The compiled information is published in WSAAfacts including on:

- Customer profiles and water volumes.
- Service performance including health, environment, service delivery and pricing.
- Infrastructure.
- Economic and financial performance.

Since 1986 the Department of Land and Water Conservation has been compiling performance comparisons annually for 124 non-metropolitan water utilities which provide water supply and sewerage services in NSW.

State Government Governance

NSW is the largest water user in Australia. Around 90% of the State's water is sourced from surface water resources with the balance from ground water.

There are four major metropolitan service providers in NSW – Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council. The Sydney Catchment Authority provides bulk water to Sydney Water which then supplies bulk water to irrigators, riparian users, local governments and industrial customers. State Water is also responsible for managing infrastructure assets including 18 major dams and 300 weirs. Further, it provides river operations, and metering and billing services. The Department of Energy and Utilities undertakes water resources management.

There are a number of regulatory agencies. The NSW Environment Protection Authority has regulatory functions related to pollution and licensing of discharges while the Independent Pricing and Regulatory Tribunal (IPART) regulates pricing. The Department of Energy and Utilities provides water licensing permits and regulation. The Healthy Rivers Commission provides independent advice on water quality and river flow objectives for critical coastal catchments.

Water and wastewater services to non-metropolitan urban areas, such as country towns and regional centres, are essentially a local government responsibility, although there are a number of utilities covering more than one local government area.

The *Water Management Act 2000* provides for the sustainable and integrated management of the water sources of the state. The water management principles set out in the Act provide for the allocation of water for the environment so that habitats, animals and plants are protected and, in the case of habitats, restored.

Institutional Reform

Institutional reform in the water industry has generally resulted in the roles of water resource management, standards setting and regulatory enforcement and service provision being separated. Specifically, following the water quality incidents in Sydney in 1998, the Sydney Water Catchment Authority was established as the bulk water supplier to Sydney Water, and the regulatory powers of the Director-General of NSW Health Department were strengthened. However, Sydney Water Corporation has re-integrated its Australian Water Technologies back into the Corporation, further reducing the level of separation between the water business and the body responsible for monitoring and testing water quality.

In non-metropolitan NSW, State Water is responsible for operating water delivery systems and maintaining water infrastructure. In its report on bulk water pricing, IPART has indicated that State Water be separated from the Department of Land and Water Conservation for reasons relating to auditing, services agreements and State Water's operating licence. Following the March 2003 State elections, the State Government split the duties and responsibilities of the Department of Land and Water Conservation between the Department of Sustainable Natural Resources and the Ministry of Energy and Utilities. State Water is now located within the Ministry of Energy and Utilities.

IPART has regulated the prices of Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council since 1992. As part of its services, IPART prepares a price path for these four utilities as well as the Sydney Catchment Authority. The four metropolitan utilities also have developer servicing plans which detail the basis on which developer charges will be calculated.

As an integral part of price determinations for urban services, IPART reviews performance indicators in all sectors. For metropolitan and some non-metropolitan urban service providers this includes water reliability, water continuity, supply adequacy, water quality and sewer surcharge.

For non-metropolitan urban services, IPART has developed guidelines for pricing, which the State's non-metropolitan service providers are currently applying. Information on the financial performance of non-metropolitan urban services is included in an annual benchmarking report released by the Department of Land and Water Conservation.

In May 2003, IPART published the following price reviews:

- Hunter Water Corporation – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005.
- Sydney Water Corporation – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005.
- Sydney Catchment Authority – Prices of Water Supply Services – Mid term Review of price path from 1 October 2000 to 30 June 2005.
- Wyong Shire Council – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005.
- Gosford City Council – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005.
- Sydney Water Corporation Operational Audit 2001/2002.

When reviewing prices for these utilities, the tribunal raised a number of issues that were consistent for all four utilities. These included:

- NSW is experiencing one of the worst droughts ever recorded.
- There is a need to send a signal to consumers of the need to conserve water. However, the Tribunal is aware that price increases are unlikely to have a significant impact on demand unless they are substantial.
- The Tribunal did not substantially increase water usage charges due to limited information on likely customer impacts such as the affordability of water services and implications to the environment.
- There is the potential that customers' demand for water will outstrip the existing water supplies.
- Sydney Water and Hunter Water are undertaking low levels of renewal and maintenance expenditure. It is possible that significant increases in renewals expenditure may be required in the future.

These issues will need to be addressed by the utilities over the next two years before the next price review.

4.1.2 Fitness for purpose / Level of service

To assist in fitness for purpose and level of service assessment, the Water Panel of the Sydney Division of Engineers Australia identified the following factors that should be considered when assessing water and wastewater infrastructure.

Factor	Potable Water	Wastewater
Asset Condition	Structural soundness of headworks and reticulation	Structural soundness of sewage reticulation and treatment plants
Asset Availability and Reliability	Reliability and security of supply in both quantity and quality.	Conveyancing and treatment of average dry weather flow, and system performance in peak wet weather. The frequency and number of overflows and the treatment of overflows.
Asset Management	The availability of data on the system, and the existence of forward planning programs of maintenance and renewal.	The availability of data on the system, and the existence of forward planning programs of maintenance and renewal.
Sustainability	Environmental: the impact of headworks on downstream waters and the impacts of treatment byproducts.	Environmental: the impact of discharges on downstream waters; the impacts of treatment byproducts.

Factor	Potable Water	Wastewater
Economic: the level of investment for maintenance and renewal, the cost to customers, concerns that pricing is not reflecting actual costs, and demand management.	Economic: the level of investment for maintenance and renewal, and the cost to customers	
Social: impact of lack of supply, health impacts of deficiencies in quality, meeting of community expectations on appropriate treatment and use of water.	Social: impact of lack of service, health impacts of deficiencies in quality of treated effluent, meeting of community expectations on appropriate treatment, and use of sewage.	

As can be seen from the above listing, the factors to be considered in the evaluation of the fitness for purpose of water and wastewater infrastructure are many and varied. For many factors, the level of service has a direct bearing on the fitness of purpose of the infrastructure. For example, the level of treatment at a sewage treatment plant has a direct bearing on the impact of effluent discharges on downstream waterways.

The key factors where the level of service is important include:

Potable Water

- Protection of catchments.
- Provision of environmental flows in rivers.
- Security of supply.
- Water treatment.
- Water quality management in the delivery system.
- Water pressure.
- Frequency of interruptions.
- Cost to customers, and the actual cost.
- Demand management.
- Infrastructure maintenance and renewal.

Wastewater

- Elimination of dry weather overflows.
- Management of wet weather overflows.
- Sewage treatment.
- Effluent reuse.
- Odour complaints.
- Frequency of sewer collapses and blockages.
- Cost to customers, and the actual costs.

- Demand management.
- Infrastructure maintenance and renewal.

Examples of infrastructure providing significant levels of service include:

- Sydney Water's northside tunnel which reduces sewage overflows into Sydney Harbour.
- Sydney Water's Sewerfix program which minimises dry weather discharges from sewage pumping stations.
- The provision of environmental flows downstream of water supply impoundments.

4.2 Wastewater

4.2.1 Overview

Sewage

Sewage is water borne waste generated primarily by residential households in the kitchen, laundry and bathroom. The non-residential component comprises industrial, commercial and municipal wastewaters that represent less than 10% of the total sewage flows.

Unless treated to an appropriate standard and disposed of in an environmentally sensitive manner, untreated sewage represents a significant health hazard and will have a significant impact if discharged into the environment. Treatment processes have improved significantly over the last fifty years and treated water can now be widely reused. As yet treatment of water to a standard that is acceptable for drinking water has not received health authority acceptance in Australia.

Reticulation Systems

Residential properties are served by plumbing fixtures and house service lines. The house service lines are connected to the sewer reticulation lines owned by the utility, and the sewage is conveyed to a treatment plant for processing and disposal.

Many house service lines in NSW are old and damaged allowing infiltration during wet weather, and inflow where illegal connections are made from the roof and yard drainage systems. Such inflows cause major difficulties, particularly in older systems when the capacities of sewers, pumping stations and treatment facilities are exceeded. The frequency of overflow from a system is a measure of the performance of that system. Odour complaints are a further measure of the performance of a system.

Inflow and infiltration are being addressed to different degrees by the various utilities. However, the investigation of the condition of house service lines, and subsequent repair where damaged, is limited.

Treatment Processes

Treatment processes are selected, in the first instance, to provide the quality of water required to protect the environment of the receiving waters. Higher levels of treatment are sometimes provided to allow effluent reuse as a result of community pressure, or to meet the requirements of regulators. For these reasons the comparison of treatment processes and the level of processing provided by different utilities may not be an appropriate comparison of the level of service provided by the utilities.

Treatment levels are referred to as primary, secondary or tertiary levels of treatment. Primary treatment removes screenings, grit and some solids. Secondary treatment follows primary treatment and incorporates a biological process that reduces the organic content of the sewage to produce a clear effluent. Tertiary treatment further treats the effluent to reduce the nutrient content, nitrogen and phosphorus. Secondary treatment is generally provided prior to ocean discharge, excepting in Sydney where primary, or advanced primary treatment is provided. Tertiary treatment and advanced tertiary treatment are generally provided prior to reuse, or discharge to inland waterways.

4.2.2 Existing Infrastructure

Metropolitan Urban Sewerage Systems

A summary of the assets owned and operated by the major metropolitan urban utilities, in 2000/01, is tabulated below.

Summary of Wastewater Assets

Utility	Treatment Plants	Pumping Stations	Mains (kms)	Properties / km	Sea Outfalls	Inland waters	Estuary Outlets
Sydney Water	30	656	22,432	68.4	10	16	2
Hunter Water	20	342	4,399	42.3	4	11	1
Gosford City	2	182	1,373	43.6	1	-	-
Wyong Shire	6	133	1,117	44.7	2	-	-
Total	58	1313	29,321	199	17	27	3

Hunter Water discharges a significant proportion of its effluent into inland waters and as a result provides a relatively high level of tertiary treatment. Gosford and Wyong discharge their effluent to the sea, and provide secondary treatment prior to discharge.

The number of sea outfalls operated by Sydney Water is relatively high and results from the high proportion of the population in the service area that live on the eastern seaboard. Sydney Water provides only primary treatment prior to discharge into the sea outfalls and this is reflected in a comparison of wastewater treatment levels. It should also be noted that the higher connection rate (properties / km) in Sydney arises from the higher population densities when compared to the Hunter, Gosford and Wyong.

Comparison of Wastewater Treatment Levels

Utility	Primary	Secondary	Tertiary
Sydney Water	83%	5%	12%
Hunter Water	-	56%	44%
Gosford City	-	100%	-
Wyong Shire	-	100%	-

The current replacement costs of these sewerage assets (in 2000/01) is:

- Sydney Water: \$5,890 million
- Hunter Water: \$965 million
- Gosford City Council: \$379 million
- Wyong Shire Council: \$316 million

Non-Metropolitan NSW

Some 127 utilities provide wastewater services to 1.58 million people in non-metropolitan NSW (DLWC 2000/01). Most utilities have one or two sewage treatment plants, and between five and ten pumping stations. Customer connections are of the order of 40 properties / km which is similar to Hunter Water, Gosford City and Wyong. The level of treatment is predominantly secondary.

The current replacement cost of the State's non-metropolitan sewerage assets (2000/01) is \$2,572 million.

4.2.3 Operational Data

Metropolitan Urban Sewerage Systems

The wastewater collected per property over the three-year period 1998/98 to 2000/2001 in metropolitan urban areas is tabulated below. In Sydney and the Hunter over the period there has been a reduction in the volume of wastewater. The main influence on the reduction in the volume of wastewater has been demand management by the utilities.

Wastewater Collected per Property (kL/property)

Utility	1998/99	1999/00	2000/01
Sydney Water	372	350	333
Hunter Water	377	360	320
Gosford City	269	259	259
Wyong Shire	256	243	309

The above volumes are based on the recorded input to treatment plants and includes inflow and infiltration. Infiltration per property in Sydney and Gosford has been estimated as follows.

Infiltration per Property (kL/property)

Utility	1998/99	1999/00	2000/01
Sydney Water	56	37	15
Gosford City	43	31	24

The reduction in infiltration over the period reflects the drought conditions experienced during this time, and the programs implemented by the utilities to reduce inflow and infiltration.

Compliance with Licence

The major urban utilities achieve high compliance with wastewater standards, and with operating licences standards regarding sewage surcharges on private land.

Service Delivery

The operating licence for Sydney Water Corporation contains a customer contract, which sets out the rights of customers regarding matters such as supply of services and interruptions to supply. The audit of Sydney Water Corporation's performance in 2000/01 (IPART 2003) showed high compliance with the customer contract.

Hunter Water Corporation has similar obligations under its licence and in 2000/01 the auditors report that the Hunter Water Corporation met the service criteria in its charter.

Effluent Reuse

A high level of effluent reuse is a goal of all utilities and the communities they serve. The level of reuse of effluent achieved by the major utilities in 2000/01 was as follows:

- Sydney Water: 1.9%
- Hunter Water: 8.1%
- Gosford City Council: 0.05%
- Wyong Shire Council: 0.0%

Sydney Water Corporation is seeking to maximise the reuse of sewage effluent wherever possible (SWC WaterPlan 21), and the Hunter Water Corporation aims to reuse 13% of its sewage effluent by 2005. The 2000/01 levels of reuse were significantly lower than targeted. The very low levels of reuse are a major concern, particularly given the growing demand for water.

Both Gosford and Wyong have investigated the potential for reuse within their area of operations. While opportunities for reuse are limited, the level of reuse in these regions could be far higher than they currently are.

Pricing

A domestic sewerage tariff of \$300 to \$350 is charged in both metropolitan and non-metropolitan urban areas. It would appear that this tariff is acceptable throughout the State, and although relatively low, all costs are recovered and a positive economic real rate of return is realised.

IPART has adopted a policy of two-part tariff pricing and the phasing out of property value based charges. Sydney, Hunter and Gosford urban utilities have virtually eliminated property value based charges, however, of the three utilities, only Hunter Water has two-part tariff pricing for sewage. Sydney Water and Gosford City have fixed price tariffs.

Return on Investment

The economic real rates of return for the three years 1998/99 to 2000/01 are tabulated below.

Economic Real Rate of Return

Utility	1998/99	1999/00	2000/01
Sydney Water	4.91%	4.65%	3.88%
Hunter Water	5.32%	4.29%	3.41%
Gosford City	4.23%	4.83%	2.97%
Wyong Shire Council	-	-	3.0%
Non-Metropolitan Urban	2.6%	2.6%	2.6%

For the major urban utilities, the economic real rate of return fell over the three-year period. An analysis of revenues and costs reveals that most utilities were able to reduce costs over the period. However, the fall in revenues outweighed the reduction in costs. Where revenue is based on user pays, the reduction in the volume of wastewater generated has had the greatest impact on revenue.

IPART has prepared a price path for the major urban utilities and has based it on an assumption that the utilities will be able to reduce costs in order to meet profit targets. The challenge will be to reduce costs sufficiently to maintain the economic real rate of return and still provide a high level of service to customers. Meeting cost reduction targets may not be achievable.

It should be noted that reductions in costs by Sydney Water and Gosford City were brought about, in part, by the reduction of depreciation. This is a book keeping entry based on estimates of the cost to a business from the ageing and deterioration of assets. Lower depreciation implies a longer life for assets, and will have bearing on the approach adopted in respect to renewal expenditure.

Renewal Expenditure

Renewal expenditure as a percentage of the replacement cost of assets is a measure of the rate at which assets are being replaced. Management determines the annual renewal expenditure but the factors influencing the rate of investment in renewals includes the age of the system, the condition of the system, and previous expenditure on renewals.

Renewal Expenditure (% of Current Replacement Cost of Assets)

Utility	1998/99	1999/00	2000/01
Sydney Water	0.95%	1.41%	1.06%
Hunter Water	0.28%	1.08%	2.35%
Gosford City	0.02%	0.04%	0.06%
Wyong Shire Council	-	2.7%	-

The difference in renewal expenditure between Gosford City and Sydney and the Hunter is primarily due to the difference in ages of the schemes. The majority of the Gosford scheme is less than 30 years old, whilst parts of the Sydney and Hunter schemes are over 100 years old.

Non-Metropolitan Urban Sewerage Systems

The Department of Land and Water Conservation produces an annual report on the performance of water utilities in NSW. The report covers 127 water utilities ranging in size from 200 to 800 connected properties to over 10,000 connected properties. Performance is reported on the basis of social, environmental and economic indicators with comparisons made of the top 20%, statewide median (50%) and the lower 20% for each performance indicator. A comparison of performance indicators for a number of utility characteristics for the top 20%, median (50%) and lower 20% for 2000/2001 in non-metropolitan urban areas, is tabulated below.

Comparison of Performance Indicators

Performance Indicator	20%	Median (50%)	80%
Wastewater collected per property (kL/a)	215	260	320
Compliance with biochemical oxygen demand (BOD) in licence %	100	100	93
Compliance with SS in licence %	100	98	89
Odour complaints (per 1000 properties)	0	0.6	1
Service complaints (per 1000 properties)	7	11	40
Reclaimed water (% of effluent reclaimed)	30	1	0

The wastewater collected per property for the lower 20% is lower than all major urban areas, whilst the median (50%) is the same as for Gosford, and the top 20% is similar to Sydney and the Hunter. The higher volumes would appear to indicate that the social environment in many non-metropolitan urban areas is similar to the major urban areas.

Compliance with licence requirements is good in at least 50% of water utilities however, in the majority of the lower 20% of utilities, the level of compliance is unsatisfactory.

Odour complaints in non-metropolitan urban areas are of a similar magnitude as in the major urban areas. Service complaints are of a similar magnitude for the lower 20% and median 50%, whilst the odour complaints from the top 20% of non-metropolitan urban utilities is significantly higher at 40 complaints per 1,000 properties.

Only a small proportion of water utilities, around 20%, reclaim water. These utilities reuse around 30% of the effluent available. For those utilities that reclaim water, their efforts are commendable; for the remaining utilities the volume reclaimed, effectively 0%, is very poor.

Financial Performance Indicators

Financial Performance Indicators	20%	Median (50%)	80%
Typical Residential Bill \$	270	345	430
Economic Real Rate of Return %	4	2.6	0.4
Renewals (% of current replacement cost of system assets)	9.1	0.0	0.0

The typical residential bill in non-metropolitan urban areas in the average property is \$345, which is similar to the tariff in the major urban areas. The tariff in the top 20% is greater than \$430, which most likely represents specific additional costs that must be met by the particular utility.

An economic real rate of return of 4% achieved by 20% of the utilities, is similar to the rate of return obtained by the major utilities, whilst the rate of return achieved by the median 50% utilities (2.6%) compares reasonably with the major urban utilities. Rates of return of 0.4% are not considered acceptable.

A renewal expenditure of 9% of the current replacement cost of system assets by 20% of utilities indicates that this group of utilities are addressing serious renewal problems. However, zero renewal expenditure by the remaining 80% of utilities would appear to indicate that most utilities are simply not addressing the question of asset renewal.

4.3 Water

4.3.1 Overview

Sourcing of Water

Supply to Australia's major cities is predominantly from impounding or storage reservoirs. Most water is supplied directly from the reservoir, however, for a small proportion the water is first released to the river and then withdrawn from the river downstream of the reservoir.

Other sources of water are the direct pumping of water from rivers (without significant impoundment), and the extraction of groundwater. Less than 10% of the total water used by major Australian cities is extracted in this manner.

Alternative sources of water are also gaining greater acceptance. These sources include individual household roof water tanks, and the recycling of stormwater and sewage effluent for non-potable water uses.

Water Treatment

Water sourced from impoundment or storage reservoirs tends to be of good quality, ie low in suspended solids and colour, and low in pathogens that are harmful to users. Groundwater is frequently of a higher standard, but may contain carbon dioxide, iron and manganese, which are removed by specific treatment processes. Depending on rainfall, water extracted from rivers tend to have a highly variable quality, both from a suspended solids and a microbiological point of view. Water treatment most commonly consists of processes to remove suspended solids, sedimentation and filtration, and a disinfection process, usually chlorination. Many utilities fluoridate the water to protect customers' teeth. Also, chemical addition may be used to reduce the potential for corrosion in the system.

Treated water is stored in covered reservoirs to prevent recontamination of the water. Further addition of chlorine may be used to provide a chlorine residual in the distributed water to prevent the regrowth of pathogenic organisms.

Distribution Systems

Treated water is pumped to elevated service reservoirs throughout the service area. The service reservoirs are sited to allow gravity feed to customers, and are sized for estimated peak demands with allowances for fire fighting and emergencies.

Water mains are laid in the streets to service the customers and are fitted with hydrants for emergency and fire fighting purposes. The main issues with distribution systems are:

- Water quality.
- Leakage (unaccounted for water).
- Main breaks.
- Water pressure.

The frequency of main breaks and the amount of leakage are predominantly a function of the age and state of repair of the system.

4.3.2 Existing Infrastructure

Metropolitan Urban Water Supply Systems

The source of water for three major metropolitan water utilities, and the Sydney Catchment Authority is tabulated below.

Water Abstraction by Source

Utility	Own Source			Bulk Raw Purchase			
	River Extraction	Ground Water	Impounding Reservoirs				
			Direct from Dam	River Release	River Water	Direct from Dam	River release
Sydney Water	1.4%	-	-	-	-	98.6%	0.01%
Hunter Water	30.5%	26.5%	43.0%	-	-	-	-
Gosford City	32.8%	-	28.6%	38.6%	-	-	-
Sydney Catchment Authority	-	-	84.3%	15.1%	-	0.6%	-

Sydney Water sources its water almost entirely from impounding reservoirs, via the Sydney Catchment Authority. Hunter Water extracts much of its water directly from the river or groundwater sources, whilst Gosford City uses both direct river extraction and impounding reservoirs.

Alternative sources of water (rainwater tanks, recycled stormwater and sewage effluent) provide only a very small proportion of the total water demand.

Summary of Water Assets

A summary of the assets owned and operated by the three major metropolitan urban utilities, in 2000/01, is tabulated below.

Utility	Water Treatment			Water	
	Disinfection only	Full Treatment	Pumping Stations	Mains km	Properties /km
Sydney Water	1	9	143	20,272	78
Hunter Water	-	7	82	4,312	46
Gosford City	-	1	23	877	70

The number of treatment plants and pumping stations reflects the size of the service area and the number of different sources of water used.

The current replacement cost of these water supply assets (in 2000/01) is:

- Sydney Water: \$5,600 million
- Hunter Water: \$766 million
- Gosford City Council: \$222 million
- Wyong Shire Council: \$295 million

Non-Metropolitan NSW

Some 127 utilities provide water services to 1.7 million people in non-metropolitan NSW (DLWC 2000/01). Customer connections are of the order of 33 properties / km which is significantly less than in metropolitan urban areas.

The current replacement cost of the State's non-metropolitan water assets (in 2000/01) is \$4,550 million.

4.3.3 Operational Data

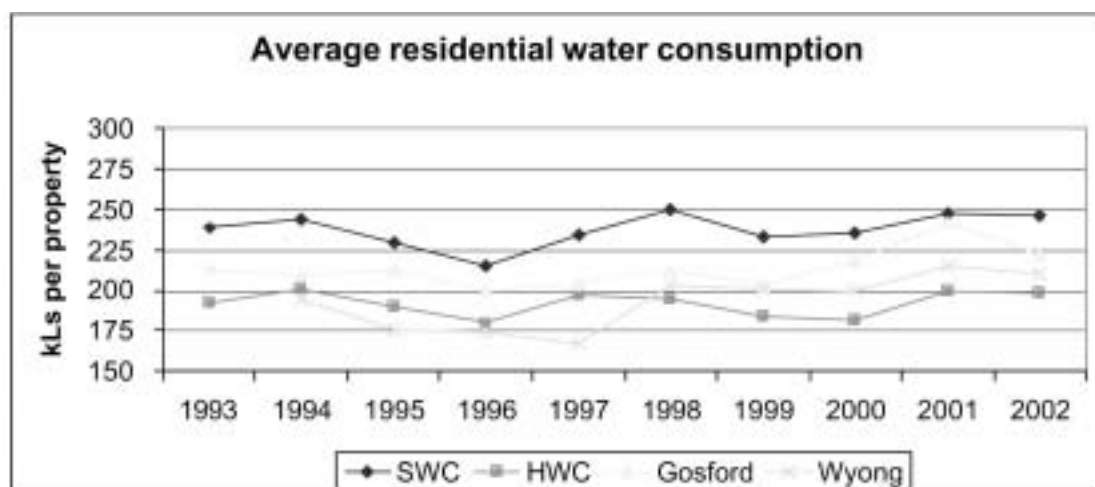
Metropolitan Urban Water Supply Systems

The volume of water consumed per property over the three-year period 1998/98 to 2000/2001 in four metropolitan urban areas is tabulated below. In all four areas there was a noticeable increase in water usage in the year 2000/01, in the order of 5% to 10%. This increase is attributable to the drought conditions prevailing during the year. Water usage in the Hunter is relatively low, and this is attributable to the efficiency of the demand management program implemented by Hunter Water.

Water Consumed per Property (kL/property)

Utility	1998/99	1999/00	2000/01
Sydney Water	242	244	255
Hunter Water	195	195	214
Gosford City	204	225	221
Wyong Shire Council	-	207	225

The calculation of the above volumes takes into account losses from breakages and leakages.



Data sourced from IPART Determination 4, 2003, Appendix 10.

System Water Losses %

Utility	1998/99	1999/00	2000/01
Sydney Water	13.3%	11.6%	10.4%
Hunter Water	14.2%	15.5%	10.6%
Gosford City	9.0%	5.1%	-
Wyong Shire Council	-	10%	-

It is desirable to reduce losses to less than 10% but a target of 5% would be desirable.

Compliance with Drinking Water Guidelines

The guidelines applicable for the Sydney, Hunter and Gosford City, for the year for which data are available (2000/01) were the NHMRC/ARMANZ Australian Drinking Water Guidelines 1996. For the year 2000/01, all three utilities achieved this standard.

Service Delivery

The operating licence for Sydney Water Corporation contains a customer contract, which sets out the rights of customers regarding matters such as supply of services and interruptions to supply. The audit of Sydney Water Corporation's performance in 2000/01 (IPART) showed overall high compliance with the customer contract.

Hunter Water Corporation has similar obligations under its licence and in 2000/01 the auditors reported that the Hunter Water Corporation met the service criteria in its charter.

Pricing

The domestic water tariff falls into two pricing groups. Customers in the Sydney metropolitan area, and in non-metropolitan urban areas, pay on average around \$300 per year for water. Customers in the Hunter Water corporation area of service, and in Gosford and Wyong pay around \$200 per year. These tariffs reflect the cost of supplying the water with a small positive real rate of return, and are acceptable to the customers.

All major urban utilities and many non-metropolitan urban utilities have two-part tariff pricing, which includes an access charge and a pay for use charge.

Return on Investment

The economic real rates of return for the three years 1998/99 to 2000/01 are tabulated below.

Economic Real Rate of Return

Utility	1998/99	1999/00	2000/01
Sydney Water	4.32%	4.08%	3.84%
Hunter Water	4.67%	4.51%	3.74%
Gosford City	2.11%	2.52%	1.17%
Wyong Shire Council	-	-	2.7%
Non-Metropolitan Urban	2.6%	2.6%	2.6%

The rates of return on investment for water are very similar to the rates of return for sewerage. Comments relative to rates of return on investment for sewerage are relevant to water.

Renewal Expenditure

Renewal expenditure as a percentage of the replacement cost of assets is a measure of the rate at which the assets are being replaced. Management determines the annual renewal expenditure but the factors influencing the rate of investment in renewals includes the age of the system, the condition of the system, and previous expenditure on renewals.

Renewal Expenditure (% of Current Replacement Cost of Assets)

Utility	1998/99	1999/00	2000/01
Sydney Water	0.96%	0.71%	1.08%
Hunter Water	0.38%	0.45%	0.37%
Gosford City	0.10%	0.27%	0.27%

The difference in renewal expenditure primarily reflects the difference in the age and condition of the various systems. It can be anticipated that renewal expenditures will need to increase as the systems age.

Renewal programs vary from utility to utility, and vary in complexity from a reactive approach (repairs are effected when a failure occurs), through to programs based on a risk assessment of the criticality of a failure, and an assessment of the condition of the asset. Sydney Water has prepared such a program (Water Mains Asset Management Plan – Sydney Water, August 2002), which groups assets into classes and sets out a thirty year capital and operating investment program for each class of assets.

Demand Management

Sydney Water's operating licence contains demand management targets that require it to reduce water consumption from 505 litres per capita (lcd) in 1991 to 364 lcd in 2004/05, and to 329 lcd in 2010/11. When audited in 2000/01, the auditors expressed the opinion that Sydney Water was unlikely to meet its 2004/05 target.

Following their mid-term review of the Sydney Catchment Authority, IPART recommended that the Sydney Catchment Authority develop a supply and demand management strategy for Sydney by 31 December 2003. As part of this strategy the Authority is to consider the security of the existing supply, alternative supply options and the impacts of increased environmental flows back to the river systems.

Hunter Water Corporation has placed a strong emphasis on demand management over a number of years. The most effective element of its strategy has been its pricing policy and the implementation of user pays pricing has significantly reduced demand.

Gosford City and Wyong Shire have been implementing demand management strategies for some years and have reduced the annual demand per property to around 220 kL. Notwithstanding, in 2000, IPART recommended that the Councils continue their current initiatives and to investigate further mechanisms to reduce water usage.

Non-Metropolitan Urban Water Supply Schemes

A comparison of performance indicators for a number of utility characteristics for the top 20%, median (50%) and lower 20% for 2000/2001 in non-metropolitan urban areas is tabulated below.

Comparison of Performance Indicators

Performance Indicator	20%	Median (50%)	80%
Average annual residential consumption kL/p	205	230	310
Unaccounted for water (including leakage) %	10	10	20
Physical and Chemical Water Quality Compliance (%)	100	100	95
Microbiological Water Quality Compliance %	100	99	98
Water quality complaints (per 1,000 properties)	2	8	18
Service complaints (per 1000 properties)	3	9	40

Water supplied to non-metropolitan urban properties is of the same order of magnitude as that supplied in Sydney and Gosford. Water losses are also of a similar magnitude to those of the major urban utilities.

Compliance with licence requirements is good in at least 50% of water utilities, however, for at least 20% of utilities the level of compliance is unsatisfactory.

For the median utility, water quality complaints and service complaints for 2000/01 were of the order of 8 to 9 per 1,000 properties, compared to 5 in metropolitan urban areas. Service complaints for the lower 20% were unacceptably high at 40 per 1,000 properties.

Financial Performance Indicators

Financial Performance Indicators	20%	Median (50%)	80%
Typical Residential Bill \$	230	310	375
Economic Real Rate of Return %	4.1	2.5	1.0
Renewals (% of current replacement cost of system assets)	0.6	0.0	0.0

The typical residential bill, median (50%), in non-metropolitan urban areas is of the same order of magnitude as the typical bill in Sydney. The lower 20% bill is of the same order of magnitude as in Gosford, and the top 20% bill is not markedly higher than the median bill.

The economic real rate of return varies from 4% to 1% for the top 20%, median 50% and lower 20%. The top 20% compares favourably with Sydney, the median 50% is reasonable and the lower 20% would appear to be lower than acceptable.

Renewals are only being funded in the top 20% of utilities at the rate of 0.6 % of the current replacement cost of system assets. It is appreciated that some water assets are relatively new, and that these assets would not require a renewal budget at this stage, however, it does appear that renewals in non-metropolitan urban systems are under-funded.

4.4 Report Card Rating

4.4.1 Trends / Future Directions

The NSW Government has adopted a new approach to the planning for the release of residential land in Western Sydney. The government has identified areas in Sydney's South West at Bringelly and in Sydney's North West at Marsden Park as potential release areas to provide a 15 year land supply for new homes for Sydney families. Government has also outlined the planning framework to be used to manage Sydney's urban growth to achieve more desirable physical, social and environmental outcomes. Regional level structure planning is to be implemented to ensure optimal environmental and community outcomes. The planning, funding, servicing and development of these residential projects will be a whole of government initiative managed by PlanningNSW.

In addition to PlanningNSW, key government agencies involved in the project are the Department of Land and Water Conservation, the Environment Protection Authority and Sydney Water. These agencies will focus on total water cycle management and integrating water, wastewater, flooding and stormwater management.

Sydney Water is committed to ecologically sustainable development, which is reflected in Sydney Water's key strategic document, WaterPlan 21. It has the following goals:

- Clean, safe drinking water.
- Sustainable water supplies.
- Clean beaches, rivers and harbours.
- Wise resource use.

- Smart Growth, which will prevent additional flows and loads to the ocean.

Key objectives for Sydney Water are:

- To minimise potable water demand sourced from potable water storages.
- To reduce wastewater flows to treatment facilities.

Key objectives for the Department of Land and Water Conservation are:

- The assessment of all aspects of flooding including overland flooding, flash and long duration, and evacuation routes.
- The development of options that ensure that watercourses, wetlands and riparian corridors are protected.
- A net improvement in surface water quality.

Key objectives of the Environment Protection Authority are ensuring that environment objectives are met and environment standards are maintained, including by:

- The protection of the Hawkesbury-Nepean River System.
- Meeting water without compromising environmental flows.
- The reduction of per capita water usage in the Sydney water service area.
- The South Creek bubble licence.

This whole of government approach to the planning moves away from single-issues based approaches of the past and has the potential to result in development that is truly sustainable from the point of view of total water cycle management.

Security of Water and Wastewater Infrastructure

Water Supply. Water supply systems have a medium level of vulnerability to malicious attack because of their extensive water catchment areas, isolated impoundments and long delivery pipelines. Most systems would have nil redundancy in these areas, and therefore impacts could be significant.

Treatment and distribution systems are less vulnerable than supply systems because of the quality of the raw water, most treatment systems could be by-passed and, in Sydney for example, there is a degree of redundancy in the distribution system.

Water supply systems are vulnerable to bushfires due to their remoteness and location in bushland areas. The recent fires in Canberra have highlighted this issue as water quality in the main catchments has been reduced due to runoff from the bushfire-affected areas.

Wastewater Infrastructure. Wastewater infrastructure is less vulnerable to malicious attack than water supply systems. Wastewater collection systems are usually buried relatively deeply and sewage pumping stations are designed to resist vandalism.

Sewage treatment plants are usually remote from developed areas, and if access were to be gained, disabling the plant could be achieved relatively easily. Recovery from such an attack would depend on the extent of the damage. Notwithstanding, it is likely that temporary treatment facilities could be brought on line relatively quickly, and that impacts could be managed.

As for water, the Canberra bushfires highlighted the vulnerability of remote infrastructure when the wastewater treatment plant was damaged.

4.4.2 Potable Water and Wastewater Issues

There are a number of issues facing the potable water and wastewater sector across NSW. They are:

1. **Water Industry Reform.** The reform of the water industry was formalised by the Commonwealth Government in 1994, and significant progress has been made over the intervening years. The present level of effort from government agencies and utilities needs to be maintained to complete the reforms.
2. **Integrated Planning and Water Cycle Management.** IPART is concerned that customers' demand for water will outstrip supply, and that further development will not be sustainable. When looking at demand management, IPART recognises that price increases are unlikely to have a significant impact on demand unless substantial, and at levels unacceptable to the public. Demand management by pricing is therefore unlikely to be successful if it is the only tool employed to reduce consumption.

A whole of government approach to the planning of large-scale residential land development is required to achieve more desirable physical, social and environmental outcomes. There is a need to move away from single-issue based approaches to approaches that combine regional planning with total water cycle management integrating water, wastewater, flooding and stormwater management. The use of alternative sources of water and the reuse of effluent and stormwater will be a major step forward in the provision of ecologically sustainable development.

The NSW Government has recently adopted this approach for the planning of the release of residential land in South Western and North Western Sydney. The models developed for these sites will provide direction for the future development of residential land in Australia.

3. **Renewal Expenditure.** Renewal expenditure by the major urban utilities is currently less than 1% of the cost of replacement of water assets and less than 2% of the cost of replacement of sewerage assets. This level of expenditure may be appropriate at this time, but needs to be reviewed and revised regularly.

A particular concern is the nil renewal expenditure by 80% of non-metropolitan urban utilities. Although many systems are relatively new, it is expected that some level of renewal expenditure by these utilities is warranted.

Potable Water Issues

4. **Potable Water Quality.** The major metropolitan urban utilities, Sydney, Hunter, Gosford and Wyong, consistently meet the Australian Drinking Water Guidelines. For the lower 20% of non-metropolitan urban utilities, water quality compliance for 2000/01 was 98% for faecal coliform (health related) and 95% for samples tested for physical and chemical compliance. This level of compliance is less than desirable and the quality of potable water in this group of non-metropolitan urban utilities needs to be improved.
5. **Demand Management.** The rewards from demand management are both financial and environmental. Significant reductions in water demand reduces the cost of operating water supply and sewerage systems, and defers the capital cost of new head works.

IPART continues to focus on demand management in its review of the performance of utilities, and in the case of the Sydney Catchment Authority is requiring the authority to prepare a demand management strategy for Sydney.

Most utilities in NSW have a formal strategy for demand management. This present level of effort needs to continue, and in some instances needs to be enhanced.

6. **Unaccounted for Water.** The main component of unaccounted for water is leakage. Leakage from the major metropolitan systems is reportedly of the order of 10%. This level is acceptable, but further reductions should be targeted where the reduction can be achieved economically.

Wastewater Issues

7. **Effluent Quality.** The major urban utilities achieve high compliance with wastewater standards, and with operating licences standards regarding sewage surcharges on private land.

For the lower 20% of non-metropolitan urban utilities, effluent water quality compliance for 2000/01 was 93% for BOD and 89% for suspended solids. A higher level of compliance, approaching 100%, should be achieved.

8. **Effluent reuse.** In 2000/01, Sydney water recycled 1.9% of the total volume of effluent, Hunter Water recycled 8.1%, and Gosford City 0.05%. The Hunter Water and the Gosford City usages reflect the available users of recycled effluent in their respective areas.

In the top 20% of non-metropolitan urban utilities, 30% of the total volume of effluent was recycled, and in the remaining utilities, the volume recycled was negligible.

Across the State in both metropolitan and non-metropolitan areas, the general level of reuse is very poor.

9. **Inflow and infiltration.** During wet weather, inflow and infiltration of groundwater and stormwater into sewers occurs in most systems. The inflow and infiltration occurs into both the house service lines serving individual properties, and the utility's sewerage reticulation system. Many house service lines in NSW are old and damaged allowing infiltration during wet weather, and inflow where illegal connections are made from the roof and yard drainage systems.

In wet weather, flows in sewers often increase by factors of between 7 and 10, and result in overloading of sewers, pumping stations and treatment works, with resultant discharge of untreated sewage to the environment.

The level of inflow and infiltration into the utility's sewerage reticulation system is a measure of the condition of these assets and will be guide to making appropriate renewal and rehabilitation decisions.

The reduction of inflow and infiltration into house service connections and the sewerage reticulation system is one of the main tasks confronting all utilities, and will require specific funding in the coming years.

4.4.3 Ratings

The Report Card rating for **metropolitan urban potable water** is **B –**. Existing impoundments provide a relatively secure source of supply, and water treatment facilities provide high quality water over the long term. The rating reflects the slow progress in demand management, the low usage of alternative sources of water, and the relatively low level of infrastructure renewal.

The Report Card rating for **non-metropolitan urban potable water** is **C –**. The rating reflects the need for significant improvement in the lower 20% of non-metropolitan urban utilities, the limited progress in demand management, the low usage of alternative sources of water, and the zero renewal expenditure by 80% of non-metropolitan urban utilities.

The Report Card rating for **metropolitan urban wastewater** is **C –**. The rating reflects the very poor effluent reuse in major urban, the need for significant asset renewal and rehabilitation expenditure to reduce inflow and infiltration into reticulation systems during wet weather, and the need for major rehabilitation works on ocean outfall sewers.

The Report Card rating for **non-metropolitan urban wastewater** is **C –**. The rating reflects the need for higher effluent quality in the lower 20% of non-metropolitan urban utilities, the lack of effluent reuse in 80% of non-metropolitan urban utilities and the zero renewal expenditure by 80% of non-metropolitan urban utilities.

These ratings may improve over the years with the introduction of integrated planning and water cycle management for major urban development. This is because this has the potential to increase the reuse of effluent and stormwater and achieve more desirable physical, social and environmental outcomes.

Case Study

Effluent Reuse

South Sydney and Shoalhaven City Councils were recognised for their effort to reuse water in their communities at the Institute of Public Works Engineering Australia (IPWEA) Excellence Awards in November 2002.

Located at Solander Park in Erskineville, South Sydney City's Stormwater Quality Improvement Reuse Treatment Scheme sources 90% of its water used for irrigation within the park from reused stormwater. The program won an IPWEA Environmental Award and also received high praise at the 2001 World Waster Congress in Berlin.

Shoalhaven City Council's Reclaimed Water Management Scheme won in the innovation in Water Supply and Wastewater category. By the year 2004, the scheme aims to reuse up to 80% of reclaimed water from six wastewater treatment plants to irrigate 750 ha in the Shoalhaven area. The \$64.5 million project was the result of a partnership between the Council the Department of Land and Water Conservation and the Department of Public Works and Services.

Gerringong and Gerroa are popular summer recreational townships located approximately 20 kilometres south of Kiama on the NSW south coast. The current permanent population of the township of Gerringong and Gerroa is approximately 3,500 persons. The peak summer population to be served has been estimated to be 11,000 equivalent persons.

Until the sewerage scheme was commissioned in August 2002, the established system of sewage treatment and disposal involved septic tank systems and disposal by pump-out and/or absorption trenches. Septic pump-out was discharged to the Gerroa Nightsoil Depot located south of Gerroa.

A conventional sewerage reticulation system has been constructed delivering to an advanced tertiary treatment plant located at Gerroa with reuse of effluent on dairy farms to the north of Gerringong and Gerroa. It is anticipated that in excess of 80% of all effluent will be reused on the dairy farms. Effluent in excess of the capacity of the reuse system will be discharged to the Crooked River via a wetland, or to dunal disposal.

Sydney Water's Georges River Program. Sydney Water has prepared a strategic plan for the upgrade of the sewerage system serving the south-west of Sydney. The catchments covered by the plan include Fairfield, Hoxton Park, Liverpool, Glenfield and Campbelltown, and Holsworthy. Key elements in the program of works are the construction of a sewer carrier from Hoxton Park to Liverpool Sewage Treatment Plant, amplification and upgrading of the capacity of the sewage treatment plants at Liverpool and Glenfield, and the construction of a recycled water pipeline.

The recycled water pipeline will transfer treated effluent from the Liverpool and Glenfield Sewage Treatment Plants to customers along the proposed route of the pipeline from Glenfield to Liverpool, to Potts Hill, Enmore/Mascot and thence to Malabar Sewage Treatment Plant. Recycled water not taken up by customers will be discharged to the Malabar deepwater ocean outfall.

The proposed route was selected after careful consideration of a number of routes. A key factor in the selection of the proposed route was the identification of potential customers for the recycled water. Some 76 industrial and agricultural customers have been identified who collectively have a potential demand of 51 megalitres a day (the pipeline will have a capacity of 100 megalitres a day).

The recycling of 100 megalitres per day will have a number of positive impacts,

- The replacement of potable water by recycled water would allow an additional 150,000 residential properties to be supplied potable water from the existing system.
- Overflows to the Georges River from the inland treatment plants will be reduced, resulting in lower levels of sewage contamination of the river.
- The volumes of sewage transferred to the coast by the Southern Suburbs Sewerage System will be reduced, thereby reducing the potential for overflows from this system, and reducing the volume of sewage discharge to the ocean.

The initial stages of the Georges River Program of works are under construction. These works include the construction of the sewer carrier from Hoxton Park to Liverpool Sewage Treatment Plant, and augmentation and upgrading works at Liverpool and Glenfield Sewage Treatment Plants. The recycled water pipeline is currently the subject of the EIS process.

If approved, the recycled water pipeline will cost of the order of \$100 million. Construction is programmed between 2005 and 2008.

5. Stormwater

5.1 Overview

5.1.1 System Description

The stormwater system is an integral part of the water cycle and conveys stormwater runoff to receiving rivers, lakes and the ocean.

It is important that stormwater is not considered in isolation, but is assessed as part of the total water cycle. The issues relating to total water cycle management are canvassed later in this section and have also been considered in Section 4 Water – Potable and Wastewater.

Primary components of the stormwater system include:

- Engineered pipes and culverts.
- Constructed channels.
- Natural creeks and waterways.
- Water quality management infrastructure.
- Water re-use infrastructure.

Many Local government authorities are currently gathering data on their stormwater systems as part of stormwater management studies and asset registers. As a result, identifying accurately the extent of these assets across NSW is not possible at this stage. However the following points provide an indication of the scale of the assets.

- Sydney Water, which oversees approximately 5% of the trunk drainage systems in the Sydney metropolitan area, is responsible for some 490 km of stormwater infrastructure including natural creeks, and provides trunk stormwater services to 1.1 million people.
- Sydney Water operates 13 stormwater pollution control devices to reduce gross pollutants entering receiving waters. This has resulted in approximately 1,600 cubic metres of rubbish and 800 tonnes of sediment being collected from the drainage systems in 1999/2000. Additionally, there are litter booms operating on four systems draining into Sydney Harbour, collected as much as 90 cubic metres of rubbish in a year (Sydney Water, 2001).
- A typical inner-city Council, Rockdale (population approximately 100,000), has some 104 km of conduits, culverts and channels with a replacement value of an estimated \$47 million (Rockdale City Council).
- Blacktown Council has a population of approximately 275,000, and has some 830 km of stormwater pipes under its control, together with some 216 km of channels and creeks (Blacktown Council).
- Wyong Shire Council on the Central Coast has some 500 km of pipes, channels and earth drains and some 800 km of kerb and gutters. Estimates of replacement value are approximately \$125M (CCIA, 2002). Gosford Council estimates a replacement value of drainage infrastructure of \$200M. The combined population estimates of these two Councils are some 300,000 (2001).

- The 2001 Australian Infrastructure Report Card states a Stormwater Industry Association estimate of stormwater assets in the six capital cities of Australia exceeding \$300 billion and nationally \$500 billion.

Traditionally the engineered stormwater system is made up of minor (piped) and major (overland) systems, which discharge stormwater through developed areas. Infrastructure associated with these systems would include catch drains, kerb and gutters, stormwater pits, pipes, culverts and headwalls, open channels, overland flow routes and detention facilities.

Growing emphasis on water quality management has seen the increased provision of retention facilities, wetlands, ponds and lakes, and structural devices to improve water quality (gross pollutant traps, litter baskets, sediment traps).

Floodplains can be viewed as a further component of the drainage system, which while they have their benefits also cause considerable damage and community disruption. The average annual cost of tangible (financial) flood damage in NSW is estimated to be more than \$128 million per year (Engineers Australia 2001).

5.1.2 Governance

The management of stormwater assets in NSW is complex, with numerous bodies responsible for provision, ownership, operation and maintenance.

Regional water authorities in Sydney and Newcastle operate and maintain some of the trunk drainage networks. Throughout its area of operations, Sydney Water operates and maintains some 490 km of trunk drainage infrastructure, together with stormwater pollution control devices such as gross pollutant traps, litter booms and sediment traps. Hunter Water owns and maintains approximately 95 km of trunk stormwater drains in the areas of Newcastle, Lake Macquarie, and Cessnock (Hunter Water). Approximately half of these are closed concrete channel drains.

Local government authorities are responsible for the operation and maintenance of stormwater infrastructure located in their local government areas. Councils generally have to comply with a number of mandatory codes and standards, namely:

- *Water Management Act 2000.*
- *Water Act 1912.*
- *Rivers and Foreshores Improvement Act 1948.*
- *Native Vegetation Conservation Act 1997.*
- *Protection of the Environment Operations Act 1997.*
- *Environmental Planning and Assessment Act 1979.*

The NSW Roads and Traffic Authority (RTA) operates and maintains drainage infrastructure within their road corridors, including pavement drainage, cross-drainage structures, and water quality devices associated with roads under their control.

To a lesser degree, private developments operate and maintain some local onsite stormwater infrastructure, such as onsite detention systems and water quality control devices.

The above demonstrates the complexities of ownership of stormwater infrastructure. For example a stormwater channel may be the responsibility of Sydney Water, however it receives discharge from Council stormwater infrastructure, and the channel may flood another Council area.

The State Government's *Water Management Act 2000* is based on the concept of ecologically sustainable development, and recognises that:

- The fundamental health of our rivers and groundwater systems and associated wetlands, floodplains, estuaries has to be protected.
- The management of water must be integrated with other natural resources such as vegetation, soils and land.
- Water management must be a shared responsibility between the government and the community.
- Water management decisions must involve consideration of environmental, social, economic, cultural and heritage aspects.
- Social and economic benefits to the State will result from the sustainable and efficient use of water.

In response to the Act, the State Government through the Department of Infrastructure Planning and Natural Resources (DIPNR) is responsible for

- Developing policies to ensure the sustainable management and use of land, soils, rivers, groundwater, coastal areas, vegetation and forests, as well as the restoration of degraded areas.
- Advising on the best use and management of stormwater and waterways.
- Providing estuarine and floodplain management services to Councils.

Catchment Management Boards (established by the NSW Government in December 1999) aim to strengthen the community-government partnership in natural resource management across NSW. Board members represent the community, industry and government, and are tasked with:

- Identifying the critical opportunities, problems and threats associated with the use of natural resources from a mostly strategic level, so as to support rural production and to protect the environment.
- Developing Catchment Blueprints, which set overarching priorities for investment in natural resource management, consistent with NSW and Commonwealth Government policy. There are 21 catchment blueprints covering the whole of NSW.

The Environment Protection Agency (EPA) in terms of stormwater, interacts with other organisations, local government and State Government agencies in relation to environmental regulation and stormwater management. The EPA requires local government agencies to prepare stormwater management plans.

Guidelines, which exist in assisting with stormwater management, include:

- Australian Rainfall and Runoff (2001).
- State Government Guidelines and Policies (eg groundwater, monitoring, water quality).
- NSW Floodplain Management Manual (2001).

- DIPNR Wetlands Manual (1998).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000).
- Catchment Blueprints.
- Council Engineering Requirements for Developments.
- Environmental Planning Instruments.
- Stormwater Management Plans.
- Council Development Control Plans.

5.1.3 Sector Trends

Up to the mid 1970s, stormwater management focussed on formalising natural waterways, creeks and open drains into pipes and concrete lined channels. This approach did not value the watercourse or receiving waters as an environmental asset. Designs provided for rapid discharge, maximising development footprints at the expense of the environment, with little consideration to discharge water quality. Stormwater drainage systems were designed on the assumption that stormwater was benign in nature (Senate 2002). Designs often had a local focus instead of considering the catchment as a whole. Since then, there has been a significant change in approach to managing stormwater, which is continuously evolving. Current approaches increasingly consider whole catchments in developing stormwater management plans, utilise Water Sensitive Urban Design principals in new developments and retrofit existing systems with pollutant management structures. More recently, in the interest of ecologically sustainable development, the entire water cycle (water supply, wastewater and stormwater) is being considered during master planning of green fields sites. This has seen increased incorporation of stormwater re-use in developments. Furthermore, stormwater management is increasingly taking account of salinity issues at a local and regional level.

State Programs

The NSW Government is committed to improving urban stormwater management, and in May 1997 established the Stormwater Trust and funded the Urban Stormwater Program. The program aims to improve the health of urban waterways through better urban stormwater management. Objectives are to:

- directly improve the health of urban waterways impacted by urban stormwater.
- improve the capacity of stormwater managers to implement better management practices.
- encourage the continued improvement of community behaviours that benefit urban stormwater.
- improve the economic sustainability of urban stormwater management.

The Urban Stormwater Program has received \$80 million over four years to encourage and support improved urban stormwater quality management practices. The program provides for:

- Planning: \$4 million allocated to Councils to prepare urban stormwater management plans that identify works for improving urban stormwater quality.

- Education: \$7 million allocated to improve awareness and change behaviours that cause urban stormwater pollution. This included mass media campaigns, and education of Councils and businesses.
- Stormwater Grants: \$66 million allocated to Councils through four competitive schemes to develop integrated solutions to improve the health of urban waterways.
- Stormwater Extension Officers: nine regionally based officers to assist in the dissemination of information and build the capacity of Councils.

The Floodplain Management Manual: The Management of Flood Liable Land (released March 2001) was prepared by NSW Government agencies after consultation with Councils and the wider community. The manual presents general principles and a process for floodplain risk management, providing opportunity to consider development on a site-specific basis. Developments within the floodplain are evaluated in terms of their strategic use and some types of developments (eg sports facilities could potentially be permitted below the traditional Flood Planning Levels). Furthermore, increasing emphasis is given to emergency and evacuation planning (and the State Emergency Services), through greater involvement of these stakeholders in the planning process.

Local Government Initiatives

Councils are in the process or have prepared stormwater management plans and utilised the instruments of the Stormwater Trust program to prioritise their stormwater infrastructure, upgrade requirements and identify strategic projects.

There is an increasing recognition of the need to manage risk of flooding in the community, particularly considering public liability associated with flooding whether it is personal safety, or property damage. The existence of under capacity stormwater systems or inappropriate overland flow paths is of major concern and many local government authorities are taking action to investigate/remedy such situations. These issues have come to the fore during the recent (May 2003) rainfalls in Sydney, and areas, for example Sutherland Shire have been declared a disaster area.

Salinity

Salinity (both urban and rural) is becoming an important consideration in the planning of stormwater infrastructure, with assessments of soil and ground salinity conditions informing stormwater strategies. Strategies most likely to reduce salinity are avoidance and management practices based on vegetation.

Many NSW rural towns and particularly areas of western Sydney are experiencing the effects of rising water tables causing salinity and waterlogging. The result is corrosion damage to buildings, amenities and infrastructure such as roads, paths, pipes and bridges. Wagga Wagga, one of Australia's first cities to experience the considerable cost of urban salinity, has instituted a program utilising borehole pumping, planting of trees/shrubs, watering wisely and minimising water seepage into the groundwater system (Wagga Wagga City Council website).

Water Sensitive Urban Design

Current stormwater practice increasingly use Water Sensitive Urban Design to:

- Protect and enhance natural water systems.
- Integrate stormwater treatment into the landscape.

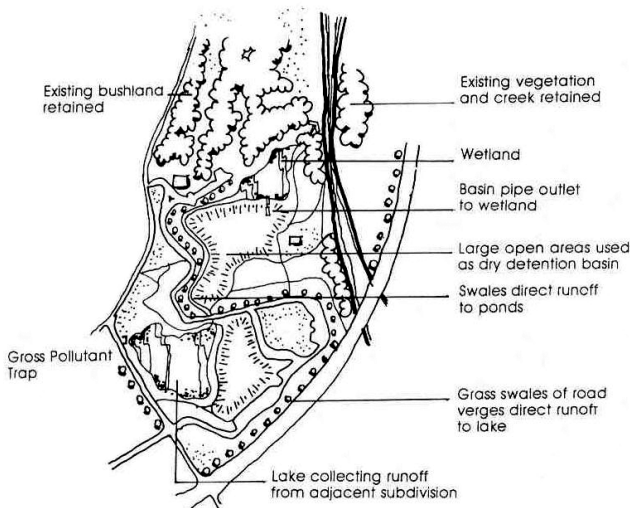
- Protect water quality draining from developed areas.
- Add value while minimising drainage infrastructure (CRC, Sep 2002).

The aim is to replicate natural water cycles, in terms of water quantity and quality management, and manage stormwater at or near the source. This involves, amongst others:

- Retention of natural waterways.
- Retrofitting existing systems.
- Provision of structural (eg sediment ponds, litter devices) and non-structural (eg education, building level controls) strategies.
- Integration of stormwater management within open space systems.
- Implementing re-use and provision of swales and buffer zones.

These initiatives are being implemented, particularly in new-release areas in the south-western areas on Sydney (Edmondson Park (Liverpool City Council, 2002) and Menangle Park (Landcom, 2002)), and in many other locations throughout NSW (for example Sydney, Gosford, Wyong and Newcastle).

An important consideration is the long-term regular maintenance of these systems to ensure that they provide the function for which they were intended, at the required level of service. This may mean an increase in labour costs in certain areas but reduced total costs on a system-wide basis.



Sourced from Managing Urban Stormwater, Strategic Framework, NSW EPA

Water Cycle Management

In the interest of ecologically sustainable development, the entire water cycle is being considered during master planning of green field sites. This includes consideration of potable water supply, wastewater collection and transportation, wastewater treatment, water recycling and stormwater. Opportunities for stormwater includes the collection of roof-run in rainwater tanks for non-potable re-use, the bio-retention of runoff from impervious areas, and recycling for irrigation. Stormwater reuse has been one of the many

initiatives of the Healthy Rivers Commission, and the number of stormwater reuse programs is rapidly increasing.

Non-structural Stormwater Management

Non-structural stormwater quality management, comprising institutional and pollution-prevention practices to prevent or minimise pollutants from entering stormwater runoff and/or reducing the volume of stormwater requiring management, are being increasingly used (CRC, Dec 2002). Strategies include town-planning controls, strategic citywide stormwater management plans, maintenance practices by local authorities, enforcement and education programs, illicit discharge elimination, training and licensing/auditing of commercial and industrial sites. Considerable government resources are being allocated to monitoring and evaluating a variety of non-structural stormwater management practices.

5.2 Level of Service

There are no key performance indicators for stormwater drainage provision to guide infrastructure upgrades and investment.

The conveyance of stormwater or floodwater and the effectiveness of water quantity and quality control facilities are highly dependent upon the condition of stormwater drainage assets being maintained.

Generally, stormwater infrastructure is considered fit for purpose if:

- It is able to convey major storm events and eliminate/minimise flooding and consequential damage to private property or critical infrastructure.
- It maintains the long-term sustainability of natural systems from a water quality perspective, by minimising discharge of pollutants and generally improving the quality of stormwater discharge.

The level of service can be assessed using the following service parameters. They should become the basis for developing statewide key performance indicators for stormwater. While it is not possible to prescribe statewide stormwater standards, indicators can be developed which provide guidance that takes into account local issues.

Parameter	Level of Service
Flooding	Frequency of flooding
	Impact and extent of flooding
	Size and capacity of system relative to catchment
	Reliability of asset
	Sustainability of asset
	Public safety
	Property damage
	Maintenance frequency
	Maintainability
Water Quality	Type of structure
	Pollutant removal efficiency and effectiveness
	Pollutant build-up rates
	Pollutant storage capacity

Reliability of asset
Sustainability of asset
Position in treatment train
Blockage frequency
Maintenance Frequency
Maintainability

Structural Infrastructure age
 Structural integrity
 Maintenance Frequency

5.3 Existing Infrastructure

Many parts of NSW have stormwater infrastructure that is old, is not being maintained, is not being renewed to current industry best management practice, or was designed for purposes and to standards that are no longer suitable or have been superseded.

Many of today's problems with stormwater infrastructure is a consequence of past design approaches. For example densification of urban areas have put pressure on stormwater infrastructure previously designed for less dense development, resulting in inadequate levels of service.

The networks of pipes transporting stormwater in the inner city areas tends to be old, inefficient and in poor condition. In many cases this infrastructure traverses areas of prime real estate, heritage properties and interfaces with other services, making retro fitting prohibitively costly.

Maintenance is inadequate and systems don't perform to their design capacities on account of debris and silt build-up. This is a particularly problem for inlet pits, channels and gross pollutant traps. A further issue is the problem of stormwater entering the sewer systems, overloading the sewer network and leading to overflows (which often make their way back into the stormwater system downstream).

Fringe suburbs tend to have better stormwater infrastructure, particularly where designs were based on recent versions of the Australian Rainfall and Runoff. The designs would have embraced recent best management practices, particularly in design standards for flooding.

Recent developments on green fields sites are increasingly embracing principals of water sensitive urban design, particularly with management of water quality and quantity. However, this application of water sensitive design is still very much a exception rather than a rule (Senate, 2002).

Regional areas also have varied conditions of stormwater infrastructure. Some older regional towns have aged systems in the town centres, with better condition stormwater infrastructure on the outskirts, particularly when designed and constructed in more recent times. Some larger regional towns (eg Orange and Bathurst) have undertaken steps to upgrade their stormwater infrastructure, implementing detention basins strategies. Problems are still prevalent and retrofitting of stormwater infrastructure is necessary. Many regional towns still operate surface drainage systems and there is a considerable backlog of works required to upgrade systems. The shortage of funds is a major problem.

5.4 Future Needs

Below is a list of the most important needs to improve the quality of stormwater.

- A program of upgrades for existing stormwater systems is required. As noted by the Commonwealth's inquiry Into Australia's urban water management, Australia's stormwater infrastructure will reach the end of its useful life over the coming twenty years, providing Australia with a rare opportunity to replace this infrastructure with best practice systems (Senate, 2002).
- Significant funding is needed to upgrade the ageing infrastructure particularly in the older areas of NSW, such as inner Sydney, and the historic regional towns to the west of the Blue Mountains.
- It is essential to continue the evolution of stormwater strategies to meet development growth, and changing standards. Urban growth such as being experienced on the western fringes of Sydney and along the NSW North Coast is putting increased pressure on the environment, particularly from a water quality perspective.
- Better integration is required of WSUD into water cycle management, which consists of water supply, wastewater and stormwater. Funds will be required for comprehensive research efforts into non-structural stormwater practices, alternative means of stormwater quantity, integrated urban water management, stormwater re-use and water quality issues.
- Standards defining targets for water quantity and quality designs will need to be further improved. Some Councils do have standards but these vary across local government areas. Other organisations, such as Sydney Water, are charged with maintaining systems but have no standards defining the level of flood protection to provide.

5.5 Report Card Rating

Today's stormwater systems are often the inefficient legacy of an out of date mindset regarding rain water falling on cities as a problem to be dealt with by removing water as quickly as possible into streams and rivers.

In the built-up areas of Sydney and Newcastle stormwater infrastructure is approaching the end of its life cycle and is under capacity. For example, some Sydney inner city systems are incapable of discharging events larger than the 2- to 5-year event. Maintenance is generally lagging, preventing stormwater infrastructure from performing at design capacities, and few systems are provided with water quality management strategies. Localised flooding in major rainfall events caused by under capacity stormwater systems or inappropriate overland flow paths is a major risk issue to local governments. Drainage improvement works in these areas are challenged by land prices, non-availability of drainage routes and interfaces with other utility services. Drainage solutions are disruptive to business, require complex engineering (eg tunnelling/services relocation), have negative impacts on the environment and are very expensive.

In the regional towns, stormwater infrastructure is varied and in some areas only surface drainage is provided. In older regional towns, retrofitting and upgrading is required to standards compatible with water sensitive urban design principles.

In summary, there is a need for significant investment and funding throughout NSW in the short and medium term to provide for upgrading and retrofitting of the ageing stormwater infrastructure, and to progress the development of stormwater strategies. This will require the development of suitable funding mechanisms.

The overall rating of stormwater infrastructure for NSW is a D.

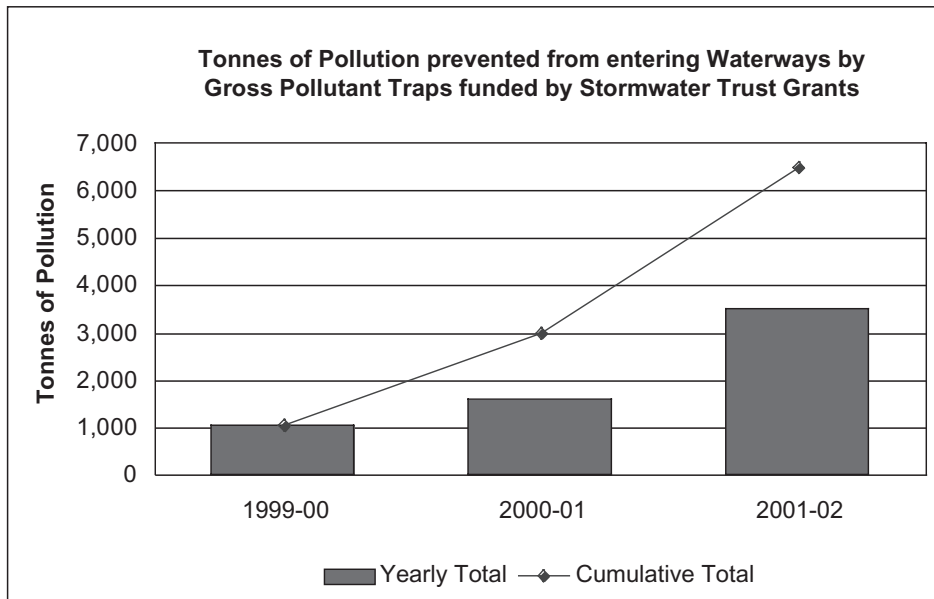
Case Study

Pollution prevented from entering waterways by gross pollutant traps funded by the Stormwater Trust

Project

Under the Urban Stormwater Program, the NSW Government has allocated over \$80 million since 1997 to prevent stormwater pollution. Of this, Councils across the State have received \$66 million to fund local projects. Some of these grant projects installed gross pollutant traps to collect the debris that enters the drainage system.

This performance indicator measures the estimated tonnes of pollution prevented from entering waterways by the traps. Trend data is extrapolated from monitoring data received from Councils.



Benefits

During 2001-02 the gross pollutant traps were estimated to prevent over 3,470 tonnes of pollution from entering waterways statewide.

Cumulatively, the traps have prevented 6,450 tonnes of water pollution (over 600 truckloads) since they were first installed.

Excerpt from NSW EPA Annual Report 2001-2002 - available at:

<http://www.epa.nsw.gov.au/corporate/annrep.htm>(EPA Annual Report 2001-2002)

6. Electricity

6.1 Overview

Electricity accounts for approximately 20% of the energy consumed in NSW. The assets to produce and distribute electricity were valued in 2000/2001 at \$21,396 million with approximately 11,400 people employed by the major electricity companies. (ESAA 2002).

NSW, like other Australian States, has undergone significant restructuring in the electricity power industry. However, unlike Victoria and South Australia where privatisation has occurred, the majority of electricity in NSW is generated, transmitted and distributed by government owned corporations.

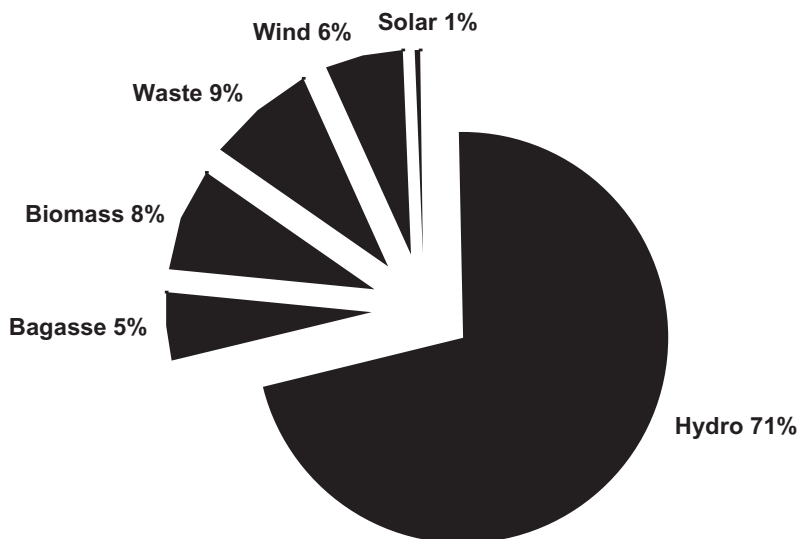
NSW participates in the National Electricity Market, which covers NSW, Victoria, Queensland, South Australia and the ACT.

The majority of the electricity in NSW is generated from coal. Coal is a low cost fuel and is likely to maintain a large share of electricity production for some time. The negative aspect of this is greenhouse gas production, particularly CO₂ emissions. NSW has been a leader in reducing greenhouse gases through such initiatives as Sustainable Energy Development Authority's Green Power and the NSW Greenhouse Gas Abatement Scheme, as well as Commonwealth-sponsored abatement schemes.

6.1.1 Generation

In 2000/01, NSW had an installed generation capacity of 12,833 MW with a consumption of 62,896 giga watt hours (GWh) for the main grid only. The generation assets were valued in 2000/01 at \$4,936 million. (ESAA 2002).

91% of electricity generated in NSW comes from coal-fired power stations, 6% from hydro electrical (predominately Snowy Hydro) with the remainder from oil, gas (natural gas, coal seam methane and landfill gas), bagasse, solar and wind generators. (ESA 2002)



Installed Renewables at June 2001 (*Electricity Australia, ESAA, 2002*)

The Federal Government passed legislation in 2000 that mandated, on a user percentage basis, a goal of 9,500GWh of electricity to be generated from renewable sources by 2010.

Renewable generation in NSW is still relatively limited in comparison with total generation, but is growing. Of the total 600 MW installed renewable capacity (excluding Snowy Hydro), over 10% has been installed since 1999. That plant is expected to generate around 270 GWh per annum. (MEU 2002).

6.1.2 Transmission

Transgrid is the State owned corporation responsible for the planning, management, operation, control and maintenance of NSW's high voltage electricity transmission system.

Transgrid manages \$2,550 million worth of assets. Its transmission system comprises over 12,400 circuit kilometres of transmission lines and 81 major substation and power station switchyards that operate at voltages up to 500 kV. (Transgrid 2002).

Transgrid is registered with the National Electricity Marketing Management Company Limited (NEMMCO) as a Transmission Network Service Provider in the NSW region of the National Electricity Market.

Regulation of transmission pricing and access is carried out by the Australian Competition and Consumer Commission (ACCC).

In 2000, Queensland's electricity grid was connected to the National Electricity Market through a 180 MW DC interconnection ("Directlink"), and a double circuit 330 kV/275 kV transmission line from Armidale in NSW to Tarong in Queensland. This completed a grid connection between Queensland, NSW, ACT, Victoria and South Australia.

Transgrid has proposed a NSW interconnector to South Australia which will provide up to 250 MW of transfer capacity to SA from NSW. The proposal passed the ACCC list for regulated status in November 2001. An Environmental Impact Assessment has been released with Transgrid targeting a summer 2003/04 commissioning date.

6.1.3 Distribution

Distribution of electricity in NSW is the responsibility of four Government owned electricity corporations: EnergyAustralia, Integral Energy, Country Energy and Australian Inland Energy and Water.

Under the National Electricity Code, the regulation of distribution pricing and access is carried out by the Independent Pricing and Regulatory Tribunal (IPART) for the NSW region.

The distribution system in NSW includes over 242,800 circuit kilometres of overhead and 23,340 circuit kilometres of underground power lines. In June 2001, the assets were worth over \$10,810 million and 3.08 million customers (NSW and ACT) consumed over 62,896 GWh of electricity. (ESAA 2002).

6.1.4 Major Trends

Electricity reform has led to the establishment of the National Electricity Market, with customers now able to choose their retailers. This choice was progressively introduced based on consumption. Since 1 January 2002 all NSW consumers can choose their retailer.

This has not affected the transmission and distribution physical assets as the power is delivered to the customers by regulated electricity corporations. In NSW the majority of the generation, transmission and distribution assets are still government owned.

The National Electricity Market now ensures competition between the generators, transmission and distribution companies throughout most of Australia. There is a mix of government owned and private owned businesses. One potentially negative effect of competition is that best practice is no longer openly shared as in the past. What appears best for the company may not necessarily be what is best for NSW or Australia. Regulation is, however, in place to ensure consumers still get a good quality of supply.

NSW's fossil fuel source industry is well established with vast reserves of black coal. The push to reduce the proportion of fossil fuel in the generation mix is being driven by governments to meet greenhouse targets. NSW also has substantial reserves of coal seam methane which can be extracted from coal which can then be treated and injected into the natural gas grid for uses including electricity generation and cogeneration.

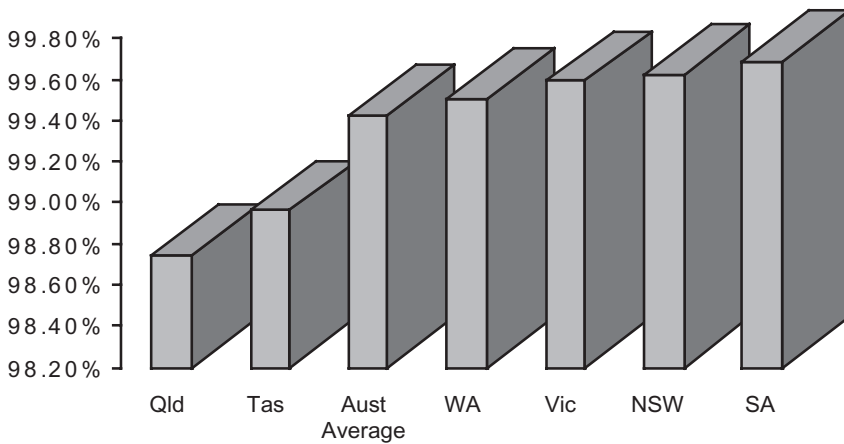
NSW's renewable energy sources such as solar, wind and biomass are still largely untapped. However, reforms introduced by the NSW State Government are promoting favourable market conditions for the development of renewable energy technologies. Moreover the cost of such technologies, although currently high, continue to reduce with growing markets and technological advances.

In 1996 the NSW Government established the Sustainable Energy Development Authority to help reduce the level of greenhouse gas emissions in NSW by investing in the development and use of sustainable energy. In December 2002 the NSW Government passed legislation implementing mandatory greenhouse benchmarks for electricity retailers operating in NSW and other benchmark participants. The scheme, to reduce or offset greenhouse emissions from electricity generation, is based on per capita targets.

Demand reduction through tools such as demand management, load management and distributed generation is also receiving more attention through legislation. Demand reduction preserves resources and delays the building of new distribution infrastructure. IPART has been asked by the NSW Government to undertake an inquiry into the future role of demand management in meeting the State's future energy requirements. The new Code for Demand Management commenced in August 2001 and this has proved effective with the financial benefits of demand management almost doubling in 2000/01.

The NSW Government continues to focus on supply reliability. Statistics show a very high transmission system reliability but as yet no clear trends in distribution reliability. Notwithstanding the latter, NSW rates in the top three of all the Australian States for transmission circuit availability and distribution. Generation availability has fallen slightly from 89% in 99/00 to 87.5% in 00/01, and ranks average in comparison to other States. (ESAA 2002).

Transmission Circuit Availability



Data sourced from ESAA Electricity Australia 2002 – Circuit Availability 2000/01

The NSW community is concerned with overhead electricity cables and there is increasing pressure to underground these assets. A recent review led to the NSW Government rejecting a proposal to underground the entire electricity network, preferring to develop improved mechanisms for those willing to pay for undergrounding. A number of Councils already require undergrounding in new developments. The NSW Government estimates that 48% of Sydney’s low voltage distribution network will be underground by 2027. (Minister for Energy 2002).

6.2 Level of Service

The Ministry of Energy and Utilities (MEU) states that *“Our principal aim is to ensure that customers have a safe and reliable electricity network, which will deliver electricity in a responsible and customer focussed manner”*. It annually publishes the Electricity Network Performance reports. Some of the key indicators reported on or sought are:

- A reduction in the number of serious electrical accidents to network workers. MEU have introduced new initiatives to facilitate the reduction. Serious electrical accidents involving the network continue to decline steadily.
- The continuation of demand management tools, generally at levels of previous years.
- Transmission reliability continues at high levels.
- Supply reliability continues at high levels. Current statistics show no clear trend in performance system improvements. A longer period of statistics is required to identify any significant effect.

The MEU compiles the statistics from each distributor and produces an annual report. For 2000-2001 there were an average of 3 complaints per 1000 customers. To put this in

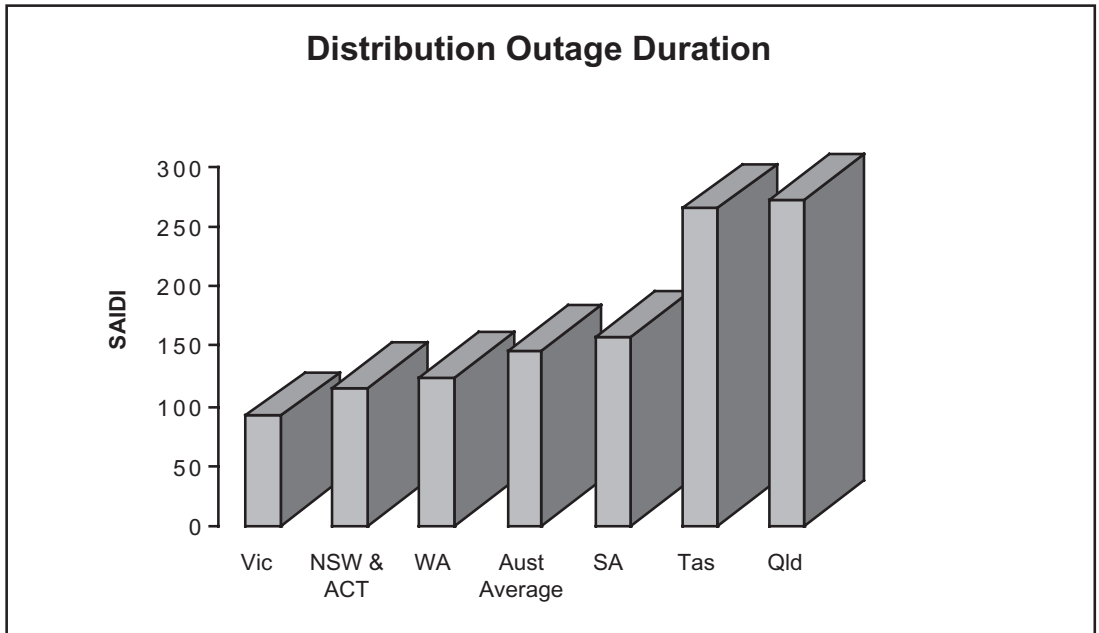
perspective there were less than 8,900 complaints for nearly 3,000,000 customers. Of the complaints received on distribution reliability, the majority (over 70%) related to the frequency of failures. The distributors average reliability targets have generally been met.

The future MEU focus is to develop network reporting to promote improved:

- Transparency of network performance.
- Accountability of network operators.
- Outcomes for demand management, reliability and quality of supply and safety.

The measures used by the MEU include:

- System average interruption duration index (SAIDI). This measures the total minutes interrupted per year divided by the total number of customers. For 2000/01, this was 105 minutes.
- System average interruption frequency index (SAIFI). This measures the total number of customer interruptions per year divided by total number of customers. For 2000/01, this was 1.21 interruptions.



Data sourced from ESAA Electricity Australia 2002 – SAIDI 2000/01

As part of the 2004 Network Price Determination, IPART intends to specify service reliability standards and provide a quality of service incentive in the price determination for the regulatory period. Incentives are being offered in other States. For example, the Queensland Competition Authority also intends to include some form of service quality incentive in the regulatory framework for the next regulatory period. The Victorian electricity industry already has in place such an incentive mechanism. The Victorian Price Determination for 2001-2005 includes two forms of financial incentives for the Victorian distributors to meet or better their reliability targets:

- an “S” factor in the CPI-X price controls that adjusts the annual price caps for each distributor to reflect actual network performance against set targets.
- “Guaranteed Service Level” payments to customers who experience reliability below specified performance thresholds.

In NSW, the *Electricity Supply Act 1995* establishes the statutory basis for electricity distributors and retailers. In relation to levels of service:

- Distributors and retailers operate under a licensing regime administered by the IPART which monitors the extent to which they comply with license conditions relating to service standards.
- The Electricity Supply (General) Amendment Regulation Act 1998 entitles consumers to rebates for failures to meet guaranteed service levels such as deadlines for provision of electricity, appointments with the customer, streetlight repair and notice of planned service interruption.

6.3 Existing Infrastructure

The NSW Statement of System Opportunities 2002, published by the Ministry of Energy and Utilities, reached the following key conclusions:

- Forecasts for total electricity generation over the period to 2010 are higher than those published by NEMMCO in 2001. This infers lower reserve margins and earlier requirements for new generation in NSW.
- Future demand may be met by investment in either new generation and transmission capacity or demand side management.
- NSW will move from winter to summer peaking from 2002/2003 onwards. As other NEM States do likewise interstate capacity shortages may adversely impact on NSW’s ability to meet its summer peaks.
- New capacity may be required in NSW from 2005/06.
- A total capacity of new plant between 1500 MW and 3000 MW may be needed over the next 10 years at an estimated cost of \$8.1 to \$8.7 billion (2002 dollars).
- Modelling supports a minimum reserve requirement of 1000 MW mainly due to ageing plant and reduced plant reliability. The figure of 660 MW is currently used by NEMMCO for NSW.
- Demand management is an increasingly important strategy for the future.
- Further commercial development is needed to reduce costs and increase the acceptance of potential renewable energy sources. Renewables are likely to meet only a small portion of increasing demand, particularly peak demands.
- Owing to difficulties in developing new high voltage transmission corridors, future transmission system development for the Sydney area will focus on upgrading the capacity of existing lines and encouraging embedded generation or demand side solutions.

These conclusions indicate that the current infrastructure is adequate. With the expanding interconnected grid joining Queensland, NSW, Victoria, South Australia and Tasmania from

2005 with Basslink, the solution is not simply a NSW State based issue. Generation planning is primarily market-driven and therefore the market will determine the next generation location. To assist the market in their decisions NEMMCO publish a Statement of Opportunities every 12 months.

Distribution challenges facing the Distribution Network Service Providers (DNSP) include the increasing use of equipment such as air conditioners and the impact on having to provide the supporting infrastructure. These power-consuming items were once luxuries but are now considered as necessities by most customers. The DNSP are looking at more user pays options to support increased capital expenditure and are putting more pressure on regulators to support such measures. DNSP require significant capital expenditure to maintain and expand the current assets to accommodate increasing demands.

6.4 Future Needs

6.4.1 Capacity

The Electricity Supply Association of Australia (ESAA) in its 2002 Electricity Australia publication concluded *“there is little room for doubt that demand for electricity will continue to grow in the next two decades – as the population increases and business expands – just as it has grown in the past 40 years”*.

ESAA estimates show consumption has doubled over the last 20 years and will nearly double again in the next 20, with 75% of the energy consumed by business. It says *“meeting this supply challenge ... will place a considerable strain on the investment community and on the governance of the national electricity market”*. While the comments relate to the Australian electricity industry as a whole, they are particularly applicable to NSW. NSW Distribution Network Service Providers have effective long term planning systems in place and have at least their 5 year capital works budgets scrutinised by their respective regulators.

The MEU 2002 Statement of Opportunities concluded *“Electricity demand in NSW is increasing rapidly..... NSW is attracting a number of large new customers If this trend continues, the current oversupply of capacity will be diminished faster than previously expected”*.

Electricity demand closely follows population growth and demand timing drives investment in plant capacity. If all consumers need electricity at the same time then the support infrastructure is far more than where there is staggered or diversified demand. Growth can also cause localised problems (eg retirees moving to out of city regions to the Northern NSW coast). Future demand needs to be met by a mix of new infrastructure and demand management.

6.4.2 Future Policy and Regulation

A frequent complaint is that there are too many regulations. In Australia the electricity and gas industries are subject to more than 130 different pieces of legislation. (Federal Minister for Industry, Tourism and Resources 2002). One major retailer advises there are more than 7,000 separate requirements that must be met to operate in the national market. The recent COAG Energy Market Review (Parer review) recommended that the energy sector be brought under a single regulator. The NSW submission to the review also highlighted

regulatory issues. The submission stated *“NSW is concerned that rationalisation of regulatory bodies as an end in itself will not resolve fundamental governance and accountability problems. However, there may be scope for rationalisation of regulatory responsibilities following clear delineation and allocation. In the longer term a fully developed national market is best regulated by a single regulator”*.

Regulation has severely delayed approvals for some new infrastructure. In NSW, it typically takes 7 years for transmission line approvals whereas previously it was only 2-3 years. This is a problem also effecting most other States. NSW has long expressed serious concern that the current level of, and regime for, electricity interconnection arrangements is far from optimal, with new and possibly unnecessary local generation proceeding ahead of more efficient interconnection due to delays or flaws in regulatory processes. (NSW Government 2002).

6.4.3 Greenhouse Gases

While NSW has taken a leading role in addressing greenhouse gas emissions, this is driven by the absence to date of an acceptable national scheme. The NSW Government believes that a national emission trading scheme is the best option for greenhouse gas emission reduction. The scheme would cover electricity, gas and industrial sectors and include carbon sequestration. Emission trading schemes are widely viewed as a means of minimising the cost of greenhouse gas reduction by allowing the lowest cost abatement opportunities to be taken up wherever they lie in the economy.

6.4.4 Social and Community Issues

The use of renewable sources, such as hydro, solar and wind, is generally supported by the community. However there can be significant opposition to individual projects which can undermine them. Issues of concern raised in relation to renewable energy include:

- Wind farms require significant amounts of land and can compete with farming activities as well as having visual and noise impacts and perceptions of impacts on birds and other life forms.
- Biomass generation concerns some sectors of the community which see the risk of fuel sources, like wood, being taken from areas such as old growth forests.
- Large solar farms require significant amounts of land.
- Solar panels on the roofs of houses is expensive.
- Some forms of renewable energy may require the use of heavy metals, for example in solar cells and associated storage batteries.

Another community concern is overhead power lines. The 2002 IPART report on the assessment of the costs and benefits of undergrounding found *“that general, widespread undergrounding is only justified if the value of hard to quantify benefits such as improved amenity is very high. If the program goes ahead, it recommends that it be funded through a beneficiary pays approach.”* The NSW Government rejected proposals to underground the entire electricity network in major centres due to its estimated cost of up to \$5.9 billion. The Government’s response has been to develop mechanisms for undergrounding where communities are willing to pay.

6.4.5 Asset Capability

Generation

NSW's major power stations have been built to supply base load at high efficiency and availability and in this they succeed at being at the forefront of world's best practice. There is however some concern of the effect of the electricity market on this plant. Competing generation companies operate the plant differently from their design intent as they seek to maximise short-term commercial gains. Irregular and cyclic operation inevitably reduces plant life and increases maintenance costs.

Transmission

Transgrid is currently undertaking major system augmentation works to ensure adequate grid capacity. Some significant works include 330 kV underground cables through Sydney suburbs to the CBD. Technological innovations are being employed extensively, such as deploying the first dry type 330 kV transformers in Australia.

Distribution

Unexpected consumption growth has occurred in major centres which is resulted in significant unplanned capital expenditure. Specifically:

- EnergyAustralia capital expenditure almost doubled the projected figure.
- Integral Energy expenditure is 43% higher the projected figure with unforeseen high load growth in the western suburbs of Sydney.
- Country Energy capital expenditure is 16% higher than the projected figure.

Security of Supply Planning

NEMMCO, in its Systems Operations role, has the responsibility of operating the NEM within the physical and technical power transfer capabilities of the power system in order that power system reliability and security are maintained within standards set by the Reliability Panel (NEMMCO 2001). This supply security covers the transmission network. The distribution network security is determined by each of the distribution network service providers. However this is currently under review by their regulator, IPART, as part of its review of service reliability standards with provision for a quality of service incentive.

6.5 Report Card Rating

The NSW electricity industry infrastructure is given a rating of B.

The state of the infrastructure is adequate for current and future short term needs, although continued investment is needed to maintain an ageing infrastructure and support the introduction of new infrastructure.

While indicators of reliability and availability for the transmission and distribution systems place NSW in the top three of the Australian States, the generation availability for the last 2 years has been below the national average.

Case Study

Renewable Energy

40% of Australia's Greenhouse gases are produced by electricity generation. This is not surprising considering it is one of the country's strongest growth sectors, up 33% since 1990. However, due to Federal Government initiatives such as Mandatory Renewable Energy Target and NSW State Government initiatives such as Renewables Investment Program and Greenhouse Gas Abatement Scheme, renewable energy generation sources applications are growing with the longer term potential of reducing greenhouse gas emissions. The NSW Government has invested more than \$22 million over the last 5 years in new renewable energy development projects. This investment has attracted more than \$100 million in private sector capital investment.

On 25 February 2003 the NSW Minister for Energy, Kim Yearson, opened Earth Power Technology's bioenergy plant in Camellia. The project represents a \$36 million investment in NSW and was assisted by a \$1 million grant under the Renewables Investment Program administered by the Sustainable Energy Development Authority.

The Camellia state of the art facility converts organic matter into gas and fertiliser. The gas fuels a cogeneration plant which produces enough renewable electricity to power 3,500 homes as well as heat used in the process to produce a high grade organic fertiliser.

The plant will save 30,000 tonnes of carbon dioxide emissions annually, using 80,000 tonnes of food waste that would otherwise go to landfill.

The plant is located within an industrial area of Integral Energy's distribution network, which will result in them importing less electricity from distant power stations. Country Energy will purchase the power contributing to the national target for renewable energy.

This example of embedded renewable energy generation demonstrates the potential for much higher overall thermal efficiency and reduced infrastructure demand from specialised projects.

Appendix 1: References

- Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) and the Australian and New Zealand Environment and Conservation Council (ANZECC), *National Water Quality Management Strategy (NWQMS)*.
- Allen Consulting, *Benefits of Public Investment in the Nations Road Infrastructure*, 2003.
- Association of Consulting Engineers, Response to the Commonwealth Green Paper, *AusLink Towards a National Land Transport Plan*, 2003.
- Auditor General NSW, *Performance Audit, State Rail Authority, The Millennium Train Project*, 2003.
- Auditor General Victoria, *Management of Roads by Local Government*, 2002.
- AusCID, *The Infrastructure Priorities of Local Government, A Survey by the Australian Council of Infrastructure Development*, 30 April 2002.
- Australian Automobile Association, *Budget Submission 2003-2004*, March 2003 <http://www.aaa.asn.au>
- Australian Automobile Association, *Infrastructure User Group Questionnaire*, GHD Pty Ltd (Unpublished), May 2001.
- Australian Automobile Association, *Submission on AusLink Green Paper*, February 2003 <http://www.aaa.asn.au>
- Australian Automobile Association, *Submission to the Inquiry into Federal Road Funding*, February 1997 <http://www.aaa.asn.au>
- Australian Local Government Association (ALGA), *Infrastructure User Group Questionnaire*, GHD Pty Ltd, (Unpublished), May 2001.
- Australian Local Government Association (ALGA), National Roads Congress 2002, <http://www.alga.asn.au/policy/roads/2002roadsCongress/000.php>
- Australian Local Government Association (ALGA), Response to the Commonwealth Green Paper, *AusLink Towards a National Land Transport Plan*, 2003.
- Australian National Audit Office (ANAO), Management of the National Highways System Program, Department of Transport and Regional Services, Audit Report No.21 2000 –2001 Performance Audit, 2001.
- Australian Rail Track Corporation (ARTC), *Infrastructure Audit 2001*.
- Australian Rail Track Corporation (ARTC), *Interstate Rail Network Audit 2001*.
- Australian Railway Association, *Yearbook*, 2003.
- Australian Urban Water Industry, *Water Services Association Facts*, 2001.
- Austroroads, National Performance Indicators, <http://www.algin.net/austroroads/NPI.htm>
- Austroroads, *Road Facts 2000, An overview of the Australian and the New Zealand road systems*, 2001 Update <http://www.austroroads.com.au>
- Boyd Michael, NSW Committee of Stormwater Industry Association and ex president of National Committee, *Personal communication*.
- Bruntland, G (ed), *Our Common Future: The World Commission of Environment and Development*, 1987.
- Bureau of Transport and Communications Economics, *Roads 2020 – Working Paper 35*, October 1997.
- Bureau of Transport and Communications Economics, *The Blackspot Program 1996-2002, An Evaluation of the First Three Years*, July 2001.
- Bureau of Transport Economics, *Information Sheet 14, Urban Transport – Looking Ahead*, 1999.
- Bureau of Transport Economics, *Working Paper 44, Spending on Local Roads*, February 2001, http://www.dotrs.gov.au/bte/docs/wp_44/exec_44.html
- Commonwealth Grants Commission, *Final Report: Review of the Local Government (Financial Assistance) Act 1995*, 2001.
- Cooperative Research Centre for Catchment Hydrology, CRC, *Non-Structural Stormwater Quality Best Management Practice – An overview of their use, value, cost and evaluation*, December 2002.

- Cooperative Research Centre for Catchment Hydrology, CRC, *Water sensitive Urban Design – A Stormwater Management Perspective*, September 2002.
- Council of Australian Governments (CoAG), *Independent Review of Energy Market Directions, Final report: Towards a Truly National and Efficient Energy Market*, 20 December 2002.
- Council on the Cost and Quality of Government, *NSW Government Indicators of Service Efforts and Accomplishments: Transportation*, 1998.
- Council on the Cost and Quality of Government, *Overview of NSW Government Services 1995 – 2000*, December 2001.
- Department of Infrastructure, Planning and Natural Resources, *The Floodplain Management Manual: The Management of Flood Liable Land*, March 2001.
- Department of Land and Water Conservation, *Performance Comparisons, NSW Water Supply and Sewerage*, 2000/01.
- Department of State Development QLD, *State Infrastructure Plan: Strategic Directions 2001*
http://www.sd.qld.gov.au/dsdweb/docs-bin/invest/sd_contents.pdf
- Department of Transport and Regional Services and Australian Local Government Association, *Report on the Roads to Recovery Program*, 2003 http://www.dotars.gov.au/transprog/downloads/roads_R2R-Report.doc
- Department of Transport and Regional Services, *Auslink Green Paper – Towards the national Land Transport Plan*, 2002, <http://www.dotars.gov.au/transinfra/auslink.htm>
- Department of Transport and Regional Services, *East Coast Very High Speed Train Scoping Study*, 2002.
- Department of Transport and Regional Services, *website and published statistics* <http://www.DOTRS.gov.au/>
- Department of Urban Affairs and Planning, *Integrating Land Use and Transport, A Planning Policy Package*, 2001.
- Dockrill, Bruce (Bruce Dockrill & Associates), *Resource Sharing Report*, 2000.
- Electricity Supply Association of Australia Limited, *Electricity Australia 2002*,
<http://www.esaa.com.au/store/products.pl>
- Electricity Undergrounding in New South Wales, *An interim report to the Minister for Energy – IPART*, April 2002.
- Engineers Australia, *2001 Australian Infrastructure Report Card*, 2001
- Engineers Australia, *A Report Card on the Nation's Infrastructure*, 2000.
- Engineers Australia, *Response to the Commonwealth Green Paper, AusLink Towards a National Land Transport Plan*, 2003.
- Engineers Australia, Yates, A., *Engineering a Safer Australia: Securing Critical Infrastructure and the Built Environment*, June 2003.
- Environmental Protection Agency (EPA), NSW, *Annual Report 2001-2002* <http://www.epa.nsw.gov.au>
- Gallagher Neil, Hunter Water, *Personal communication*.
- GHD Pty Ltd, *Central Coast Infrastructure Assessment, Planning NSW, Gosford City and Wyong Shire Councils*, October 2002.
- Gosford Council, *City Management Plan*.
- Independent Pricing and Regulatory Tribunal of NSW, *Inquiry into the Role of Demand Management and Other Options in the Provision of Energy Services*, Final Report, October 2002.
- Independent Pricing and Regulatory Tribunal of NSW, *Sydney Water Corporation, Prices of Water Supply, Wastewater and Stormwater Services*, From 1 July 2003 to 30 June 2005.
- Independent Pricing and Regulatory Tribunal, *Gosford City Council – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005*, May 2003.
- Independent Pricing and Regulatory Tribunal, *Hunter Water Corporation – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005*, May 2003.

- Independent Pricing and Regulatory Tribunal, *Price and Service Report for 2000/01 NSW Distribution Network Service Providers*, September 2002 <http://www.ipart.nsw.gov.au/>
- Independent Pricing and Regulatory Tribunal, *Sydney Catchment Authority – Prices of Water Supply Services – Mid term Review of price path from 1 October 2000 to 30 June 2005*, May 2003.
- Independent Pricing and Regulatory Tribunal, *Sydney Water Corporation – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005*.
- Independent Pricing and Regulatory Tribunal, *Sydney Water Corporation Operational Audit 2001/2002*, May 2003.
- Independent Pricing and Regulatory Tribunal, *Wyong Shire Council – Prices of Water Supply, Wastewater and Stormwater Services – Prices from 1 July 2003 to 30 June 2005*, May 2003.
- Infrastructure Coordination Unit, *State Infrastructure Strategic Plan 2002*, <http://www.nsw.gov.au/www>
- Institute of Public Works Engineering Australia, *Infrastructure User Group Questionnaire*, GHD Pty Ltd, (Unpublished) May 2001.
- Institute of Public Works Engineering Australia, NSW Division Conference, *Winning the Game*, 2002, <http://www.ipwea.org.au/events/nsw/142.html>
- Landcom, *Menangle Park Preliminary Water Cycle Assessment*, 2002.
- Liverpool City Council, *Water Cycle Management Edmondson Park Master Planning*, 2002.
- Local Government and Shires Association NSW, *Local Government and the Affordability and Accessibility of Public Liability Insurance*, 2002.
- Local Government and Shires Association NSW, *NSW State Budget Submission 2002-2003*.
- Local Government Association NSW and Shires Association NSW, *Annual Report 2001-2002*, 2002 <http://www.lgov.org.au>
- McAuley, Ian, *Public Investment infrastructure: justified and effective*, Discussion paper prepared for and published by Engineers Australia, March 2002, <http://resources.dmt.canberra.edu.au/imcauley/engineer/infraspending.doc>
- McLeod Stewart, Director Technical Services, Dubbo City Council, *Personal communication*.
- Minister for Energy, *Media Release – Way forward on underground electricity – no cost to households*, 19 September 2002 http://www.doe.nsw.gov.au/whats_new/index.htm
- Minister for Industry, Tourism and Resources, *The Need for a National Energy Policy*, Speech to the Australian Council for Infrastructure Development, 24 October 2002.
- Ministry of Energy and Utilities, *Electricity Network Performance Report (2000/2001)* http://www.doe.nsw.gov.au/industry_performance/networks/index.htm
- Ministry of Energy and Utilities, *Energy in New South Wales 2000* <http://www.doe.nsw.gov.au/statistic/spdstats/publication/index.htm>
- Ministry of Energy and Utilities, New South Wales, *Statement of System Opportunities* http://www.doe.nsw.gov.au/whats_new/index.htm
- Moree Rural Roads Steering Group, *Moree Rural Roads Funding Report*, February 2001.
- National Electricity Market Management Company Limited (NEMMCO), *Annual Report 2000 – 2001*, <http://www.nemmco.com.au/publications/annual/annual.htm>
- National Institute of Economic and Industry Research (NIER), *Transport infrastructure: a perspective and prospective analysis of its role in Australia's economic growth*, AusCID, December 2002.
- National Office of Local Government, *2001-2002 Report on the Operation of the Local Government (Financial Assistance) Act 1995*, 2003, http://www.nolg.gov.au/publications/national_report/01_02
- National Roads and Motorists' Association Limited (NRMA), *Media Release*, 15 August 2002 http://www.mynrma.com.au/member_centre/corporate_profile/media_centre/releases2002/020815.shtml
- National Roads and Motorists' Association Limited (NRMA), *Media Release*, 28 August 2002 http://www.mynrma.com.au/member_centre/corporate_profile/media_centre/releases2002/020828.shtml

- NSW Government, *Action Plan for Transport 2010: an integrated transport for Sydney and NSW*, 1998.
- NSW Government, *Planning Policy: Integrating Land Use and Transport*, SEPP66, September 2001.
- NSW Government, Special Commission of Inquiry, *Final report of the Glenbrook Inquiry*, 2001
- NSW Government, *Submission to COAG Energy Market Review – Issues Paper*, March 2003
<http://www.energymarketreview.org/submissions/government.htm>
- NSW Government, *Working with Government: Guidelines for Privately Financed Projects*, November 2001,
<http://wwg.premiers.nsw.gov.au/wwg/wwgguidelines.pdf>
- NSW Infrastructure Council, *State Infrastructure Strategic Plan (SISP) 2002*,
<http://www.premiers.nsw.gov.au/wwg/council.asp>
- NSW Legislative Council, General Standing Committee No4, *Privatisation of Freight Corp*, 2000.
- NSW Transport Agencies, *Response to the Commonwealth Green Paper, AusLink: Towards the National Land Transport Plan*, February 2003.
- Office of the Coordinator General of Rail, *Long-term Strategic Plan for Rail*, June 2001.
- Owens M, *Track Rehabilitation – Achieving More with Less*, National Passenger Transport Summit, Sydney, August 2002.
- Railway Technical Society of Australasia, *Rail in the next decade: where to and how?*, November 2002
<http://www.rtsa.com.au>
- Roads and Traffic Authority (RTA), *Statistics and Specifications*, Online data:
<http://www.rta.nsw.gov.au/publicationsstatisticsforms/index.html>
- Roads and Traffic Authority, *Roads and Traffic Authority Annual Environment Report 2002*, 2002.
- Roads and Traffic Authority, *Roads and Traffic Authority Annual Environment Report 2001*, 2001.
- Roads and Traffic Authority, *Roads and Traffic Authority Annual Report 2002*, 2002.
- SEDA, *Media Release 94 – Food Waste Generates Power in Sydney’s West*, 25 February 2003.
- Senate Environment, Communications, Information Technology and the Arts References Committee, *The Value of Water: Inquiry into Australia’s management of urban water*, December 2002.
- Stormwater Industry Association, *Bulletin No 109*, January 2003.
- Sydney Morning Herald, *Sewage emptying into Harbour by the pool-full as tunnel fails*, 17 May 2003.
- Sydney Water Corporation, *WaterPlan 21*, 2000.
- Sydney Water, *Submission to the Senate Standing Committee on Environment, Communications, Information Technology and the Arts, Inquiry Into Australia’s Urban Water Management*, 2001.
- Sydney Water, *Water Mains Asset Management Plan*, August 2002.
- Transgrid, *Annual Report 2002* <http://www.transgrid.com.au/publications/>
- Transport NSW, *Connecting the Central Coast Transport Action Plan*, August 2002.
- Urban Development Institute of Australia, NSW Division, *Action for One Plan for Sydney*, 2003.
- Victorian Infrastructure Planning Council, *Final Report: an assessment of Victoria’s infrastructure needs*, 2002.
- Victorian Office of Local Government, *Facing the Renewal Challenge Victorian Local Government Infrastructure Study*, July 1998.
- Warren Centre, *Community Values Research Report*, May 2001.
- Warren Centre, *Sustainable Transport in Sustainable Cities*, 2000.
- Warren Centre, *Towards a City of Cities*, 2003.
- Water Services Association of Australia (WSAA), *WSAAfacts: Yearbook*.
- Wyangshire Council, *Development Control Plan 100 and Management Plan 2002-2003*.
- Z Laird, P Newman, M Bachelts, J Kenworthy, *Back on Track – Rethinking Transport Policy in Australia and New Zealand*, 2001.

Appendix 2: Acronyms

AAA	Australian Automobile Association
ACCC	Australian Competition and Consumer Commission
ACOSS	Australian Council of Social Services
ANZECC	Australian and New Zealand Environment Conservation Council
ARA	Australian Railway Association
ARMCANZ	Agriculture and Resource Management Council
ARTC	Australian Rail Track Corporation
ATC	Australian Transport Council
ATEC	Australian Transport and Energy Corridor
ATS	Actual Travel Speeds
AusCID	Australian Council for Infrastructure Development
BASIX	Building Sustainability Index
BOOT	Build Own Operate Transfer
BTE	Bureau of Transport Economics
BTRE	Bureau of Transport and Regional Economics
CCQG	Council on the cost and Quality of Government
CIRG	Critical Infrastructure Review Group
COAG	Council of Australian Governments
DIPNR	Department of Infrastructure Planning and Natural Resources
DIRN	Defined Interstate Rail Network
DMR	Department of Main Roads (Queensland)
DNSP	Distribution Network Service Providers
EA	Engineers Australia
EPA	Environment Protection Agency
ESAA	Electricity Supply Association of Australia
FAGS	Federal Assistance Grants
IPART	Independent Pricing and Regulatory Tribunal
IPWEA	Institute of Public Works Engineering Australia
LGAQ	Local Government Association of Queensland
MEU	Ministry of Energy and Utilities
NEM	National Electricity Market
NEMMCO	National Electricity Marketing Management Company Limited
NHMRC	National Health and Medical Research Council
NTC	National Transport Commissions

RAC Rail Access Corporation
RIC Rail Infrastructure Corporation
RONI Roads of National Importance
RSA Rail Services Australia
RTA NSW Roads and Traffic Authority
RTSA Rail Technical Society of Australasia
SAIDI System average interruption duration index
SAIFI System average interruption frequency index
SISP State Infrastructure Strategic Plan (NSW)
SRA State Rail Authority
STE Smooth Travel Exposure
SWC Sydney Water Corporation
TSSR Transport Safety and Reliability Regulator
VKT Vehicle Kilometres Travelled
WSAA Water Services Association of Australia
WSUD Water Sensitive Urban Design

Appendix 3: Rating Methodology

The ratings used in this scorecard are based on those used in the 2000 Australian Infrastructure Report Card, and 2001 Australian Infrastructure Report card. The definition of each rating is below.

Published Rating	Review Criteria
A Very Good	Infrastructure is fit for its current and anticipated purpose in terms of infrastructure condition, committed investment, regulatory regime and planning processes.
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 and anticipated purpose.
C 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 and anticipated purpose.
D 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 and anticipated purpose.
F Inadequate	Totally inadequate for 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:

- *Economics*: 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 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.

www.InfrastructureReportCard.org.au



Project Manager
Engineers Australia
11 National Circuit
Barton ACT 2600
tel 02 6270 6555
fax 02 6273 2257
web <http://www.engineersaustralia.org.au>
email policy@ieaust.org.au



Consultant
GHD Pty Ltd
10 Bond Street Sydney NSW 2000
tel 02 9239 7100
fax 02 9239 7191
web <http://www.ghd.com.au>
email tpinzone@ghd.com.au