# Infrastructure Report Card

# QUEENSLAND

ENGINEERS AUSTRALIA

# 2004
# Queensland Infrastructure Report Card

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# Communiqué

Australia's physical and economic 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, construction and maintenance, tomorrow's needs as well.

The table below summarises the ratings for Queensland's infrastructure alongside the ratings from two earlier Engineers Australia Report Cards - the 2001 Australian Infrastructure Report Card and the 2003 NSW Report Card.

| Category | 2004 Qld Grade | 2003 NSW Grade | 2001 Australian Grade |
|---|---|---|---|
| National Roads | **C+** | C+ | C |
| State Roads | **C** | C+ | C- |
| Local Roads | **C** | C- | D |
| Rail | **C+** | D | D- |
| Electricity | **D+** | B | B- |
| Urban Potable Water treatment | **B** | * | Not rated |
| Urban Potable Water reticulation | **B-** | * | Not rated |
| Urban Wastewater treatment | **B** | * | Not rated |
| Urban Wastewater reticulation | **C-** | * | Not rated |
| Stormwater | **C** | D | D |
| Gas | **C** | Not rated | C |
| Telecommunications | **B** | Not rated | B |
| Irrigation | **C+** | Not rated | D- |
| Airports | **B** | Not rated | B |
| Ports | **B-** | Not rated | Not rated |

** The NSW Report Card rated Potable water as Metropolitan (B-) and Non-metropolitan (C-). It also rated Wastewater as Metropolitan (C-) and Non-metropolitan (C-).*

For those sectors that have scored a D or lower, the infrastructure is in a disturbing state and requires immediate attention. While Queensland infrastructure is generally in a better state than the average for Australia, Queenslanders should not be complacent, particularly given Queensland's high population growth forecasts. All sectors require significant enhancement before they could be regarded as meeting Queensland's current and future needs. The only way that this will occur is if infrastructure planning, maintenance and development become a priority for all three levels of Government - Federal, State and Local.

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

The major impediments to proper infrastructure provision are a lack of co-ordination between spheres of Government, a failure to put in place long term plans for infrastructure which has a life of up to 100 years

or more, and the generally low priority given to infrastructure in budgets. All spheres of government also need to work co-operatively and closely with the private sector, to encourage private sector investment in infrastructure.

## Recommendations

Engineers Australia makes the following recommendations which are aimed at ensuring that Queensland's infrastructure meets the current and future requirements of the community and industry.

1. Planning and provision of infrastructure should become a true partnership between the three spheres of government, the professions, business and the community. Accordingly, the Queensland government should establish an Infrastructure Advisory Council tasked with providing government with detailed infrastructure research as well as recommendations on infrastructure deficiencies, prioritisation and funding options.

2. Planning and provision of infrastructure should be based on integrated land use planning and should give greater emphasis to consideration of sustainability issues and cost-reflective pricing.

3. Given that a large proportion of Queensland's population live in urban and near-urban areas, the Federal government should directly contribute to the funding and planning of urban infrastructure.

4. Infrastructure owners and operators should incorporate the threat of malicious attack into their risk management strategies, and an annual State of Queensland Infrastructure Security Report should be produced to report to Cabinet on the security of Queensland's critical infrastructure.

5. The quantum of funding for infrastructure should increase to overcome maintenance backlogs and to provide for new infrastructure at a rate commensurate with Queensland's rapid population growth. A joint taskforce established by Queensland Treasury and the Infrastructure Advisory Council should examine the optimal sources of the new funding including hypothecated taxes, user charges and infrastructure bonds. A public debate needs to be initiated on the wisdom of maintaining a low tax, low debt State in the face of the increasing need for investment in our physical infrastructure.

6. Substantial reform of infrastructure policy, regulation and taxation should be initiated in all spheres of government to maximise the effectiveness of planning and to encourage greater investment in the provision of infrastructure.

7. Government management and advisory boards ought to have a balanced membership covering technical, governance and community expertise and representation.

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# 1. Overview

## 1.1 Background

The Queensland Infrastructure Report Card is the fourth of a series of Report Cards published by Engineers Australia.

The first was the Report Card on the Nation's Infrastructure (EA, 2000), which examined roads, bridges, railways, water and wastewater. A much expanded national review was published the following year called the 2001 Australian Infrastructure Report Card (EA, 2001).

In 2002, EA started a program to produce report cards for all States and Territories. The first of these was the NSW Infrastructure Report Card (EA, 2003) and the second is this report card.

The purposes of the Queensland Infrastructure Report Card include:

- Identifying the state of infrastructure and the challenges facing its providers.
- Raising awareness 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 (including condition, distribution, funding and timing) required to meet society's needs.
- Encouraging the implementation of best practice infrastructure provision and management including triple bottom line and demand management.

This report provides a strategic overview of Queensland's infrastructure which other organisations can use when they undertake detailed analysis of particular infrastructures. It also provides a benchmark that the community can use to evaluate infrastructure provision over time.

## 1.2 Process

The objective of the Report Card is to rate the quality of roads, railways, airports, seaports, water, stormwater, electricity supply, gas and telecommunications infrastructure at a State level.

The assessment was carried out through research and consultation. It included interviewing stakeholders, reviewing various documents, and producing draft reports which were reviewed by an independent expert or advisory group. Each sector was assessed using the methodology contained in Appendix B.

For each infrastructure sector, a range of relevant parameters were used to derive an overall rating. The ratings are based on asset condition, asset availability and reliability, asset management, sustainability (including economic, environmental and social issues) and security.

The ratings used are identical to those used for previous Report Cards 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. |
| E | Inadequate | Inadequate for current and future needs. |

An important consideration was the relationship between "level of service" and "fitness for purpose" and an assessment of the appropriate level of service and how this related to community needs. The process involved identifying whether "level of service" was defined and how it varied; identifying the trends or

future needs; identifying the performance indicators; assessing whether the infrastructure was fit for its current and anticipated service based on these parameters; and finally determining a rating.

A variety of stakeholders were consulted including infrastructure owners and operators, industry associations ( eg RACQ, LGAQ, and ESAA) and expert panels and groups of Engineers Australia.

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

## 1.3 Ongoing Developments

This Report Card provides a snapshot at a point in time. Developments, such as policy initiatives and construction programs, are ongoing and will have a significant impact on the quality of infrastructure in the future. Where these developments have been sufficiently defined to allow their impact to be predicted, they have been considered in the ratings. Where it has not been possible to define their impact, they have been mentioned in the Report Card but not factored into the ratings.

Examples of upcoming developments which have been factored into the ratings include:

- The creation in 2004 of a new Queensland Office of Urban Management that incorporates urban land use planning, transport planning and infrastructure coordination under the one Ministry.
- The release of the AusLink White Paper by the Federal government in 2004.

## 1.4 Significant Issues

A number of significant issues were identified during this study. These are listed below.

### 1.4.1 Strategic Planning, Co-ordination and Integration

Infrastructure provision throughout Queensland requires better coordination and more integrated strategic planning. This comment is applicable for all infrastructure sectors and across all spheres of Government. Unfortunately Australia's three spheres of Government work against such coordination and integration.

The efficient allocation of funds, effective prioritisation of funds and future sustainable land use planning can all be achieved through implementing integrated and coordinated strategic plans for infrastructure. To be effective, such strategic planning needs to incorporate updates to accommodate changes in strategies and include long-term (at least 20-year) schedules of works and budgets. As noted throughout this report, it is essential to have longer-term strategic plans to ensure that infrastructure requirements (e.g. public transport corridors) are provided for early in the land use planning cycle, where economic, social and environmental costs to the community can be managed more effectively.

Although long-term plans are available in Queensland for a number of infrastructure sectors, these generally do not cover infrastructure across all tiers of government, or the private sector. Furthermore, they are often incomplete and more importantly are not necessarily always committed to by Government or updated to account for changes.

The Queensland Government took a step in the right direction a few years ago by producing the *"State Infrastructure Plan – Strategic Directions 2001"* document. Unfortunately, many of the directions within the plan have not been committed to by Government and it seems the significance of the plan has declined in recent times.

In recent years there have been some commendable improvements. Examples include the publication of the Integrated Regional Transport Plan for South-East Queensland (1997), which set out a program to improve integration between land use and transport. Forward works plans for the provision of State roads and railways are being prepared annually by the relevant State departments.

Queensland has seen a number of recent initiatives, all of which take steps to improve coordinated and integrated strategic planning including:

- The Federal AusLink White Paper (DOTARS 2004), which starts the process of developing a twenty year National Land Transport Plan.

- The “whole of government” approach to land use planning and infrastructure provision for South-East Queensland (SEQ) growth through the establishment of the Office of Urban Management, committing the State and local government to a new planning framework to manage SEQ’s urban growth to achieve more desirable physical, social and environmental outcomes.
- The Roads Alliance between the Department of Main Roads and the Local Government Association of Queensland which is an initiative targeting the ‘grey’ area between lower-order State-controlled roads and the higher-order local government roads.

A number of recent reports have identified the need to improve coordination. For example. the Infrastructure Association of Queensland discussion paper entitled ‘The Day After Tomorrow’ which identified Queensland’s future water resource infrastructure needs found that several of the key impediments to enhancing the delivery of infrastructure related to the coordination across regional, sub-regional and local levels.

### 1.4.2 Funding

Lack of funding is a fundamental issue. Major concerns include that:

- Budgetary commitments to critical infrastructure elements are often only short-term, which prevents long-term planning benefits.
- Governments are reluctant to utilise public debt funding.
- There has been limited use of private sector funding, notably public-private partnerships.
- There is an immediate need for increased funding for maintenance and renewals.
- There is little provision for funding to address changing community expectations and levels of service, such as for effluent reuse or improved public transport.
- There are numerous competing priorities for limited funds.
- The provision of infrastructure grants often only cover capital works with no allowance for ongoing maintenance.

Infrastructure renewal studies undertaken within various infrastructure sectors throughout Australia have generally found that the level of investment in infrastructure renewal and maintenance is not sufficient to maintain service level standards or achieve the best lifecycle cost outcomes. This finding applies in Queensland. For example, as described in Chapter 7 Electricity, the Independent Panel Report on Electricity Distribution and Service Delivery found that *“the current state of the networks operated by Ergon Energy and ENERGEX dictates that they require greater levels of expenditure on capital and maintenance than they have been accorded in recent years”* (EDSD Review, pp28).

The need for greater funding for maintenance across all infrastructure sectors has been highlighted by many stakeholders. For example, the Association of Consulting Engineers Australia, Engineers Australia, and the Queensland Government all identified this need for roads and rail in their submissions to the AusLink Green Paper. The recent Courier Mail report, The Roads Solution has concluded that *“for road projects in SEQ alone, at least $600 million to $700 million additional annual funding is estimated as required”* of which $200 million is needed for maintenance and rehabilitation (Courier Mail 2004). Another example can be found in the Senate urban water inquiry. This identified a looming problem with new Water Sensitive Urban Design (WSUD) systems for stormwater drainage and the fact that Federal capital grants do not cover ongoing maintenance costs. The Senate report stated 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)

There is continuing debate on the source of funding. This has been highlighted in recent comments concerning dividends paid to Government by Government Trading Enterprises. A recent report in the Australian Financial Review is typical. It stated that *“infrastructure groups and business energy users demanded State governments reduce the levels of dividends they were stripping from State-owned power utilities in such States as NSW and Queensland and urgently adopt better demand management*

*strategies".* (AFR 15 October 2004) Opportunities exist for increased use of private sector funding for infrastructure, however, the Queensland Government has been slow to grasp these opportunities notwithstanding the release of the Guidelines for Privately Financed Projects. These guidelines should facilitate an increase of the number of private/public partnerships and it is anticipated that the duplication of the Gateway Bridge and its approaches will be funded through this mechanism.

In recent years governments have not supported debt funding of infrastructure. Engineers Australia raised its concerns in 2002 when it published an Issues Paper on the subject. In the paper, "Public investment in infrastructure: Justified and Effective", the author 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 "*. He calls for "*public leadership in infrastructure provision – a government role in allowing and encouraging Australians to invest in their future productive capacity"* (EA 2002).Since then, there has been increasing public debate questioning Governments' reluctance to utilise debt funding for infrastructure. In its "Funding Urban Public Infrastructure Report", Allen Consulting analysed various funding alternatives for NSW infrastructure and concluded that Government debt funding produced superior long term economic benefits. It also observed that "*There is compelling evidence that investment in additional urban public infrastructure investment raises economic growth"* and that "*There is a need to change the misperception of infrastructure spending and increase understanding that this expenditure is an investment*". (Allen 2003)

Local governments have experienced considerable funding pressure over the last five years. This has arisen because of increased awareness of public liability associated with the ownership, more complex management and operation of infrastructure, the introduction of regulation for service pricing, and rising 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 an unacceptable risk.

### 1.4.3 Sustainability

Of the many definitions of sustainability, the most widely used is that development is sustainable *'if it meets the needs of the present without compromising the ability of future generations to meet their own needs'* (Brundtland Report, 1987).

Clearly it is essential to ensure that the quality of life for future generations of Queenslanders is enhanced. The concept of inter-generational equity is being incorporated into the sustainability objectives of plans for many infrastructure organisations.

The South-East Queensland region is currently experiencing population growth of over 70,000 persons per year, with this growth predicted to continue for the next twenty years. This, together with changes to household size, is fuelling significant demand for new dwellings. Growth has extended from outer suburbs of Brisbane City to undeveloped areas of the region, as people make lifestyle choices and seek affordable property in areas some distance from existing essential infrastructure.

With respect to land use, there are a number of issues which need consideration in developing sustainable infrastructure strategies for Queensland. These include the following:

- Land use policies must promote sustainable development and recognise how they impact on resources, community and social well-being and accessibility.
- Planning of infrastructure must consider issues of asset longevity and adaptability, as well as by the major effect they have on quality of life in terms of economic, environmental and social (triple-bottom line) factors.

- Essential resources – particularly water and energy – are limited throughout the State and need to be managed through appropriate conservation, reuse and renewable strategies.
- Lack of long-term planning and inadequate funding of maintenance and renewals will create significant sustainability problems for future generations.
- Specific sustainability measures which should be considered include:
  - Reducing the reliance on private motor vehicle travel by implementing appropriate travel demand management and improved opportunities for sustainable alternate modes of travel.
  - Identifying and preserving appropriate sites or corridors for strategic infrastructure.
  - More efficient and effective means for the management and reuse of water.
  - Introducing a triple-bottom line evaluation process for infrastructure options.
  - Increased the use of renewable energy sources.

In recent times, Queensland has seen some significant sustainability achievements and policy initiatives such as:

- The establishment of the Office of Urban Management to achieve and maintain sustainable growth and manage the provision of infrastructure in South-East Queensland.
- The development of the Integrated Transport Planning Framework which is a best practice transport planning guide seeking consistent and sustainable transport planning.
- The introduction of the Integrated Planning Act (IPA), with the Integrated Development Assessment System (IDAS) providing a transparent decision-making process. Proposed amendments to the Act are expected to be passed by Parliament before the end of 2004. These amendments will further improve the management of infrastructure through mechanisms such as Priority Infrastructure Plans (PIPs).

While these initiatives are commendable, it is critical to recognise that there are still some significant outstanding issues relating to sustainability. These include:

- The growing need for infrastructure in previously undeveloped areas of South-East Queensland, and the economic, environmental and social impact that this will potentially cause.
- The growing reliance on car use in urban areas is unsustainable as the increase in congestion causes considerable environmental and economic harm to the community.
- The need to achieve demand reductions for essential resources such as water and electricity.
- The need to overcome social inequities in gaining access to key social infrastructure, particularly relating to accessibility to public transport and the differences between older urban, fringe urban and rural areas.

One important sustainability initiative is improving bus transport. In Brisbane a significant investment was made to construct the South-East Busway ($456 million) and the Inner Northern Busway (approximately $200 million) to improve bus service reliability with busways around congested peak hour traffic. However, the system remains inefficient without the vital $120 million section in the CBD. This link has been funded in the 2004 State Transport Budget with Brisbane City contributing through the conversion of the King George Square car park to a proposed Bus Station. This initiative should ensure that the community will have access to a much more effective bus system which should attract significant commuter patronage.

### 1.4.4 Level of Service

Determining the appropriate level of service depends on understanding the expectations of the community. This is typically obtained by comprehensive customer satisfaction and importance surveys. Even with this sort of data, it is still often very difficult to determine relative community priorities, as those issues that generate considerable community debate are usually treated in isolation and little consideration is given to relative demands or the opportunity cost of addressing one problem. Issues also are often influenced by media headlines, talkback radio, and political discussion.

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. This requires appropriate community/stakeholder education and a transparent approach to the provision of information to ensure all are adequately informed. Increasingly, there will be the need to trade-off between a desirable level of service, affordability/available funds, competing priorities and competing standards and policies.

Some organisations apply considerable effort into determining the level of service and linking it to their asset management. For example, the Department of Main Roads (DMR) conducts regular community expectations surveys and its road design manual utilises fit for purpose concepts.

### 1.4.5 Security

Security risks to Australia's infrastructure have heightened following the 11 September 2001 attacks in the US, the October 2002 Bali attacks and Madrid attacks in March 2004.

The Federal Government has enacted legislation including the Security Legislation Amendment (Terrorism Act) 2002 and the Terrorism Insurance Bill 2002.

The Queensland Government has introduced new regulation and legislation and amended others in response to the new security environment. These include the Terrorism (Community Safety) Amendment Bill 2004, Disaster Management Act 2003 and declaring ammonium nitrate an explosive. In addition, in September 2004, the Queensland Government, in conjunction with the Local Government Association of Queensland, released the Local Government Counter-Terrorism Risk Management Kit. The kit will help councils systematically identify security risk management activities and integrate those activities into existing disaster management arrangements.

The Queensland Government has established the Security Planning and Coordination (SPC) Unit in the Department of Premier and Cabinet, and the Counter Terrorism Coordination Unit (CTCU) in the Queensland Police Service. These Units provide leadership and coordination across all spheres of government and the private sector to implement a consistent approach to ensuring security and continued effective operation of Queensland's critical infrastructure. Critical infrastructure is defined as infrastructure that, if destroyed, degraded or rendered unavailable for an extended period, will significantly impact on social or economic well-being or affect national security or defence.

The Queensland Government has identified critical infrastructure in the following areas:

- Banking and finance.
- Electrical power systems.
- Emergency services.
- Food supply.
- Gas, oil and fuel.
- Water supply.
- Transport.
- Information and communications.
- Health services.
- Government services.

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, and *"Queensland's Infrastructure in the age of terrorism",* July 2004.

## 1.5 Future Directions

As with previous Australian and NSW Infrastructure Report Cards, a major objective of the Queensland Report Card is to provide a baseline for future analysis and benchmarking so that progress can be monitored and evaluated. These processes will also raise awareness and enhance the level of debate. In this way, it is hoped that the Report Card can contribute to achieving a coordinated and sustainable Statewide focus on infrastructure planning and management which overcomes sectoral interests.

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

In particular the following broad areas require attention:

- Planning and provision of infrastructure should become a true partnership between the three spheres of government, the professions, business and the community.
- 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.
- A Statewide infrastructure plan which incorporates long term strategic planning and funding commitment is needed. The plan must cover all infrastructure sectors and all owners and operators.
- Data collection and analysis needs improvement. This requires the commitment by all infrastructure owners to providing quality data and the establishment of appropriate standards.
- Alternative funding mechanisms including public debt and public-private partnerships need to be utilised where appropriate. Funding of renewals and maintenance requires greater consideration.
- Asset management strategies need expansion to incorporate overall needs, funding, fitness of purpose, level of service and community involvement.
- Security issues need to be given higher profile by governments as well as all infrastructure owners and operators.

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

However, it is not just a matter of just building more infrastructure. Resources are limited and must be used judiciously. Alternatives to building more infrastructure must also be considered such as reducing demand.

A balanced approach is needed to infrastructure provision. This should be based on managing and maintaining existing infrastructure more efficiently, reducing consumption as well as planning for and providing new infrastructure for future needs.

# 2. Roads

## 2.1 Overview

### 2.1.1 System Description

There are approximately 178,000 km of public roads in Queensland, providing access across the State for commuters, travellers, business and freight.

The road system is divided into National, State Strategic, Regional, District and Local road categories, detailed as follows (DMR, 2004):

- 4,183 km of National Highways were funded under the pre AusLink arrangements by the Federal Government and managed by the Queensland Department of Main Roads (DMR).
- 5,009 km of State Strategic Roads managed by DMR;
- 24,368 km of Regional Roads and District Roads managed by DMR.
- 144,505 km of Local Roads managed by local government, funded by local ratepayers, Federal road assistance grants and the State under subsidy arrangements (eg Transport Infrastructure Development Scheme).

At June 2003, around 68,500 km of these roads were sealed, approximately 52,500 km gravelled, 43,000 km formed and 15,000 km cleared only. Around 38% of Queensland's road network are sealed (ABS, 2003).

Roads in which DMR has an interest include 2,773 bridges and 3,583 culverts. It should be noted that DMR (similar to a number of other States in Australia) defines a bridge as a structure with a span of 1.8m or a waterway area of $3m^2$ or more. Of the 2,773 bridges under DMR control, 2,306 of them are concrete / steel and 467 are timber (DMR, 2004).

The 144,505 km local government managed road network is further divided as follows:

- Urban network – 15%.
- Sealed non-urban network – 15%.
- Gravel non-urban network – 35%.
- Formed non-urban network – 27%.
- Unformed non-urban network – 8%.

### 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.

The Federal Government previously had sole financial responsibility for the National Highway System. However, under AusLink, the Federal Government has an interest in a wider network (National Highways, the Pacific and Flinders Highways and the Port of Brisbane Motorway). Funding will be provided for this new National Network on a project-by-project basis with subsidy arrangements varying from 50% to 100%. Arrangements will be formalised under an Intergovernmental Agreement that will provide predictability of funding and recognise the need for long term corridor planning.

The Federal Government also funds:

- Road safety improvements throughout the whole road network through the National Black Spot program.
- Roads of National Importance (RoNI) program jointly with the States.
- Roads to Recovery (R2R) Program.
- Provides untied funds to State and local government authorities.

The Federal Government does not have direct road management responsibility. DMR owns and manages the national highway network in Queensland, planning, designing and supervising works on behalf of the Federal Government who provides most of the funding.

DMR is the steward of Queensland's state-controlled road network which comprises 20 per cent of the State's total road network, carries 80 per cent of traffic and represents the State's largest single physical asset at $26.6 billion. DMR is responsible for the construction and maintenance of the network, as well as management of traffic operations and activities that occur within the road corridors, that is lines, signs and environment. DMR also has responsibility for the management of the total road system.

Local governments are responsible for the funding and management of local roads. In some circumstances, councils also undertake maintenance and rehabilitation work on State-controlled roads under sole invitation road maintenance performance contracts.

***Roads Alliance***

In response to the increasing demands on the road system coupled with limited funding, DMR and the Local Government Association of Queensland (LGAQ) have developed a road management partnership called the Roads Alliance. Under the Roads Alliance, local governments work with each other and DMR in Regional Road Groups (RRGs). The RRGs will agree on regional road investment priorities that will deliver the highest need road projects and achieve benefits for all users.

The Roads Alliance is based on a plan to make road building and funding decisions on a network basis regardless of ownership or local government boundaries. RRGs have identified a network of regionally important lower-order, State-controlled roads and higher-order, local roads that they will jointly manage. This network is called Local Roads of Regional Significance (LRRS).

The Roads Alliance will deliver improved road management capability, better and more consistent asset management practices, a statewide methodology for prioritising investment and improved opportunities for joint purchasing and resource sharing.

The benefits of this partnership approach to road management should be seen in the next few years. So far the RRGs have agreed their LRRS networks, trained in road asset data collection and collected a set of agreed road asset data. A small number of RRGs have started producing investment strategies with 20-year visions for the LRRS network.

In July 2004, the RRGs produced their first joint State and local government regional works program. This is a 2-year program for projects to be delivered in the 2004-05 and 2005-06 RIP (Roads Implementation Program). In 2005, RRGs will produce a 5-year regional works program.

### 2.1.3 Sector Trends

***Federal Funding***

The AusLink White Paper recently released by the Federal Government has the aim of more integrated road and rail funding. Included within the program is an extension of the four-year Roads to Recovery program and continuation of the existing Black Spot program until 2005-06, largely aimed at the local road system.

Funding within the AusLink White Paper has identified significant funds for Queensland roads, however it should be noted that the portion of funding for the road network in Queensland has fallen from 25% of all funds to 19%, whilst the State’s road system caters for over 30% of the freight tonne kilometres within the country. AusLink has delivered a significant shift from road to rail funding, but the increase in rail funds has occurred south of Brisbane and National Transport Network rail projects in Queensland remain the State’s responsibility.

Federal funding provided under the 2004 Federal Budget and AusLink program in summarised in Table 1.

**Table 1 2004 Federal Budget Funding in Queensland**

| 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 5 yr Total |
|---|---|---|---|---|---|
| $264.85M | $143.10M | $266.50M | $461.60M | $327.00M | $1463.05M |

There is some additional funding for major corridors within South-East Queensland, however it falls well short of the identified needs within the period (LGAQ, 2002). Outside of the south east corner, there is limited funding for the National Highway system and this will have a drastic effect on the level of service and maintenance of these facilities into the future, particularly with the projected increase in road freight demand along these key corridors.

Some of the key road projects to be funded in Queensland as part of the AusLink White Paper proposed over the first five years (2004-2009) are listed in Table 2.

**Table 2 AusLink Funding Commitments for Queensland (2004-2009)**

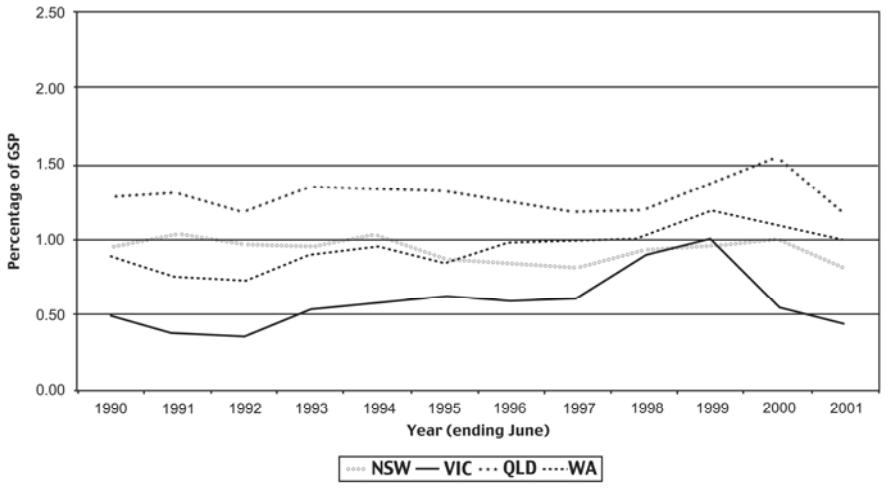
| Project | Funding |
|---|---|
| Brisbane Urban Corridors | $573M |
| Pacific Highway (Tugun Bypass) | $120M |
| Bruce Highway (Gympie-Cairns 5 year upgrade program) | $210M |
| Bruce Highway (Boundary Rd-Caboolture) | $191.6M |
| Barkly Highway | $112M |
| Strategic Corridor Program | $86M |
| Maintenance (2004-5) | $67M |
| Other | $47M |
| Total | $1463M |

It should also be noted that the Roads to Recovery (R2R) Program was extended in January 2004, with the Federal Government announcing that a further $1.2 billion would be paid out over a further 4 years from June 2005, when the previous program was due to expire. Funding for this extended program will be distributed at a rate of approximately $300 million a year nationally, of which $200 million are tied funds and Queensland has secured 20.7% of these funds. The remaining $100 million will be contestable on a project-by-project basis.

***Spending on road infrastructure***

Queensland has consistently invested a higher percentage of Gross State Product (GSP) in roads, highways and subdivisions infrastructure than any other State in Australia. Figure 1 shows that the Queensland Government consistently invested between 1.25 and 1.5% of GSP from 1990 to 1999 in infrastructure. There was a peak in 2000 (due to the Pacific Motorway special initiative), followed by a trough in 2001, but Queensland's percentage has remained higher than New South Wales, Victoria and Western Australia.

**Figure 1 Percentage of Gross State Product Invested in Roads**




*Source: Neilson, 2003*

The 2004 Queensland State Budget allocated $1.013 billion for expenditure on roads infrastructure in 2004-05, and also provided additional funding (over and above the 2003 Budget) over the next 5 years of $1.058 billion. It should be noted that the Integrated Regional Transport Plans (IRTP) for South-East Queensland in 1997 identified a projected shortfall in funding between 1996 and 2021 of $10-12 billion. This indicates that the challenge for Federal and Queensland Governments is to maintain and increase the $1 billion of annual expenditure over the next 20 years, given the continuing growth occurring in the south-east corner of the State.

***Spending on Local Government Road Infrastructure***

The recently released *2002-2003 National Report on Local Government* (National Office of Local Government, 2003) recognises that local governments' capacity to fund infrastructure is constrained by its general revenue raising capacity. In 2001-02, most revenue for local governments in Queensland came from levied rates and the sale of goods and services, as well as taxation revenue. This was supplemented by Federal Government financial assistance grants and subsidies.

The Local Government Association of Queensland (LGAQ) conducted a "*Public Inquiry on Mechanisms to Fund Queensland's Roads and Transport Infrastructure*" in May 2002. The report identified that spending on local government-controlled roads in Queensland has increased over the past decade. In 1992-93, a total of $371 million was spent on the local road network, increasing to over $500 million in the late 1990s. (A recent Federal Government budget announcement revealed that Queensland local governments would receive $294.4 million in Federal funding in 2004-05.) Subsequent reports into the lack of infrastructure spending in Queensland have recommended that debt funding be used by Councils to assist in funding infrastructure, including roads.

***Freight task in Queensland***

Approximately 440 million tonnes of freight is moved every year in Queensland. However, due to the geographical size of Queensland and its dispersed population, a relatively low percentage of freight is transported interstate. ABS statistics indicate only around 20% of total freight tonne-kilometres travelled were interstate, representing approximately 5% of total tonnages. Due to the large proportion of intrastate freight movement, rail was used for approximately 55% of all tonnes carried, the majority of which is coal, while road carries just over 40% of total tonnes transported. However, when bulk commodities such as

coal are removed from the equation, road dominates the general freight task, placing significant demands on the road system.

***Demand Management***

Brisbane City Council's *"Transport Plan for Brisbane 2002-2016*" identified that the cost of congestion in Brisbane was estimated to be $2.6 billion per year. If Brisbane's transport needs are not addressed then this could reach as high as $9.3 billion by 2015 – higher than both Sydney and Melbourne (BTRE, 1999). Population in Brisbane has grown by 1.4% annually, while traffic volumes on BCC roads have increased by 1.8% per annum and by 2.3% annually on State-controlled roads. Public transports share of urban travel has steadily declined since the 1980s. To be effective in addressing congestion and the environmental impacts of traffic, policies designed to manage travel demand must target road travel directly.

The Brisbane Transport Plan identifies a number of challenges to improve the quality of life for residents within the city. These challenges include improving air quality, reducing greenhouse gases, facilitating economic growth and increasing accessibility throughout Brisbane. These challenges rely significantly on demand reduction. The six strategic objectives of the Transport Plan for Brisbane 2002-2016 further emphasise this concept and are identified as follows:

- Quality public transport.
- Managed travel demand.
- Coordinated transport and land use.
- A safe and efficient road network.
- Delivering goods on time to the right place.
- More clean and green personal transport.

Recent international experience has shown that demand reduction measures should be implemented sooner rather than later. If actions in the first decade of the plan do not deliver required shifts in travel behaviour, Council would consider cordon-tolling around the CBD. While these measures may be considered politically difficult, the consequences of not doing so will be extremely large costs to road users, the community, the economy and the environment in South-East Queensland. It is not possible to "build your way out of congestion", so a series of sustainable policy options, such as congestion-charging, parking levies, intelligent transport system and improved public transport, must be introduced to change travel behaviour.

***Tourism***

Tourism Queensland surveys indicate that in the year ending December 2003, Queensland had over 16 million domestic overnight visitors, equating to around 79.5 million domestic visitor nights. Visitor numbers are expected to grow at a rate of 1% p.a. Surveys indicate that around 75% of all domestic visitors utilise road transport. These visitors were most likely to visit Brisbane and the Gold and Sunshine Coasts, placing further demand on an already congested road network.

There were also 1.8 million international visitors, equating to just less than 25 million international visitor nights. Numbers are expected to grow at a rate of 4.7% p.a. In contrast to the domestic tourist destinations, the international visitors were most likely to travel to Brisbane, Tropical North Queensland and the Gold Coast, once again using hire cars for travel and placing an additional demand on the road network.

Driving holidays in Queensland accounted for 10.1 million visitors in 2003 (third only to NSW and Victoria), with annual growth in this market between 1999 and 2003 of 1.8% p.a. (second only to Tasmania). This type of holiday accounted for 62% of total domestic visitors and 55% of total domestic visitor nights in Queensland in 2003.

Driving visitors, the majority of whom are Queensland residents aged greater than 50, are more than likely to visit Brisbane, the Gold and Sunshine Coasts, Tropical North Queensland and Central Queensland.

The Coolangatta to Cairns road network (Pacific and Bruce Highways) is the most frequented by tourists. Tourism Queensland claim that around half of all traffic between Maryborough and Townsville is tourist traffic.

The Toowoomba - Morven - Cloncurry link also has a high proportion of tourist traffic, with between 57 and 69% of all traffic being tourism-based.

Tourism Queensland were unable to provide detailed 2003 figures, but they indicated that the Townsville to Mount Isa and Cairns to Karumba corridors were experiencing significant growth in tourism traffic (as much as 5% per annum).

## 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 congestion, safety performance, condition of the network and durability. 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. There is an intrinsic link between the assigned Level of Service, community expectations and asset management strategies. DMR data pertaining to general level of service can be summarised for National Highways, State Strategic Roads and Regional / District Roads over the past 5 years as:

National Highways

- Capacity – modest improvement.
- Safety – stable with minor decrease in fatalities.
- Condition – 5% improvement in roughness.
- Seal Age – significant improvement in pavement durability.

State Strategic Roads

- Capacity – minor improvement.
- Safety – minor increase in number of accidents but no change to fatalities.
- Condition – significant improvement in roughness.
- Seal Age – significant improvement in pavement durability.

Regional and District Roads

- Capacity – modest improvement.
- Safety – significant increase (approx 10%) in accidents and fatalities.
- Condition – general improvement in roughness.
- Seal Age – significant improvement in pavement durability.

Having identified that there have been some improvements in overall capacity, it is important to note that some significant road links within each of road category that are becoming more congested.

### 2.2.1 Safety Performance

Since the large reductions in fatalities on Queensland roads in the mid-1990s, the numbers of fatalities throughout the State have been relatively consistent over the past five years. In the five years to the end of 2003, the average number of fatalities on Queensland roads was 317. (The 1997 ten-year average was 405 fatalities p.a.)

In the eight-year period to 2001, the number of fatalities per 100,000 population reduced from 13.2 to 8.9, but this figure has not decreased from 8.9 since 1999. Also, the number of serious casualty crashes per 100,000 population increased from 10.2 in 1997 to 13.1 in 2001. The Queensland Government’s strategy for road safety identifies a target of less than 5-6 deaths per 100,000 people by 2011. Based on the 2003 figures, this is currently at 10.3, well above the 2011 target.

Queensland is unique in that road trains efficiently service remote area freight. However, these areas are becoming increasingly popular to the “grey nomads” (“baby boomer” retirees exploring the outback with caravans and four wheel drive vehicles). Accordingly, consideration will need to be given to investing in wider pavements and driver education where this traffic mix impacts on road safety.

In its role as State-controlled road system manager, DMR is placing greater emphasis on the overall safety performance of the system. This is captured in the strategic directions of 'Roads Connecting Queenslanders', and aligns well with the contribution expected of road system operators in the National Road Safety Strategy. It also complements the work undertaken in the Queensland Road Safety Strategy 2004 – 2011 and associated action plan 2004-05. The strategy recognizes that the Queensland road toll has plateaued since 1998 and the complex nature of contributing factors to road crashes.

In recognition of the fact that Queensland Government’s road safety strategy target is a challenge, DMR has established a special project called the 'Targeted Road Safety Initiative' (TRSI). The TRSI project was guided by research and analysis of:

- Conditions in Queensland. Just under 50% of the killed and serious injury (KSI) crashes are on State-controlled roads with 80% occurring on only 16% of the network.
- Research and best practice in other jurisdictions in Australia and overseas.

Reducing trauma is being achieved through a series of activities including:

- Enhancing the current crash analysis toolkit by adopting a system wide approach to analyzing crash data.
- Concentrate on crashes with highest social costs. The KSI crashes are only 20% of total crashes, but 94% of the social cost of road trauma.
- Focus attention on crashes that DMR, as a road authority, can most readily influence through engineering countermeasures. (77% of all Main Roads' crash types involve an intersection, head-on, run-off road or pedestrian impact.)
- Refocus on reducing crash severity rather than crash numbers, eg by introducing forgiving roadsides.
- Using a combination of cost-effective means of reducing crashes.
- Work with Police and Queensland Transport in developing effective solutions.

Two reports have been produced:

- "Crash Data Analysis Report"; statistical analysis to identify crash zones (road segments and intersection sites) or features with the worst crash history.
- "Guidelines for Developing Targeted Road Safety Initiatives" – a methodology to identify, evaluate and improve locations with poor crash records.

This new Targeted Road Safety Initiative is being implemented via a 4-year, $60 million program commitment of new funding commencing in 2004-05. Projects will be delivered through the RIP process.

In order to reduce the number and severity of accidents on local government-controlled roads, the State Government is in the early stages of establishing a State Alliance between Queensland Transport, the Department of Main Roads, the Local Government Association of Queensland, and the Queensland Police Service.

### 2.2.2 Road Condition

The road network’s physical condition can have a significant impact on freight operating costs and performance. Key performance indicators (KPIs) associated with road condition include the following:

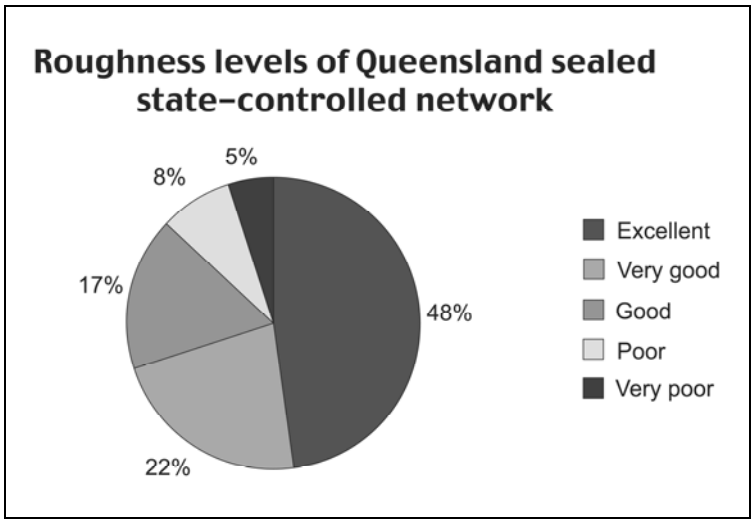
- Road roughness.
- Road pavement durability (seal age).
- Structures condition (bridges).

***Road Roughness***

The roughness level of a road link should be assessed with recognition of the traffic volumes utilizing the specific road. In its “*2002-2003 Annual Report”*, DMR identified a qualitative level of roughness for National Highways and State-controlled roads compared against traffic volumes for the sealed network.

DMR identified that about 87% of the network has a good, very good, or excellent roughness level, while 13% of the network has a poor or very poor roughness level. This is shown in Figure 2.

**Figure 2 Roughness Levels of Queensland's Sealed State-Controlled Roads**




*Source: DMR, 2003*

Table 3 indicates that the percentage of Queensland's rural roads having an acceptable level of roughness (<110 NRM) has improved slightly from 1995 to 2002 to 90%. However, this compares poorly with the equivalent figure of 92% in NSW and Victoria.

**Table 3 Roughness Levels of Queensland's Roads**

| Roughness Level | Urban Roads | | Rural Roads | | National Highways | |
|---|---|---|---|---|---|---|
| | 1995/96 | 2001/02 | 1995/96 | 2001/02 | 1996/97 | 2001/02 |
| <110 NRM | 92% | 94% | 87% | 90% | 95% | 94% |
| <140 NRM | 97% | 98% | 95% | 96% | 98% | 99% |

At the more desirable level of roughness (<70 NRM) Queensland's National Highway System falls well behind the southern States with only 62% of road lenghts on National Highways achieving this standard, compared to 72% in NSW and 88% of National Highway travel in Victoria (Austroads, 2003 in Layton et al, 2004).

***Road pavement durability***

DMR collects annual data on road surface cracking (longitudinal and crocodile). However, the data is not interpreted to the extent that roughness levels are and subsequently, a qualitative rating similar to that given to roughness levels is not readily available. However, predictions of residual pavement life are a reasonable measure of durability. Annual reports published by DMR do not comment on road durability.

***Bridges***

DMR is responsible for 2,773 bridges. (A bridge is defined as a structure having a span of at least 1.8m.) In 2004, 2,306 bridges were made of concrete and steel, while there were 467 bridges made of timber.

DMR has implemented an efficient and effective bridge management system that provides a targeted maintenance program throughout the State. The "Which Bridge" program sources data from the Bridge Asset Management System (BAMS) and gives a numerical rating of the bridge. This rating is basically a risk score and is calculated based on a number of factors. These factors include the probability of bridge

failure and the consequences of the failure, including environmental and social accessibility factors. The higher the score then the higher the risk factor. Any bridge with a score of 1,500 points or higher has been designated as requiring attention.

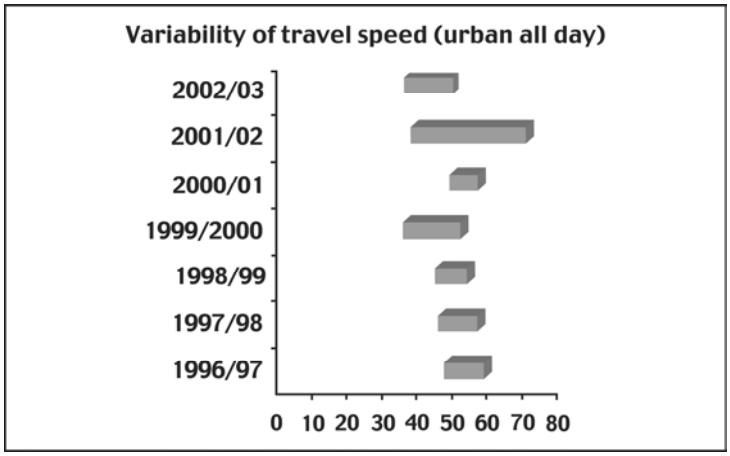
Of the 2,773 bridges in which DMR has an interest, 87 of them have a risk score between 1,500 and 3,000 points. A further 179 bridges have a risk score larger than 3,000. This indicates that over 9% of the bridges within the State are deficient in nature.

The 2004 Budget includes $80 million worth of specific projects incorporating bridge widening or replacement work. However, while DMR now has a robust asset management system and maintenance program in place, they are still developing a strategy and program for the progressive replacement of defective bridges.

### 2.2.3 Convenience of Travel

Travel speeds have generally declined on urban roads since 2000, whilst the variability of travel speeds has increased as shown in Figure 3. As congestion increases in urban areas, the average travel speed will continue to decrease and become more unreliable. In urban areas, public transport has a crucial role to play in the management of peak hour travel speeds.

**Figure 3 Variability of Travel Speeds on Urban Roads in Brisbane**




*Source: DMR, 2003*

RACQ's 2004 Brisbane travel time surveys indicated a more serious deterioration in travel times with morning peak inbound road trips slowing by an average of 23% since 1993. Similarly Austroads National Performance Indicators 2000 show that Brisbane's morning peak hour travel times had increased by 27% from 1997 to 2000.

South-East Queensland commuters will be facing increasing levels of congestion and longer journey to work travel times. If a future crisis in the cost of congestion is to be avoided in the region, the community will need to consider significant investment in both public and private transport infrastructure to maintain an acceptable standard of service for the motoring public.

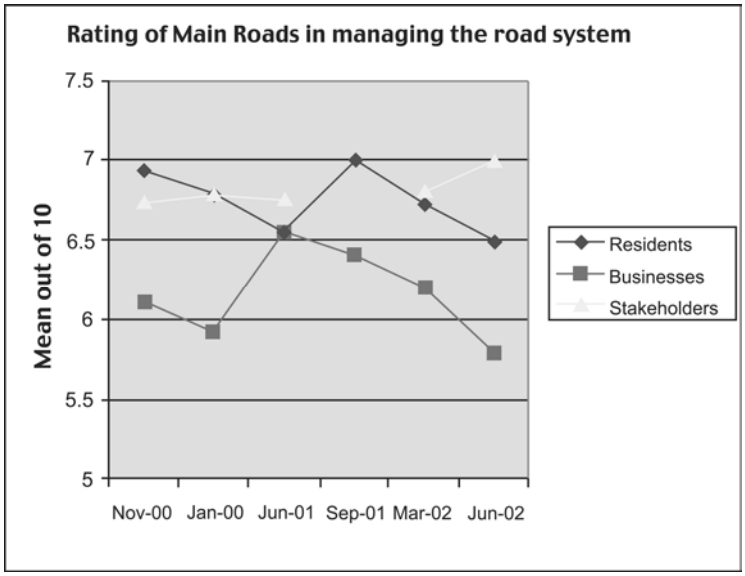
### 2.2.4 Community Expectations

***DMR Community Expectations Surveys***

DMR conducts regular surveys to determine resident, business and stakeholder attitudes about how the State Government is managing the road system. The results of the surveys are summarized in DMR Annual Reports. The *"Annual Report for 2002-03"* indicates that the community's rating has been consistent over years.

As can be seen in Figure 4, stakeholders have been the most consistent of the three sub-groups, with residents and businesses indicating that from September 2001 to June 2002, there was a decrease in 'approval rating'. The mean score of between six and seven out of ten indicates that stakeholders are moderately satisfied with DMR's management of the road system.

**Figure 4 Community Satisfaction of the State-Controlled Road Network**




*Source: DMR, 2003*

Further to the surveys conducted by DMR, Austroads derived a User Satisfaction Index (USI) in 1995, 1998 and 2000 measuring the road system and road agency performance. The survey considers eight attributes. They are road types and characteristics; traffic control / safety infrastructure; meeting road user needs; communication; traffic flow management; other road safety considerations; environment; and customer service. On a scale of 0 to 100 points, Queensland's USI has increased from 58 points in 1995/96 to 64.8 points in 2000/01.

The Local Government Association of Queensland conducted a "*Public Inquiry on Mechanisms to Fund Queensland's Roads and Transport Infrastructure*" in May 2002. Part of the Inquiry constituted a community survey of the road system in Queensland. In terms of rating the quality of roads in terms of standard and condition, a total of 36% rated Queensland's system 'good', and another 36% rated it 'fair only', with only 7% of those surveyed rated the system as 'very good'. Over 20% of those surveyed rated the road system 'poor' or 'very poor', and within this group, more than 80% identified the poor maintenance of roads as being a key negative factor.

***Funding***

The surveys also questioned the community on different methods for future funding mechanisms for Queensland's road network. More than 40% of respondents supported the removal of the fuel subsidy. Similarly, 40% of respondents were in favour of greater use of toll roads to provide an improved standard of road infrastructure. Only 30% of respondents favoured a system where motorists pay directly for actual use of roads in peak hour congested periods, although near one fifth of respondents neither supported nor opposed the proposition. Having said this, almost 50% of those surveyed supported specific charging for vehicles entering congested city centre areas if the funds were used to improve public transport. Over 50% of respondents favoured the greater use of borrowings by State and local governments to obtain funds to upgrade roads.

***RACQ RedSpot Survey***

In January 2004, RACQ published a report titled “Red Spot Survey” which detailed members’ responses to identify problem intersections, roads and rail crossings from a traffic delay and efficiency perspective. The majority of these locations were in the urban areas of South-East Queensland and most are being addressed in forward work programs. However, none of the at-grade rail crossings identified for upgrading had been funded under any roads or rail programs.

## 2.3 Existing Infrastructure

### 2.3.1 Funding and Investment

The Federal, State and local governments share responsibility for funding and management of the 178,000 km of public roads in Queensland. Essentially, the Federal Government is responsible for funding of the National Highways and provides contributions to selected projects in the RoNI (Roads of National Importance) program, while the State funds the State-controlled road system and provides TIDS funding to local governments. Local governments are responsible for the balance of the road system, amounting to approximately 80% of the length of the network.

The State Infrastructure Plan for Queensland identified a $4.8 billion backlog in rehabilitation and maintenance works on State-controlled roads throughout the State. Furthermore, a recent inquiry into the road network of Queensland identified that $400 million more each year for the next decade would be needed to bring the National Highway System to an acceptable standard. The inquiry also outlined that a funding gap of around $350 million a year existed in South-East Queensland alone.

LGAQ’s “*Public Inquiry on Mechanisms to Fund Queensland’s Roads and Transport Infrastructure”* identified that the replacement value of Queensland local government road network at more than $10 billion.

Total funding for roads in Queensland in 2004-05 will be about $1.358 billion (including $72 million from the new AusLink), consisting of:

- $313 million Federal funding for National Network, RoNI, Black Spot programs and National Disaster Relief.
- $1013 million Queensland funding.
- $32 million NDRA / developer contributions.

This funding is distributed:

- $724 million construction and rehabilitation.
- $255 million program and routine maintenance.
- $117 million corporate and technical.
- $73 million regional stewardship and capability (planning, operations, ITS).
- $62 million for local government subsidy (TIDS).
- $127 million for debt servicing.

The Federal Government announced in January 2004 that the Roads to Recovery Program would be extended for a further four years, with local governments across Australia sharing in $300 million per year for the 4-year period.

While the focus of State grants varies significantly from State to State and from year to year, funding for road transport remains a major component in the Queensland budget.

### 2.3.2 Asset Management

DMR has good data regarding its assets and is in the process of implementing strategic asset management systems for roads, bridges and other components. Over the past five or so, preservation of DMR’s assets has emerged as a key strategic imperative and it has developed consistent Statewide rating systems for pavements and bridges.

DMR utilises a system called ARMIS (A Road Management Information System). This database holds large amounts of information about the road system, including pavement history, asset management data, bridge asset data. The Department has developed a Road Asset Maintenance Policy and Strategy, which is to optimise the performance of the road asset, taking 'whole-of-life' costs for DMR and the user perspective into account.

All Queensland local governments have asset management systems of one form or another and extensive data on local roads does exist. However, the lack of consistent, consolidated data and the lack of standardised asset management systems have reduced the value of the data.

A State and national effort is required to coordinate the 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 future funding liability as they mature.

The Roads Alliance initiative between DMR and the LGAQ is addressing the disparity between asset management systems through the use of Regional Road Groups and a common asset management program has been established. In order for the evaluation of investment projects within the Local Roads of Regional Significance (LRRS) network of higher-order local roads and lower-order State-controlled roads, each local government needs extensive road condition data.

### 2.3.3 Environment

The design, construction and operation of environmentally benign roads are major challenges for Federal, State and local authorities. In recent years there has been a significant change in approach by the proponents of new roads and more thorough consideration is being given to environmental issues. Recent experience has indicated that a significant investment (5% to 20% of construction cost) is now made into the study and mitigation of adverse environmental impacts associated with new road projects.

However, a number of significant environmental issues remain including:

- Vehicle emissions and greenhouse gases.
- Noise and vibration.
- Alienation of land (severance).
- Traffic congestion.

Transport in Queensland was responsible for emissions of 15.4 million tonnes $CO_2$ equivalent in 1999 – or about 11% of total net State emissions. The Environmental Protection Agency (EPA) estimated road transport in 1999 produced 13.7 million tonnes $CO_2$ equivalent – around 10 % of total net emissions (EPA, 2004).

Between 1990 and 1999, emissions increased by 31% (EPA, 2004). It has been projected that Queensland's high population growth and increasing freight task will cause further rises in emission levels by 2010. Public transport initiatives and other government programs contribute towards limiting the growth of transport-related greenhouse gas emissions in Queensland.

The *"Queensland Greenhouse Strategy 2004"* (QGS) is a co-ordinated Queensland Government response to address greenhouse gas emissions and respond to climate change. Actions within the QGS for reducing rates of increase of greenhouse gases are consistent with the direction set by the Australian Transport Council in its *National Strategy and Action Plan for Lowering Emissions from Urban Traffic 2002.*

Queensland Transport are addressing the rising greenhouse problem by implementing measures including:

- Road transport smoothing (enhanced traffic management).
- Expanding the Aircare program (on-road vehicle emissions testing).
- Implementing an initiative to encourage cleaner buses.
- Examining options for improving in-service emissions of light and heavy vehicles.

DMR and Queensland Transport have also developed a Transport Portfolio Environmental Framework, to ensure that there are reduced impacts from transport on the environment and increased awareness of

environmental issues in the short term, and the development of a minimal impact transport system in the long term.

Important initiatives in recent years to improve road traffic in South-East Queensland have included the provision of the South-East Busway and other dedicated bus lanes. The completion of the Inner Northern Busway will further encourage an increase in availability and efficiency of buses. However, a continued program of investment in both public and private transport infrastructure will be required to arrest the anticipated increase in urban congestion and avoid the serious environmental consequences that arise from traffic congestion.

### 2.3.4 Social

Significant suffering results from motor vehicle deaths and injuries. Road safety programs and initiatives such as speed cameras, 50 kph local speed limits 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 demonstrated substantial benefits. Queensland Transport notes that in the three decades since 1972, Queensland's road toll has been decreased by 44%.

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

In rural communities throughout Queensland, public transport is often not a viable solution to accessibility issues. Roads are a fundamental element of the social fabric of rural communities and the condition and availability of the road system continues to be essential components of the socio-economic system.

## 2.4 Future Needs

***Long-term National Infrastructure Strategy***

The initial article of the first issue (March 2003) of the Public Infrastructure Bulletin – a paper released by the Australian Centre for Public Infrastructure – identifies the need for a long-term National Infrastructure Strategy. The strategy would assist governments to budget in a more transparent and efficient way, as well as providing greater certainty for private sector investment to assist in meeting the infrastructure needs of the community. The article suggests that the time has come for decision-makers to articulate such a future strategy – given competing demands, limited resources and massive costs of infrastructure – and take action on current implementation issues. The AusLink initiative (discussed below) goes some way to developing such a national strategy, but there needs to be significant levels of co-ordination and agreement across the three spheres of government throughout the country. The Australian Centre for Public Infrastructure believes that this may be the most significant challenge in achieving the long-term National Infrastructure Strategy.

***AusLink***

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

- The establishment of an integrated National Land Transport Network.
- The development of a National Land Transport Plan.

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 effect on Federal funding for roads), a

more coordinated approach at regional level is also required in Queensland. Local government has already made considerable progress on developing a regional focus through the formation of Regional Organisations of Councils (ROCs) and the Roads Alliance.

***DMR / LGAQ Roads Alliance***

The Roads Alliance will facilitate a greater focus on regional strategic planning. Under the Alliance, the Queensland Government will assist in funding the development of consistent asset management capability throughout the State.

Local governments 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.

***Public Private Partnerships***

Public Private Partnerships have been used by other State Governments for some time for the delivery of roads infrastructure. They have not been used by DMR or Councils as a means of roads infrastructure delivery in Queensland. However, there may be potential for these agencies to initiate partnerships with private enterprise to relieve the backlog of road network improvements.

Cardinia Shire in Victoria has recently entered into a 15-year local roads public-private partnership (PPP) for the sealing and maintenance of a 50 km network of unsealed roads. This would be undertaken in just two to three years under the partnership and it is expected that Cardinia Shire will make substantial savings on construction and maintenance costs.

***State Infrastructure Plan – Strategic Directions 2001***

Queensland's Department of State Development and Innovation (DSDI) released the *State Infrastructure Plan (SIP)* in November 2001. The plan is the government's tool to guide long-term economic infrastructure development in Queensland. The first component of the SIP was the *Strategic Directions 2001* document, providing strategic guidance for a five-year timeframe of economic infrastructure planning by all areas of Government and the private sector.

The second component of the Plan are the annual Implementation Plans that report progress in implementation of the SIP and contain descriptions of the relevant projects and programs being progressed each year. The most recent was the Implementation Plan for 2003/04.

It is a matter of significant concern that the Implementation Plan follows, rather than leads infrastructure provision by State agencies. There is a need to give the Plan a longer horizon (say 5 years) for commitment of funds to enable infrastructure providers to manage project development and delivery with confidence.

***Smart State Building Fund***

A number of Queensland Government's priorities for major infrastructure for the next few years are to be funded through the "Smart State Building Fund", announced in December 2003. Among other outcomes, the State Government plans to implement a $3.75 billion smart transport strategy over three years, in order to protect South-East Queensland's liveability and meet the region's future transport needs. A major component of the Smart State Building Fund (SSBF) is directed towards encouraging sustainable travel choices.

The fund includes a $1.4 billion integrated public transport ticketing initiative called *TransLink*, which will co-ordinate transport services and tailor them to passenger demands. It will bring together the Queensland Government, Brisbane City Council, Queensland Rail and 15 private bus operators between Noosa, Coolangatta and Helidon. The fund also identifies a $568 million upgrade of South-East

Queensland's road system, distributing funds almost equally between Brisbane, the Gold Coast and the Sunshine Coast.

***Bridging the Funding Gap***

A recent LGAQ inquiry into the road network of Queensland identified a number of potential mechanisms to bridge the significant funding gaps for road infrastructure. These mechanisms include:

- Borrowing money.
- Scrapping the existing 8.3c/L fuel subsidy.
- Private developers contributions.
- User charging (eg Tolls).

Each of these mechanisms has merit. Consultation with a number of stakeholders in Queensland has also identified that the community needs to make choices about the road network they utilise. The community needs to understand that, one way or another, they will pay for the transport system they use, in the higher costs of infrastructure provision, or in its operation through the costs of congestion, accidents, maintenance, availability and energy. The key question is "How willing is the community to pay for significant and costly improvements to the State's road system?"

***Integrated Land Use and Transport Planning***

Integrating land use and transport planning has a vital role to play in an increasingly complex society with competing demands and limited resources. Both Ministers for Transport and Ministers for Planning endorsed the National Charter of Integrated Land Use and Transport Planning in 2003. This agreement commits to an agreed set of good planning practices, designed to support existing and future planning mechanisms of the Federal and all States and Territories. The Charter identifies nine aims – the first focuses on integrated planning and the others relate to different outcome areas, including, amongst others: linking investment decisions; protecting and enhancing transport corridors; making better use of existing and future infrastructure and urban land; and increasing opportunities for access now and in the long-term. Implementation of the Charter will depend on the commitment of all levels of government.

***Long-term Road Network Planning***

Queensland Transport and DMR are continuing to be active in developing plans to address future needs of growth regions, although the prioritisation methodology and approach as with DMR varies from one area to the next. A number of 'Integrated Regional Transport Plans' (IRTPs) have been introduced throughout key areas of the State, including South-East Queensland, Townsville-Thuringowa, Gladstone, Capricornia, Wide Bay and Eastern Downs.

The IRTP for South-East Queensland was introduced in 1997 and identified a number of targets aimed at reducing dependence on the private motor vehicle and increasing the proportional usage of sustainable travel modes such as cycling, walking and catching public transport. Since 1997 though, the region has not experienced a significant change in travel behaviour, and Queensland Transport predictions indicate that in around 10 years, the number of cars on the road will increase by 70%, traffic congestion will double trip times and pollution levels will exceed recommended levels. The need for an achievable strategic road and transport plan has never been greater.

In the 2004 election the Queensland Government announced the formation of the Office of Urban Management within the Department of Local Government, Planning, Sport and Recreation, reporting to the Treasurer. One of the main tasks of the Office of Urban Management will be to work quickly on the completion of the South-East Queensland 2021 Regional Plan in 2004, which is focused on ensuring the integrated development of the land use transport system serving this region.

As Queensland continues to attract strong population growth there is an ongoing need for the long term planning of multi-modal transport corridors. More importantly, governments must develop and implement a program for the acquisition and preservation of these corridors to ensure that the transport needs of

future communities can be efficiently accommodated as they develop, rather than overwhelming the capacity of the transport system.

## 2.5 Report Card Rating

Queensland is a large State with long highway distances and limited budgetary resources. Hence, there is a significant contrast between the urban and rural environment for its roads and the ratings have been prepared separately for these two categories. The assessment has also considered the three basic levels of road; National Roads (as defined by AusLink), State Roads and Local Roads (including LRRS).

Ratings were also allocated on the basis of the key criteria of asset condition, asset availability and reliability, asset management, sustainability (including economic, environmental, safety and social issues) and security.

***Urban Roads***

Asset Condition was based on assessments for road condition (pavement) and “fit for purpose” (alignment and cross section) for both freight and passenger tasks. At the National Road level, asset condition was rated good with a B-, while both the State and Local Roads were considered adequate and rated C. The overall rating was achieved by combining the three road categories to produce a C+ rating of adequate.

Asset availability and reliability relate to capacity and convenience of travel which is related to the level of service. The urban networks are generally heavily trafficked and under capacity, generating poor reliability and long travel times, particularly in peak hours. The National and State Roads both attracted D ratings, while the Local Roads performed slightly better at C-. The overall rating of D+ reflected a poor level of service experienced in the over stressed urban networks.

Asset management is rapidly improving. Initiatives such as ARMIS and the Roads Alliance Program are a step in the right direction with real long-term benefits being delivered. A rating of B was given for the National and State Roads while the Local Road rating of C- reflected the less developed local government asset management system. The overall rating of B- reflects the significant investment in building MRD’s asset management system and anticipates its future benefits.

Sustainability includes a rating for funding, environment, social and safety. The rating ranged from poor for National Roads at D+, to a C- for State Roads and to Local Roads at C.

Despite the introduction of AusLink and the potential for PPP delivery, reliable adequate funding from conservative treasuries continues to throw doubt over future programs. This lack of confidence resulted in a D rating for funding of National Roads while State and Local Roads rated a C.

The rating for environmental aspects for National and State Urban Roads was also poor, D+ and C- respectively, evidenced by the fact that congestion costs are rapidly increasing, affecting liveability and the sustainability of the transport network. Local Roads were environmentally just adequate at C-. A number of significant issues remain, notably vehicle emissions and greenhouse gasses and traffic congestion.

Social and Community aspects were generally considered adequate although poor access to public and community facilities across transport corridors is still a problem for the higher order roads with National Roads a C-, State Roads a C and Local Roads a C+.

Safety aspects in urban areas are still considered a serious problem with the stalling of safety improvements in recent years causing concern. National Roads rated a D+, State Roads a C- and Local Roads a C.

Security rating needs to reflect an all-hazards approach to risk management. However, responsible agencies appear to be internalising the risk management task and there is a need to allocate resources on the basis of risk identification rather than short-term priorities, and to implement a comprehensive, best practice approach to the treatment of security threats. The moderate exposure of urban Roads

attracted an adequate rating of C, as it is understood that the authorities have recently examined this issue and established appropriate safeguards against the most exposed elements of the network.

***Rural Roads***

Asset Condition of National Roads was rated very adequate with a C+, while both the State and Local Road classifications were considered adequate due to roughness and rated C. The overall rating was achieved by combining the three road categories to produce a C+ rating of adequate.

Asset availability and reliability of Rural Roads was moderate as they were generally not heavily trafficked and had adequate capacity. The National and State Roads both attracted C+ ratings, while the local Roads performed slightly better at B. The rating suffered due to some low flood immunity in remote locations but the overall rating of B- reflected a good level of service experienced over the rural networks.

Asset management is also improving in the rural environment. ARMIS and the Roads Alliance Program are positive improvements to the management of the network. A rating of B was given for the National and State Roads while the Local Road rating of D+ reflected the poorly developed state of the local government asset management system in rural areas. The overall rating of C+ reflects the significant investment in building MRD's asset management system that needs to flow on to local government.

Sustainability includes a rating for the issues of funding, environment, social and safety. The overall rating under this category ranged from a barely adequate rating for National Roads at C-, to a C for State Roads and a C+ for Local Roads.

Despite the introduction of AusLink and the potential for PPP delivery, reliable adequate funding from conservative treasuries continues to throw doubt over future programs. This lack of confidence induced a D rating for funding of National Roads, while State and Local Roads rated a C.

The rating for environmental aspects for National and State urban Roads was adequate at C and while Local Roads rated a C-.

The Social and Community aspects were generally considered good with National and State Roads a B and Local Roads a B-. Roads remain an important component for the social fabric of rural areas and a good rating is desirable for these communities.

Safety aspects in rural areas are still considered a serious problem with long distances contributing to driver fatigue and a high accident rate. National and State Roads rated D, while Local Roads were C+.

In the remote rural areas of Queensland, security is not considered a serious threat to the road system. Natural disasters are a greater threat and generally lost infrastructure can be temporarily reinstalled without long term dis-benefit to the users of the network. The minimal exposure of rural Roads attracted a good rating of B to the National and State Roads, and a B+ for Local Roads.

***Overall rating for road infrastructure***

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

**Table 4 Overall Report Card Rating for Road Infrastructure (Urban and Rural)**

| | |
|---|---|
| Urban Roads **C** | The lack of commitment to adequate funding and integrated planning and the threat of increasing congestion results in an adequate rating. |
| Rural Roads **C+** | Lack of aggregated Statewide data on condition, availability/reliability and sustainability issues reduce the rating to C+. |

**Table 5 Overall Report Card Rating for Road Infrastructure (National, State and Local)**

| | | |
|---|---|---|
| National Roads | Urban C<br>Rural C+ | The general condition of National Roads is adequate in most areas and existing asset management systems are performing well. However, the score is reduced due to the lack of availability and reliability of National Roads throughout Queensland, coupled with lack of funding and safety problems. |
| State Roads | Urban C<br>Rural C+ | The condition of State Roads throughout Queensland is adequate, though there are some serious issues with capacity and reliability of these roads in urban areas. The environmental impacts of State Roads in urban areas and safety problems in rural areas further reduce the rating. |
| Local Roads | Urban C<br>Rural C+ | Local Roads throughout the State provide a fit for purpose asset in the majority of areas. The capacity of many urban local Roads and the lack of consistent asset management systems reduce the rating. |

**Table 6 Summarised Roads Report Card Rating**

| Road Category | Report Card Rating |
|---|---|
| National Roads | C+ |
| State Roads | C |
| Local Roads | C |

***Case Study***

**Flow-on effects of the Pacific Motorway upgrade**

An example of the need for longer term planning has occurred on the Gold Coast, where the Pacific Motorway upgrade to a high standard State Strategic Road has encouraged long-distance commuting to the Brisbane Central Business District, even from areas in northern New South Wales. The city is growing at rates in excess of population projections and traffic volumes on the arterial road system have increased significantly over the past five years.

The poor standard of the old highway between Brisbane and the Gold Coast and the consequent low level of reliability had suppressed the demand for development along the corridor. Following the construction of the new facility, travel times between the two centres improved significantly and the area has subsequently experienced dramatic growth as development occurs and takes up the spare capacity offered by the new facility.

Although the Queensland Government has stated it will continue its commitment to providing a 'smart transport system' throughout South-East Queensland, the current transport system in the region is struggling to keep up with demand.

**Central Queensland, The Dawson Highway**

Large construction projects get the publicity but, in Central Queensland, strategic rehabilitation work on the Dawson Highway is making real efficiency gains for the transport industry without the fanfare or high costs.

The Dawson Highway extends from Gladstone to Springsure and is the key route between the rapidly developing Gladstone Port and industrial precinct and the coalfields and farms in Central Queensland. It is 406 km in length and services the towns of Biloela, Banana, Moura, Rolleston and Springsure. It currently carries around 20% commercial vehicles, and an additional 400 over mass or over dimensional vehicles each year.

In 1999, 320 km of the road were below the minimum width suitable for heavy vehicles, and 250 km had a roughness exceeding 120 counts per km. There were also 21 structurally deficient bridges, limiting the access of over mass vehicles.

Funding of around $6 million per annum was provided by DMR to upgrade the road during the period between 1996 and 1999. In recognition of the Highway's importance to freight transport, since 1999 the Queensland Government has increased funding by 30% to approximately $8 million per annum.

This has allowed for 105 km of the Highway to be widened and/or strengthened and 14 deficient bridges have been improved, including five new bridges. The current program shows a continuation of this work with a further 125 km of the Highway planned for widening and 9 bridges are planned for replacement or repair over the coming 5 years.

This additional investment in the Highway has seen the width deficiency reduced from 320 km to 215 km. Roughness has improved from above 120 counts per km to less than 100 counts per km. There has also been a reduction in deficient bridge numbers by 53%.

The benefit of this investment has been extended through aggregating works (the average project size has increased by 25%) and through the adoption of 'fit for purpose' design and construction standards.

Bringing together a range of small projects into one large package means considerable savings from economies of scale and the opportunity to apply innovative treatments and materials. The "fit-for-purpose" design has reduced costs by an average of $120,000 per km.

One other benefit of investing in rehabilitation work, which is often overlooked, is the employment it generates in rural and remote townships. With low commodity prices and an entrenched drought, minor roadworks can make all the difference to a small, economically depressed area directly by maintaining the local workforce and indirectly through flow-on effects.

# 3. Rail

## 3.1 Overview

Queensland's railway infrastructure supports the operation of both passenger and freight rail services. The State (Queensland Transport) owns all rail corridor land and this is leased to accredited railway managers such as QR Network Access Group (QRNAG), which manage the vast majority of the rail system throughout Queensland. The Weipa Bauxite railway, the sugar cane rail system and a small number of balloon loops (totalling under 35 km) are the only exceptions to this.

Queensland Rail was formed in 1865 and has recently undergone a number of changes. Introduction of legislation in 1991 led to the establishment of a Board of Directors and the corporatisation of Queensland Rail into QR in 1995. QR now acts as an access provider (QRNAG), freight operator (QR Coal and Freight services) and a number of passenger operators (run by QR Passenger Services) and is a State owned corporation, reporting to the Minister for Transport and Main Roads and Treasurer.

### 3.1.1 System Description

The rail network within the State is approximately 9,500 km in length and occupies around 40,000 ha of rail corridor land. Approximately 1,900 km of the network is electrified with a 25,000v 50Hz AC supply. A narrow gauge heavy rail network dominates rail infrastructure in Queensland. There is also a 99 km standard gauge heavy rail track connecting NSW to the freight terminal at Acacia Ridge. From Acacia Ridge, dual gauge tracks link to the Brisbane CBD (terminating at Roma Street Station) and Fisherman Islands in the Port of Brisbane.

The heavy rail network in Queensland consists of:

- Approximately 9,500 km of operational rail track.
- Bridges, tunnels and around 3,650 level crossings.
- Signalling and telecommunications.
- Overhead electric traction equipment.
- Train control centres and marshalling yards.

The rail network in Queensland is comprised of the following sub-systems:

- Brisbane Metropolitan System.
- Blackwater System.
- Central West System.
- Goonyella System.
- Maryborough System.
- Moura System.
- Mt Isa System.
- Newlands System.
- North Coast Line System.
- South Western System.
- Tablelands System.
- Western System.
- Standard & Dual Gauge System.

QRNAG facilitates nearly 900 train services a day, moving 160,000 passengers and 400,000 tonnes of freight on a daily basis.

### 3.1.2 Governance

The vast majority of Queensland's rail network is owned, operated and managed by the various departments of QR. QR is self-funded through its own commercial operations, but also receives funds

from the Queensland Government, through Queensland Transport as Community Service Agreement payments.

Queensland Transport is responsible for developing rail policy advice and contracts for the provision of the rail services and infrastructure that the State Government wishes to purchase. Queensland Transport is also head lessor for rail corridor land in Queensland.

The functions of QR are to provide comprehensive transport services and ancillary support to those services, whether in or outside Queensland or Australia, including:

- The provision of passenger and freight services.
- The provision of consultancy and training services relating to transport services.
- Establishing, maintaining and arranging for provision of transport infrastructure.

QR also provides goods and services to Government departments, business enterprises and to the public including passenger rail transport; commercial and industrial rail transport; railway track construction and maintenance for the Australian rail industry: industrial logistics rail services; and a network for general freight that utilises both rail and road transport.

***Access Pricing and Competition Policy***

As with the road transport industry, the rail industry is also subject to the National Competition Policy (NCP) reform obligations. The Queensland Competition Authority (QCA) administers the NCP in Queensland. The third party access regime for infrastructure in Australia is closely associated with the NCP, and the National Competition Council has set out a series of goals to promote the competitive and efficient use of Australian rail networks.

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

### 3.1.3 Sector Trends

***Public to Private Operators***

While QRNAG remains the major owner and manager of rail networks throughout Queensland and QR's rail operating bodies provide operators, Queensland Transport (QT) is seeking to encourage innovative private sector investment in the State's rail network. This initiative is identified as an objective of the *Rail Network Strategy for Queensland 2001 - 2011*, released by the State Government in 2001. The strategy identifies that efforts should be made towards facilitating private sector proposals for investment, including partnership arrangements, where risks can be appropriately managed and net benefits to Queensland can be demonstrated.

A recent example of private operations was the implementation of the Airtrain. The Queensland Government granted Airtrain Pty Ltd an exclusive concession to Build Own Operate and Transfer (BOOT) a commuter rail link from the Metropolitan Network to Brisbane Airport. Operations on the link commenced in May 2001 and benefits to the State included a $200 million investment in capital infrastructure.

***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 have 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).

AusLink represents a new approach to planning and decision-making for the National Transport Network based on integrated corridor strategies. The AusLink Rail Links include the Brisbane –Townsville link (North Coast Line System) and Townsville-Mt Isa link (Mt Isa System), providing the opportunity to establish these elements in future funding programs. However, the initial AusLink 5 year National Land Transport Plan, which commenced on 1 July 2004, did not invest in these two links and only funded signalling improvements to the standard gauge line between Brisbane and the NSW border.

The lack of long-term investment to modernise and expand public transport – including the urban rail system in South-East Queensland – has been identified by the State Government. In an effort to coordinate public transport planning and investment, Queensland Transport established TransLink to facilitate such initiatives as "TransLink Ticket" and a series of planning studies to focus investment on catering for the projected population growth in South-East Queensland. The ticketing came into effect on 1 July 2004 to allow multi-modal journeys in the re-zoned public transport system.

***Investment in Urban Rail***

Urban rail is considered to be the most efficient form of mass transport, however, nationally in the last 40 years, 400 km of urban freeways have been constructed compared with just 80 km of rail. In Brisbane, the investment in Airtrain, the Gold Coast line, the Merrivale Bridge and the Roma St to Central tunnels compares poorly with the investment made in the Gateway, Logan and Pacific Motorways. Residents in the fringes of cities are becoming increasingly reliant on the private motor vehicle without complementary investment in public transport infrastructure.

The Federal Government provided over $1.5 billion (1999$) between 1974 and 1996 (Laird P, Newman P, Bechels M and Kenworthy J, 2001). However, in the AusLink white paper the Federal Government clearly views the funding of urban rail as a State responsibility.

A number of planning projects have been undertaken by Queensland Transport, looking at the feasibility of extending the Gold Coast line south of Robina, increasing the capacity of the Gold Coast line, the Petrie-Kippa Ring rail link and duplication of the Caboolture-Landsborough section of the North Coast Line. The latter proposal has been plagued by planning delays, resulting in further rounds of feasibility study and the prospect of sub-optimal alignments. While further investment is needed to complete such projects identified in the Queensland Government's Integrated Regional Transport Plan, the only significant capacity upgrade project in the 2004 budget is for the Gold Coast line.

***Investment in Freight Infrastructure***

In addition to essential maintenance, Queensland's non-bulk rail freight network has seen little improvement to track alignment and capacity. Limited axle load capacity, level of service and speed of delivery provided to rural Queensland has seen rail's market share decay. Queensland Transport has identified the scope of improvement works for several critical links (including the approximately $700m Gowrie to Grandchester section and the approximately $400m Landsborough to Caboolture section), but successive Federal and State budgets have not funded these improvements. While the 2004 Queensland Budget included only $0.5m for upgrades on the Caboolture to Landsborough section it is understood that this project remains high on the Department's agenda.

Various proposals have been made to extend the catchments of the Ports of Brisbane and/or Gladstone by linking various elements of the inland rail network through NSW and on through to Melbourne via Parkes. These proposals include an Australian Inland Rail Expressway (AIRE), as part of the Australian Transport and Energy Corridor (ATEC), and the Great Australian Trunk Railway. Recently, Patrick Corporation has publicly supported the inland rail concept.

A report released in late 2000 by the Bureau of Transport Economics (now BTRE) showed that ATEC's proposal had very significant economic benefits. The economic analysis indicates that every dollar spent

on the project should generate a benefit of between $3.60 and $8.50. This equates to a whole of life economic benefit of at least a $5 billion asset.

However, after gaining “in principle" support from the Federal Government since 1998 for feasibility studies and Major Project Facilitation (MPF) status, the various proposals have failed to secure adequate financial support to fund the high initial capital cost of extending a standard gauge inland railway into Queensland. In June 2004, AusLink reported that ARTC had committed $57m to track improvements between Cootamundra and Werris Creek, but the significant link into Queensland remains unfunded.

## 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).

### 3.2.1 Passenger Services

Queensland Rail’s passenger services can be categorised as three segregated services – the Citytrain service, the Airtrain and the Traveltrain services.

The *Citytrain* services are the suburban and inter-urban network within South-East Queensland. These services catered for over 45 million passengers in 2003, operating around 740 services a day.

Airtrain Citylink Ltd, which, owns the *Airtrain,* is a private, independently operated company using QR rollingstock. The Airtrain links Brisbane’s domestic and international airports to the CBD in 20 minutes.

The *Traveltrain* services are made up of around ten long distance and tourist trains and provides transport for around 900,000 passengers a year. These services operate as a dedicated tourism arm of Queensland Rail and link Brisbane to Rockhampton, Proserpine, Townsville, Cairns and Charleville and also provide linkages between Cairns, Kuranda and Forsayth, Rockhampton and Longreach, Townsville and Mt Isa and Normanton and Croydon. The QR *Tilt Train*, with the potential to operate at 160 km/h, provides a high-speed passenger service from Brisbane 3 days a week to Cairns and 6 days a week to Rockhampton.

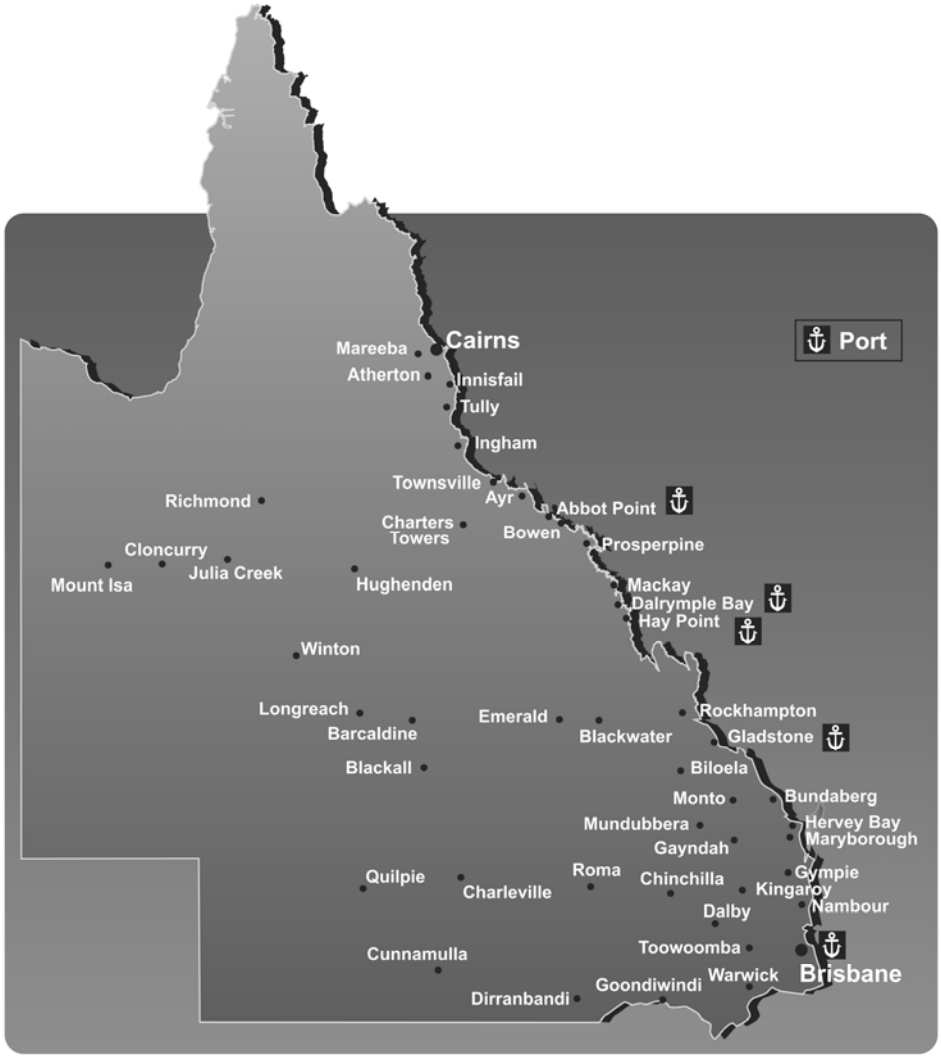
There are a number of indicators to measure the current performance of the passenger rail system. QR’s Annual Report for 2002-03 outlines a number of performance measures for the passenger component of the State’s rail system. These include:

- Very high levels of peak on time running, averaging 96% and reliability averaged greater than 99% for Citytrain services.
- The number of signals passed at danger (red) has decreased to 2.55 per million train kilometres against a target of 4.14.
- A very high level of overall satisfaction with Citytrain services, achieving a rating of 7.47 on a 10-point overall satisfaction scale (where 10 is extremely satisfied). Traveltrain achieved a rating of 8.45, which is also very high.
- Patronage growth for the network to increase with Citytrain increasing by 1.7%.

### 3.2.2 Freight Services

QR provides a number of freight and logistics services throughout the State. *Q-Link* is an integrated rail / road transport and logistics management system. It also provides freight consolidation and distribution, materials handling solutions for difficult freight, warehousing, on-shipment, delivery to retail outlets, and repacking from bulk to smaller loads. Queensland’s Freight Distribution Centres are shown in Figure 5.

**Figure 5 Queensland Freight Terminals**




*Source: Queensland Rail, 2004*

QRNAG's ***Coal Rail*** network links over 30 coal mines, located in the rich coal fields of central and South-East Queensland, to six export coal terminals on the State's eastern seaboard. Maintenance of QR Coal and Freight Services' rollingstock is performed at facilities in Rockhampton, Gladstone, Mackay and Townsville districts.

QR's ***Industrial Products*** Division provides transport and logistics services to the mining, mineral processing and industrial sectors. Moving about 5 million tonnes each year of mineral products including copper, zinc, lead and nickel in both ore and metal form, this is one of the leading bulk mineral and metal transporters in Australia.

QR's freight services also include ***Regional Freight***, which caters for grain, cattle, and general freight.

The QR Annual Report for 2003-03 stated that the rail system carried 156.5 million tonnes of coal and freight in the financial year. This was a 1.8% increase on a record set in 2001-02, despite major impacts arising from severe drought conditions affecting grain and livestock tonnages.

Toll's Queensland operation, *Toll North* (QRX), is one of the private freight companies shipping goods by rail in Queensland. Pacific National is growing into Queensland through its *Pacific National Queensland* brand and will provide more competition within the freight industry in Queensland.

## 3.3 Existing Infrastructure

### 3.3.1 Freight General Background

Freight service performance measures within QR's Annual Report are:

- The Track Quality Index for the Central Queensland Coal Region.
- The Track Quality Index for QR's below rail network, excluding the Central Queensland Coal Region, the metropolitan region and QR's standard gauge infrastructure.

The Track Quality Index for the Central Queensland Coal Region was 29.1 in 2002-03, and the indicator for the balance of the network was 52.5 in the same period. The lower the indicator, the better the track quality.

Furthermore, QR produces quarterly data for performance measures relating to freight services. For the October – December 2003 quarter:

- Services that exit the QR network on-time within an agreed threshold equalled 96%.
- Services that do not deteriorate beyond an agreed threshold equalled 87%.
- Major reportable safety incidents equalled 12.
- Percentage of the track under temporary speed restrictions – Central Queensland equalled 0.78% with the balance equalling 7%.

### 3.3.2 Previous Rating

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 gave the following grades to some Queensland sectors, using the same grades as developed for the 2001 Australian Infrastructure Report Card.

- Melbourne – Sydney – Brisbane main line track: F
  - Poor track coordination, steam-age alignments and inadequate signalling and communication systems.
- Central Queensland coal lines: A-
- Brisbane – Cairns: C+
  - Caboolture – Landsborough is the most congested single track in Australia. Duplication and other track straightening are long overdue.
- Grandchester – Gowrie: D
  - This 19$^{th}$ century track alignment is in need of replacement.

The RTSA did not rate the Brisbane Metro rail system, but did rate the Perth network at A-, Sydney at C- and Adelaide at D. It is understood that the Melbourne and Brisbane networks would have been rated in the B+ to C range.

### 3.3.3 Metropolitan Network

The Brisbane Metropolitan System features 691 km of track length, with an additional 38 km of dual gauge track length. The predominant traffic on the system is passengers, grain, coal and general freight. Current operators on the system include Queensland Rail (passenger and freight), Pacific National, and CountryLink. The system is a centralized network of single, duplicated, triplicated and quadruplicated railways radiating from the Brisbane CBD.

The majority of the system is powered by a 25 kV AC overhead traction supply. The track itself is predominantly 47 kg/m rail on timber sleepers, with around 30-35% of the sleepers being either concrete or steel. The maximum line speed of most of the system is 100 kph, with the Beenleigh – Robina link a

140 kph corridor, however, the alignment of the majority of the network means that speeds are well below 100 kph.

Many of the overhead traction components in the system are approaching the end of their serviceable life, and QR is undertaking progressive replacement of these components. Nine of the system's bridges are timber, with the balance being concrete or steel. The timber bridges are in the process of being replaced. There are also 29 mid-section footbridges, some of which are timber. Investigation and investment into making these public crossings safer are being prioritised for the system. There are a large number of open level crossings at grade. The ultimate solution of constructing grade-separated crossings is dependent on government funding.

Capacity constraints, such as peak hour corridor capacity, river crossings, tight curves, passing loop length, crossing times and shunting operations, have been identified by QR, with corridor capacity representing the most pressing issue for the next decade.

### 3.3.4 Blackwater System

The Blackwater System features 677 km of track and predominantly transports coal. Current operators on the system include QR freight and passenger services. The system includes 197 track kilometres of the North Coast Line and there are 11 mines in the system. The Blackwater System is bi-directional duplicated track between Callemondah and Rocklands, Westwood and Windah, Tunnel and Aroona, and Duaringa and Wallaroo, with the balance of the track being single line. Track structure from Gladstone to Gregory is mostly 60 kg/m rail on concrete sleepers. The spur lines to the mines are 57/43 kg/m rail on timber or concrete sleepers. Boonal is the only spur that consists of 41 kg/m rail on timber sleepers. Bridges consist mainly of pre-stressed concrete decks with reinforced concrete piers designed up to M270 standard. Fencing is mostly stock fencing. Capacity constraints, including passing loop availability, transit times and shunting operations, have been identified.

### 3.3.5 Central West System

This system is comprised of 1,333 km of track length and mainly transports cattle, cotton and grain. Queensland Rail passenger and freight services are the current operators on the network, which is divided into sections varying from good quality track with 50 kg/m rail to track in poor condition comprised of 20 kg/m rail. The rail lies predominantly on timber sleepers. The section from Burgrove to Emerald is the highest quality track in the system and represents the highest tonnage. The Central West System is all single track and features 46 crossing loops. The system does not experience major capacity constraints due to its low tonnage, but if coal development in Springsure eventuates, then current track structure may be a constraint.

### 3.3.6 Goonyella System

The Goonyella System has 734 km of track and predominantly transports coal. Operators on the system include QR freight services. The system is bi-directional between Dalrymple Bay and Broadlea, with the remainder of the track being single track. The system consists predominantly of 60 kg/m and some 53 kg/m continuous welded rail on concrete sleepers. The original line construction standards are typical of that found on coal corridors. The most significant issue with the system is the ballast and formation condition. Foul ballast or poor formation is the cause for the majority of speed restrictions within the system. There are several bridges in the system constructed to M270 standard (with pre-stressed concrete decks and reinforced concrete piers), but the majority are an M220 standard. The entire system is covered by a 25 kV overhead traction power system. Capacity constraints, including speed restrictions, some sections of single track, congestion at crossings and capacity at Jilalan, have been identified.

### 3.3.7 Maryborough System

The Maryborough System features a number of branches, predominantly catering for general freight. The system is 565 km in length and Queensland Rail freight services are the major operator on the system. The majority of the system features 31 kg/m or 20 kg/m rail and timber sleepers. The track has generally good alignment for a branch line, although the section that climbs the Dawes Range from Many Peaks has many sharp curves and steep grading. Some sections of the system are also prone to flooding. The system is all on single track and there are 16 crossing loops throughout the system. No capacity constraints have been identified on the Maryborough System, but the existing track structure would be a limitation is traffic demand was to increase.

### 3.3.8 Moura System

The Moura System is 368 km in length and transports coal, grain and general freight. Queensland Rail's freight services are the major operators on the system. Track in the Moura System consisting of 60 kg/m and 53 kg/m rail is generally continuously welded, whilst the 47 kg/m rail is long welded into 110m lengths. Rails of 41 kg/m and 31 kg/m are mechanically jointed into various lengths of less than 110m. The system is all single track and has 10 crossing loops in total. Bridges from Callemondah to Moura Mine Junction are constructed of concrete to M220 standard. The system is not electrified except for Barney Point to Callemondah and part of the Byelee flyover. These links are powered by an autotransformer system with the overhead line equipment operating at 25 kV, 50 Hz, alternating supply.

### 3.3.9 Mt Isa System

The Mt Isa System is a 1,042 km network catering for minerals, livestock and industrial products. QR freight and passenger services are the major operators on the system, with the link between Hughenden and Cloncurry being influenced by areas of black soil formation. The original line construction standards are typical of that found on western corridors. Flooding and line overtopping are regular events, with sections west of Hughenden more prone to prolonged track outages. Bridging is either concrete or steel, with one timber bridge near Cloncurry. Track structures throughout the network range from a 47/53 kg/m concrete sleepered track between Stuart to Hughenden, to 41 kg/m steel sleepered track east of Cloncurry. The Mount Isa System is all single track, besides a short length of duplicated track on the North Coast Line between Stuart and Townsville. The system has 44 crossing loops equipped with trailable facing points that limit speed to 25 kph. Capacity constraints, including passing loop availability, right hand running through passing loops and seasonal speed restrictions, have been identified for the Mount Isa system.

### 3.3.10 Newlands System

The Newlands System is a 184 km system that predominantly transports coal. Queensland Rail freight services are the primary user of the system, with mines located at McNaughton and Newlands. The track is mostly 53 kg/m rail on concrete sleepers and the system is not electrified. Bridges are constructed of concrete to M220 standard, except for Euri Creek (M160 standard) and Sheepstation Creek (C21 standard). Despite modern formation, the system is subject to formation movement and subsequent geometry variability. Capacity constraints, such as the strength of bridges, length of loops, seasonal speed restrictions and congestion between Durroburra and Abbot Point, have been identified for the Newlands System.

### 3.3.11 North Coast Line System

The North Coast Line System features 2,008 km of track and predominantly transports general freight along the main coastal freight artery within the Queensland Rail network. QR passenger and freight services and Great South Pacific Express are the major operators on the system. The system is bi-directional duplicated track from Callemondah to Rocklands and duplicated track from Nome to

Townsville, with the balance of the system being single track only. There are 129 crossing loops on the single track and a total of six single line branches in the North Coast Line.

The system has gone through a number of evolutionary phases, especially south of Rockhampton where electrification in 1989 and a number of deviations and relays since this time. More than 90% of the system south of Rockhampton is capable of 80 km/h, although the alignment of the Landsborough – Maryborough link is a major impediment. South of Gladstone, the rail is mostly 47 kg/m, with 60 kg/m rail north to Rockhampton. The Brisbane – Rockhampton link features concrete sleepers, with a limited number of steel sleepers in certain areas. Limited component replacement of overhead electrified systems will be required in the near future. North of Rockhampton, track structure is being upgraded to 60 kg/m on concrete sleepers, enabling 100 kph speeds. Bridges are mostly concrete, as well as a number of steel structures and a small number of timber bridges. The Townsville to Cairns section of the system is to be strengthened by replacing the existing timber and interspersed steel sleepers with 100% steel sleepers. The existing 41 kg/m rail is considered adequate for the lower traffic task.

The North Coast Line System operates at near capacity at a number of locations. Competition between freight and suburban / inter-urban passenger services between south of Nambour has emphasized the need for consideration of duplicating the track to accommodate further growth. There are also speed restrictions on the North Coast Line System due to cane crossings, although renewal projects in the Cairns to Rockhampton corridor may address this.

### 3.3.12 South Western System

The South Western System is 687 km in length, predominantly transporting grain, cotton and general freight. Queensland Rail freight services are the major operator on the system, which is all single track. The system has a number of branches, with the Toowoomba to Thallon link of the system having 47/41 kg/m rail on timber and interspersed steel sleepers. Between Warwick and Inglewood there is 30 kg/m rail and south of Warwick there is 41/31 kg/m rail on timber sleepers. The northern branch from Wyreema to Millmerran is made up of 30 kg/m rail on timber sleepers. West of Thallon the track is in very poor condition, with 20 kg/m rail on timber sleepers. There are 30 crossing loops throughout the system, but crossing loop capacity on the system has been identified as a constraint. Furthermore, an upgrade of track west of Thallon would reduce a number of capacity constraints. Steel bridges between Warwick and Inglewood are approaching their limit in load carrying capacity.

### 3.3.13 Tablelands System

The Tablelands System is 658 km in length providing transport for QR passenger and freight services carrying mostly sugar. The Cairns – Kuranda Steam Train also operates on the link as a major tourist attraction within the region. The system has evolved into two separate corridors – from Normanton to Croydon and from Cairns to Forsayth – both of which are single track. There are six crossing loops on the Cairns to Forsayth link. The track from Cairns to Kuranda consists of 41 kg/m and 31 kg/m rail on timber and interspersed steel sleepers. Track clearance on this link is limited by heritage constraints and the size of tunnels restricts container traffic to small size only. Speed limits are also constrained due to sharp curves and steep grades. Maintenance and upgrades on this link are costly due to the geographical nature of the network. From Kuranda to Arriga, the track consists of 47, 41 and mostly 31 kg/m rail with timber and steel sleepers and bridges are of timber and steel construction. From Mareeba to Atherton, the track structure reduces to 31 and 20 kg/m rail on timber sleepers. The Arriga to Forsayth and Normanton to Croydon links are available for rail motor traffic only, with the latter constructed over a century ago. The minimum earthworks on this link makes it prone to flooding, especially during the cyclone seasons. The mountainous nature of the link and the lack of crossing loops have been identified as the predominant capacity constraints on the system.

### 3.3.14 Western System

The Western System has 1,552 km of track length and transports coal, livestock, grain and general freight for QR, as well as some QR passenger services. The system is comprised of the main line from Rosewood to Charleville and five branches. The track is duplicated from Rosewood to Grandchester and from Yarongmulu to Helidon, with the balance of the system being single track. Track structure from Rosewood to Helidon is 41/50 kg/m rail on timber sleepers and there are steep grades and tight curves near the Toowoomba Range. West of Toowoomba the track is in reasonable condition with 41 and 31 kg/m rail on predominantly timber sleepers interspersed with one-in-four steel sleepers. The Wandoan branch operates with 41 kg/m rail on timber sleepers and is in reasonable condition. The Westgate to Quilpie branch was built to a low standard, with 20 kg/m rail on timber sleepers and the Charleville to Cunnamulla branch is of similarly poor standard, supporting very little traffic. From Dalby to Glenmorgan the track varies between 31 and 41 kg/m with predominantly timber sleepers. There is 31 kg/m rail on timber sleepers for the Tycanba to Jandowae branch. There are 62 crossing loops throughout the system.

The track structure on the Rosewood to Helidon section of the system is inadequate for the traffic task. QR has identified that significant problems with rail creep are occurring. The major impediments to growth and competitiveness are the grades and alignments of the Little Liverpool and Toowoomba Ranges. The Westgate to Quilpie link has been identified as a strategic link for regional Queensland, and needs upgrading to ensure sustainability. The crossing loop lengths are also inadequate given the current traffic task.

### 3.3.15 Standard and Dual Gauge System

This system is 99 km in length and caters for general freight, bulk steel and passenger services. A number of operators use the system, including QR, Pacific National, Countrylink and Great South Pacific Express. The system is comprised of a single line standard gauge track (1,435 mm gauge) with three crossing loops. The track consists of 53/60 kg/m continuously welded rail on timber sleepers with around a third being concrete. The system allows for 115 km/h freight transport and 125 km/h passenger transport and connects with the NSW North Coast Line and ultimately the remainder of the Australian standard gauge system. Capacity constraints on the system have not been a significant issue. However, AusLink has recognised and funded the upgrading of the out dated signalling system on the link between NSW and Acacia Ridge.

The standard gauge line has been highlighted as having the potential to provide an additional route for QR Citytrain services. Studies are currently underway to examine the viability of this proposal and the impacts the additional services will have on the existing network.

### 3.3.16 Funding and Investment

QR currently has assets valued in excess of $7.1 billion, with a gross annual turnover of around $2.5 billion. QR's investment program for 2002/03 excceeded $444 million, with more than half of these funds being allocated to QR's infrastructure.

The 2002-03 Implementation Plan for Queensland's State Infrastructure incorporates a Transport Action Plan for the State. Several of the initiatives within the plan are directed towards planning for investment in the rail network. These are summarised as follows:

- Townsville to Mount Isa Rail Corridor Directions Proposal – internally funded in 2002/03 by Queensland Transport, with DMR, QR and local governments being other stakeholders.
- North Coast Line Rail Corridor Study – internally funded in 2002/03 by Queensland Transport, with DMR, QR and local governments being other stakeholders.
- Robina to Tugun Road and Rail Corridor Study - internally funded in 2002/03 by Queensland Transport and DMR with QR and Gold Coast City Council being other stakeholders.

- Australian Inland Rail Expressway - a proposal to construct a standard gauge railway from Melbourne to Brisbane and Gladstone. The State Government agreed to manage the Environmental Impact Statement investigations and provide project facilitation support. The EIS is being undertaken from 2002/03 to 2003/04 and the private sector is to develop the infrastructure from 2004/05 to 2006/07 onwards, subject to a market assessment. Besides ATEC, stakeholders in the development of the inland railway include the Department of State Development and Innovation, the Transport Department, the Australian Rail Track Corporation (ARTC) and local governments.
- Toowoomba Range Rail Crossing – investigations and studies enabling recommendation of a preferred corridor were funded and completed by Queensland Transport and Queensland Rail in 2002/03, with other stakeholders including Toowoomba City Council and the Federal Government.
- Rail upgrade between Rockhampton, Townsville and Cairns – Queensland Transport spent over $100 million in 2002/03 improving the railway track and associated infrastructure between Rockhampton and Cairns.

***Additional projects that are progressing include:***

- Duplication of parts of the Gold Coast Line.
- Duplication of parts of the Ferny Grove Line.

The 2004-05 Federal Budget was announced in May 2004 and this included significant funding for land transport improvements throughout Australia. In total, $1.487 billion has been allocated to AusLink over the five-year period, with the ARA anticipating that around $550 million of the AusLink budget being specifically for rail network improvements.

However, the rail funding allocation has been focused on the southern states, and only the signalling upgrade of the 90 km standard gauge track between NSW and Acacia Ridge has seen funding under this plan. While these funds should improve the operation of the Sydney to Brisbane corridor, it will do nothing to enhance rail networks north of Brisbane.

### 3.3.17 Asset Management

QR's approach to asset management is primarily based on a whole-of-life-cycle approach. To optimise the network assets, Queensland Rail developed an Asset Management Framework with a time horizon of around a decade. The approach consists of:

- QR's Network Development Plan.
- QR's Network Maintenance Plan.
- An Alliance-style Maintenance and Project Agreements with specified goals.
- A Detailed Performance Monitoring Framework.
- Independent Asset Condition and Service Provision Auditing.

QR's Asset Management Framework also includes a Financial Asset Corridor Model to provide historical and projected indications of the financial performance of each system in QR's rail network. This model takes into consideration revenues, capital investment, maintenance activities, capital charges and internal costs and service charges.

Further to this, QR has the capacity to assist in the development of a complete asset management program that can increase the effectiveness and reduce the running costs of the networks. Asset management capability in QR encompasses more than just maintenance, with systems covering:

- Procurement and materials logistics.
- Track and structures performance management.
- Detailed long and short-term planning advice.
- Rail infrastructure condition monitoring.
- Asset inspection and safety auditing.
- Compliance.
- Property and contract management.

### 3.3.18 Environment

Bureau of Transport and Regional Economics (BTRE) studies have proven railways to be a far more environmentally-friendly form of transportation than most other forms of transport as they are more energy efficient, produce fewer emissions and are generally less intrusive on communities and the landscape. BTRE studies indicate that car travel uses up to six times more energy per-passenger km and road freight uses at least three times more energy per tonne-km as the equivalent rail task. Further, the studies indicate that car travel produces twice as much greenhouse gas emissions per passenger-km and road freight produces three times as much greenhouse gas emissions per tonne-km as the equivalent rail task.

The reasons for the superior fuel efficiency of rail compared with road are:

- Lower rolling resistance from steel wheels compared with tyres.
- Lower air drag – one train compared with many individual trucks.
- Easier gradients on rail tracks than on many roads and greater potential to take advantage of momentum for parts of a journey.

QR's Corporate Environmental Management System (EMS) is designed to assist QR to achieve compliance. The following are the major environmental issues being managed by QR:

- Noise.
- Contaminated land.
- Water pollution.
- Waste management.
- Vegetation management.
- Energy usage.

In November 2000, QR became a signatory of the Australian Greenhouse Challenge and now measures and reports to the Australian Greenhouse Office its greenhouse emissions compared to its transport output. Improvements in the rate of energy use and greenhouse gas emissions have been gained through the implementation of a number of existing operational initiatives. Examples of these include the introduction of:

- Larger wagons.
- Improved rollingstock utilization.
- More energy efficient locomotives and passenger rollingstock.

As a result of these initiatives, QR's greenhouse gas static efficiency forecast of a 477,000 tonne saving between 2000 and 2004 contributes approximately 2% of the total national target.

QR has instigated various environmental initiatives including its aim to potentially phase in the use of ultra-low sulphur diesel fuel (ULSD). However, a noticeable deficiency exists with regards to economic recognition of such initiatives. That is, the additional costs to be incurred by QR in phasing in the use of ULSD (which is more expensive than fuel with higher sulphur content) are not covered by any entitlement under the Diesel Fuel Rebate Scheme (DFRS). This increase in cost could result in higher haulage costs being charged to QR's customers.

## 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 Queensland and throughout Australia, are outlined below:

***AusLink***

The AusLink White 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 Federal 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, in the 2004 Federal budget, delivered limited investment for the National Rail Network to allow it to compete with road transport for the freight task. The increasing trend for general freight to be hauled by road rather than rail will continue as long as road improvement funding delivers travel time and operational savings to road freight operators, while rail operators are burdened by infrastructure funding structures requiring more direct cost recovery. It has been reported that the Rail Plan needs political will and AusLink fails to address the recovery of real road costs from heavy trucks.

***Australian Transport Council***

The Australian Transport Council (ATC) is a Ministerial forum for Federal, State and Territory consultations and provides advice to governments on the coordination and integration of all transport issues at a national level. The ATC announced that the National Road Transport Commission would take responsibility for rail and intermodal operations from 1st July 2003. This combined transport responsibility is now the responsibility of the National Transport Commission (NTC).

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

***Australasian Railway Association***

The Australasian Railway Association (ARA) is promoting five key areas vital to the future of rail:

- ***Infrastructure Investment*** – ARA identifies that there are two broad issues in this area, including the renewal of current assets to provide growth for the freight and passenger markets in order to met projected demands; and the need for long term planning, including new rail corridors. Modest investment in existing infrastructure could create a range of opportunities to increase rail freight movements, which could assist with reducing road congestion and improving local amenities. To assist in prioritising national rail infrastructure planning directions, the ARA is establishing a statistical database. The database will provide information on the general health of the industry; economic performance indicators; private sector investment in the industry; and the value of the industry to the national economy.
- ***Modernisation of Communication Systems*** – ARA suggests that a move to digital communication systems will remove the need for current trackside technology and thus revolutionise the industry. While such a move represents a major investment, a broad range of benefits will flow over time, including improved safety; increased track utilisation; reduced congestion; and options for better rollingstock maintenance warning systems. New communication systems would need to be standardised throughout Australia to avoid the current difficulties with voice communication systems, where train operators are required to carry multiple radio sets within their locomotives.
- ***Expansion of National Codes*** – A Memorandum of Understanding (MOU) has recently agreed by the ARA and Transport Ministers (through the Australian Transport Council). The MOU supports the strengthening of the co-regulatory framework including improving road safety regulation. ARA states that an expansion of National Codes is a key vehicle to improve efficiency through the harmonization of operational and engineering practices.

- ***A Better Regulatory Environment*** – Codes must be matched by a single government approach to rail safety regulation. The ARA is working with the National Transport Commission (NTC) towards a safety regulatory framework that focuses on risk based safety management and removing differences between the States. The regulation must recognize the nature of the industry, as opposed to implementing an overseas or different transport mode model.
- ***Public Transport*** – The ARA has established a Public Transport Alliance with the International Association of Public Transport (UITP) that also seeks to engage Federal and State Governments. It recognises that a multi-modal approach to planning and investment is needed to address issues such as inner-city congestion. The ARA is particularly focusing on planning and how to optimise the use of the available track.

### 3.4.2 Growth Investment

There is a reasonably urgent need to invest in rail throughout Australia. 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 and we just don't have the infrastructure to handle it. No country is more dependant on its 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 at increasing investment in rail, are listed below:

***Rail Network Strategy for Queensland***

As identified earlier, the *'Rail Network Strategy for Queensland 2001 – 2011'* was developed by Queensland Transport in 2001. The aim of the strategy was to identify specific strategies relating to policy and planning for the future of rail infrastructure and rail corridors throughout the State. The primary purpose of the strategy is to facilitate the effectiveness of the contribution of rail to the Government's desired transport outcomes. The strategy identifies the rail network's corridor capabilities that will form the basis of Rail Corridor Direction Statements. These statements will be developed to provide a vision for the management and ongoing development of the rail network.

***Network Development Plan***

The purpose of Queensland Rail's *'Network Development Plan – 2nd Edition, December 2002'* is to set a strategy and direction for the development and management of QR's railway infrastructure network. The plan aims to optimise the rate of return on assets and support the operational drivers of:

- Investment to increase capacity.
- Investment to maintain reliability and efficiency.
- Investment for safety and environment.

The plan identifies committed and uncommitted Queensland Rail projects. These projects are identified at system level from 2002/03 to 2011/12 and at statewide level from 2002/03 to 2008/09 (and beyond). The statewide projects are grouped into a number of categories where investment will be directed, including:

- Safety and security.
- Environment.
- Electric traction infrastructure.
- Land and civil infrastructure.
- Signalling, operating systems and telecommunication infrastructure.
- Asset protection.
- Information systems.

The Network Development Plan does not identify the projected costs of the investment projects identified above.

***Integrated Regional Transport Planning***

The Queensland Government – through Queensland Transport – has been implementing a number of Integrated Regional Transport Plans (IRTPs) throughout the State. Primarily undertaken in areas of significant population and economic growth, the IRTPs are developed to provide an overall 'strategic' level plan for the future. They include recommended actions for future development of the transport system, so that all the agencies involved can respond in a co-ordinated way.

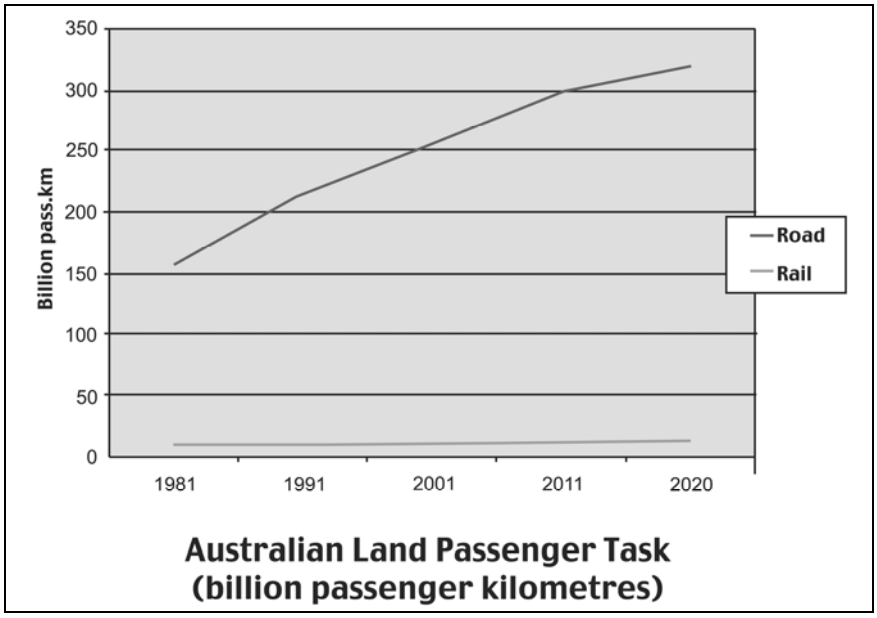
IRTPs complement the forward planning of all government agencies and play a vital role in managing the future development of transport and transport related infrastructure in an area or region, by providing a strategic regional level framework for transport planning.

***State Infrastructure Plan – Strategic Directions 2001***

The Queensland Government – through the Department of State Development and Innovation (DSDI) – released the *State Infrastructure Plan (SIP)* in November 2001. The plan is the government's tool to guide long-term economic infrastructure development in Queensland. The first component of the SIP was the *Strategic Directions 2001* document, providing strategic guidance for a five-year timeframe of economic infrastructure planning by all areas of Government and the private sector.

The second component of the Plan are the annual Implementation Plans that report progress in implementation of the SIP and contain descriptions of the relevant projects and programs, being progressed each year. The most recent was the Implementation Plan for 2003/04, the release of which was delayed beyond the end of the 2003/04 financial year due to a number of factors.

**Figure 6 Australia's Land Passenger Task, 1981 – 2020**




*Source: RTSA, 2003, from BTRE data*

***Investment in Urban Rail***

There is a major need for increased investment in urban public transport infrastructure. Significant population growth is predicted throughout South-East Queensland, and Figure 6 suggests that road travel will continue to increase unless investment in a comprehensive urban rail system can provide an alternative for commuters and general travellers, especially in South-East Queensland.

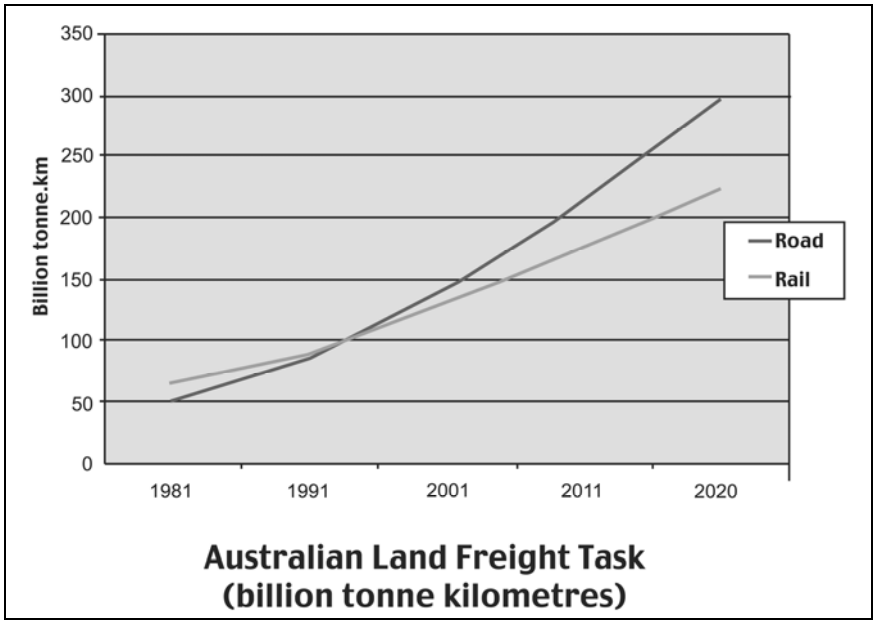
A sustainable public transport system is needed, providing communities with convenient off-road transport options. This may mean that a combination of both heavy rail and light rail systems are needed

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

***Investment in Rail Freight***

Increased investment in Queensland's rail network is needed to ensure that rail freight can be competitive with road transport. The road freight task is becoming a more efficient option, as can be seen in Figure 7, and this trend will further increase unless significant investment is directed towards rail infrastructure. The Sydney – Brisbane rail link needs to be upgraded, and the inland rail link connecting Melbourne – Brisbane is also a potential investment option. The feasibility of these options is discussed in the Case Study at the end of this report.

**Figure 7 Australia's Land Freight Task, 1981 – 2020**




*Source: RTSA, 2003, from BTRE data*

Investment also needs to be directed to rail infrastructure north of Brisbane. Queensland Transport has undertaken a number of studies in recent years looking at the quality of rail track in Queensland. The "*Straight Track Study*" completed in 2002 gave estimates of the additional freight train operating costs, track maintenance costs and external costs that result from track-imposed speed constraints for a standard freight train travelling along the North Coast Line System. Furthermore, a "*Smooth Running Study*" identified operating costs incurred due to slowing down freight trains. The study calculated that the cumulative effects of the speed constraints on a 100 km/h standard freight train between Landsborough and Townsville were approximately $2,600 per trip. Four basic investment options to attend to this issue were identified including:

- Replacement of all timber bridges and strengthening steel bridges to 20 TAL.
- Concrete or steel re-sleepering with continuously welded rail (CWR).
- Easing all necessary curves to allow 100 kph through running.
- Grade easing to 1:75 south of Rockhampton and 1:100 north.

A modified Main Line Upgrade investment program was approved.

***Smart State Building Fund***

The Queensland Government's priorities for major infrastructure for the next few years are to be boosted by the "Smart State Building Fund", announced in December 2003. Among other outcomes, the State

Government plans to implement a $3.75 billion smart transport strategy over three years, in order to protect South-East Queensland's liveability and meet the region's future transport needs. A major component of the Smart State Building Fund (SSBF) is directed towards encouraging sustainable travel choices.

The fund includes a $1.4 billion integrated public transport ticketing initiative called *TransLink*, which will co-ordinate transport services and tailor them to passenger demands. It will bring together the Queensland Government, Brisbane City Council and QR, identifying a $400 million *MetTrip* upgrade of the CityTrain network to be completed in 2007-08. It is envisaged that the project will enable an extra 3700 passengers per day to utilise the urban rail network, or almost one million extra passengers a year.

***Investment in an Inland Route for both Passenger and Freight:***

Promoters of the Inland Route, 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. This potential investment is discussed further in the Case Study at the end of this report.

### 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.

The issue of transport security was discussed in detail at a recent meeting of the Australian Transport Council, in April 2004. The ATC was briefed on the outcomes of an international transport security mission, where three broad recommendations for land transport were made:

- Establish a consistent national approach to transport for land transport based on risk assessments, security programs and business continuity programs.
- Establish an Inter-governmental Agreement to strengthen transport security across jurisdictions.
- Develop and implement a National Dangerous Goods Security Program.

A "*National Transport Security Strategy" (NTSS)* was also agreed. This will form the basis of Australia's land transport security system. The strategy includes ten key passenger transport system priorities, including (amongst others): strengthening the capability of private transport operators to undertake security planning; reviewing and enhancing mechanisms for reporting and analysing incidents; and putting internal communication strategies in place to improve process and procedures for reporting incidents and suspicious activity.

## 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 a more stable political direction and management of the system will be necessary to restore confidence and achieve significant progress. In particular, uncertainty over the future funding of the National Rail Network needs 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 into the poorly performing general freight market.

However with the continued uncertainty over the lack of government investment in the network, capacity and reliability improvements have not been programmed. Consequently the decline in rail's share of the freight market within Queensland has not been arrested.

The inadequacy of current funding levels within the Metropolitan Network is highlighted in the lack of a long-term strategic plan for CityTrain services.

Funding for improvements to the road network within the region significantly exceeds investment in the rail network. This trend continues to penalise the ability of rail to compete against private motor vehicles and road freight.

While the metropolitan and other networks remain seriously under funded, the coal lines have enjoyed adequate investment programs and are performing very well.

The Queensland Rail Network has been rated under the three network elements of:

- Metropolitan Network C (inadequate funding and planning delays).
- Coal Networks B+ (coal industry funded).
- Other Networks D+ (inadequate funding and poor service provision).

The overall rating for the Queensland Rail Network is a **C+**.

***Case Study***

**New Versus Upgraded Infrastructure for Interstate Freight – A Look at the Inland and Coastal Freight Route Options**

Queensland currently has a weak rail connection with New South Wales. The need for works on the Sydney – Brisbane rail link was noted as far back as 1989. In the late 1990s, Federal MPs in NSW identified that 41% of the track between Sydney and Brisbane failed to meet basic fast train standards of curve radii exceeding 800m.

A 2001 ARTC Track Audit recommended investment works along the interstate rail link, including longer crossing loops, track upgrading and CTC signalling between Greenbank and Casino. With its 60-year lease starting from 5 Sept 2004, ARTC are to invest $119m on these improvements between Brisbane and Newcastle while AusLink funding of $450m will be invested on a range of other improvements to increase travel speed and reliability on the Brisbane to Sydney rail line over 5 years.

This investment should redress the balance between rail and road freight performance in this corridor and may offset the travel improvements to be provided to road freight by the $2.2 billion upgrade of the Pacific Highway over the same period. As a result, the performance of the “coastal “ rail corridor should improve significantly for freight (and passenger travel) by 2010.

Proposals for the upgrading of existing inland rail lines to form a more direct Melbourne – Brisbane route date back to 1986. The main missing links for the inland route is in southern Queensland, where a new rail track is needed to traverse the Little Liverpool Ranges and the Toowoomba Ranges, and in northern NSW from North Star to Carrington. If this link to Brisbane were to be built as a standard gauge line with double stacking container capability, an inland route to Brisbane would be established. AusLink 2004 reported that ARTC would invest $57m in track improvements between Cootamundra and Werris Creek as part of the inland corridor.

There are questions of whether the inland route should be developed in preference to a major upgrade of the Sydney - Brisbane link. While the commitment to the improvements to the mainline north of Sydney has been made, rail congestion across the Sydney metropolitan area will be aggravated by Melbourne - Brisbane freight. Hence, it is suggested that the Inland Route may be necessary for the Melbourne – Brisbane freight task to bypass Sydney.

The need for continuing investment in the inland rail route will become more urgent if there is to be a significant investment to upgrade the Newell Highway. Without an inland rail route this could result in the long distance Melbourne – Brisbane freight being inefficiently transported by road trains rather than fast rail by 2010.

# 4. Aviation

## 4.1 Overview

Aviation remains a vital communication link for Queensland by providing passenger and freight services throughout the State. Forming an integral part of this service are the airports, which act as the hub through which passengers and freight pass. Queensland is one of the least centralised States in Australia and with the vast scale of the State, the development of regional air services with supporting infrastructure and maintenance is required. This relates to both general and emergency services throughout the more remote parts of the State.

The Federally-owned airports (Brisbane, Archerfield, Gold Coast, Mt Isa and Townsville) were leased during 1997 and 1998 to private operators. In addition the Queensland Government operates the Cairns and Mackay Airports through the Cairns and Mackay Port Authorities while the remaining airports in Queensland are operated by local government authorities.

The collapse of Ansett in September 2001 and the subsequent failure of its sale in early 2002 resulted in a significant disruption to air services throughout Australia. In addition to this was the September 11 attacks on the United States, which created a dramatic fall in international, and to some extent domestic, passenger movements. However, recent figures show that, in most locations, passenger numbers are back to normal levels with strong growth trends being seen at most major airports.

## 4.2 System Description

### 4.2.1 Airports

There are three international airports and 130 domestic airports located in Queensland. Queensland is the only State with two major international airports (Brisbane and Cairns) and a third airport (Gold Coast) providing direct Asia and New Zealand flights. A large number of the domestic airports in Queensland are small airfields owned by local councils or indigenous land councils.

Table 7 shows the international and major regional airports located within Queensland that have annual passenger movement numbers (from scheduled services) greater than 50,000 per annum.

**Table 7 Major Airport Location and Ownership in Queensland**

| Airport | Ownership | Airport | Ownership |
|---|---|---|---|
| Brisbane Airport | Brisbane Airport Corporation Limited | Townsville Airport | Australian Airports (Townsville) Pty Ltd |
| Cairns Airport | Cairns Port Authority | Hamilton Island Airport | Hamilton Airport Pty Ltd |
| Gold Coast Airport | Gold Coast Airport Limited | Rockhampton Airport | Rockhampton City Council |
| Sunshine Coast Airport | Maroochy Shire Council | Mackay Airport | Mackay Port Authority |
| Mount Isa Airport | Australian Airports Limited (Mount Isa) Pty Ltd | Gladstone Airport | Gladstone-Calliope Aerodrome Board |
| Proserpine Airport | Whitsunday Shire Council | Bundaberg Airport | Bundaberg City Council |

*Source: DOTARS Air Transport Statistics 1992-93 to 2002-03*

The next group of Queensland airports are those which have annual passenger movements of 30,000 to 40,000 passenger movements per annum (scheduled services). These airports include:

- Thursday Island Airport.
- Weipa Airport.

- Emerald Airport.
- Hervey Bay Airport.

*Source: DOTARS Air Transport Statistics 1992-93 to 2002-03*

Finally the airports that have less than 30,000 passenger movements per annum are airports such as Longreach, Maryborough, Cloncurry, Cooktown and the remaining rural and remote airfields in Queensland.

### 4.2.2 Airlines and Industry

Major trunk route carriers and regional airlines operating within Queensland include Qantas, Virgin Blue, Alliance Airlines, Australian Airlines, Jetstar and Macair, while in the last few years, several high profile aerospace companies supporting maintenance, training, production and operations have established significant operations in Queensland.

Companies established in Queensland over the last 5 years include:

- Virgin Blue
- Boeing Australia
- Qantas Reservations
- EADS Australian Aerospace
- Qantas Catering (Snapfresh)
- Qantas B767 Maintenance (and A330)
- Australian Airlines
- Singapore Flying College
- DHL International
- Smiths Aerospace
- National Jet Systems
- Alteon
- Raytheon
- Sikorsky/Helitech
- Pratt & Whitney
- Frequentis

While the majority of the operations listed above do not provide direct growth in airport specific infrastructure, they have supported significant infrastructure development to support their operations.

## 4.3 Governance

The main areas of aviation regulation are:

- Air safety – Civil Aviation Safety Authority (CASA).
- Aviation Services – Airservices Australia (AA).
- Regulation of competition – Australian Competition and Consumer Commission (ACCC).
- Environmental Regulation – Queensland and Federal Government.
- Development Control – Department of Transport and Regional Services (DOTARS) – Leased airports only.
- Regulate Air Services – Queensland Transport (QT) where considered necessary for service requirements to rural and remote areas in Queensland.
- Aviation Security – DOTARS.

Airport operators do not have the responsibility to provide all aeronautical services at airports. Services outside their responsibility include en-route navigation and terminal navigation (air traffic control and airspace management within 50 kilometres of airports), aeronautical information, communications and fire fighting and rescue.

## 4.4 Funding

The smaller regional and remote airports have limited sources of revenue from landing charges and concessionaires located at the airport. However, through the Queensland Government's Rural & Remote

Airport Development Program (RRADP), local council owners can apply for funding to assist in the upgrading of aviation infrastructure. Whilst in the first instance it is the responsibility of the owners to fund aviation infrastructure, including ongoing upkeep and development, some projects may be eligible for supplementary funding through the RRADP. Local governments located in areas which are rural and remote may apply for assistance under the scheme. Funds are available to a maximum of 50% of the original capital cost of the works. Examples of works which may attract funding include runway extensions, fencing, lighting, new airstrips and airstrip upgrades.

The leased airports within Queensland gain their funding through the landing charges system, leased space from Concessionaires and revenue from leased property located within the airport owned land. This last element could include revenue from non-aviation sectors such as industrial development, warehousing development and catering facilitie. Any increase in landing charges is controlled by the Federal Government through three Acts; the Airports Act 1996, the Prices Surveillance 1983 and Trade Practices Act 1974. These regulate a number of aspects for the provision of airport services including planning, development and pricing.

The Air Services Unit of QT, whilst also managing the RRADP, regulate the air services within rural and remote Queensland to meet accessibility and mobility needs of transport disadvantaged communities. This includes subsidising certain air routes where the market does not provide an appropriate service.

## 4.5 Tourism

Whilst business passenger movements and freight at some of the larger airports are significant contributors to the revenue base, tourism also plays a vital role in significantly contributing to passenger movement numbers at airports. For example, Gold Coast Airport has found that approximately 80% of the passenger movements are attributed to tourist travellers.

## 4.6 Level of Service

### 4.6.1 Safety Performance

All accidents and incidents involving Australian registered aircraft, or foreign aircraft in Australian airspace, must be reported to the Australian Transport Safety Bureau (ATSB). The ATSB maintains its own database (Occurrence Analysis and Safety Information System) in which all reported occurrences are recorded. Table 8 provides accidents and fatal accident statistics for the State of Queensland 1994 – 2003. This table highlights the fact that there have been no fatal accidents with Air Transport operations (ie scheduled airline services). However, charter and private business statistics present the majority of fatalities over the last 10 years.

Safety at airports is strictly controlled through the security measures that are in place for controlled access to airside facilities. This will be further enhanced once the increased security measures for major and regional airports are fully implemented through the new Aviation Transport Security Act 2004.

**Table 8 Accidents, fatal accidents and fatalities to all Australian registered civil aircraft by region for years 1994-2003**

Accidents, Fatal Accidents and Fatalities to All Australian Registered Civil Aircraft by Region for Years 1994-2003

QLD

| AIR TRANSPORT | | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High Capacity | Accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | *1* |
| | Fatal Accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *0* |
| | Fatalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *0* |
| Low Capacity | Accidents | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | *3* |
| | Fatal Accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *0* |
| | Fatalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | *0* |
| GENERAL AVIATION | | | | | | | | | | | | |
| Charter | Accidents | 15 | 13 | 14 | 14 | 17 | 9 | 10 | 11 | 6 | 6 | *115* |
| | Fatal Accidents | 2 | 0 | 3 | 1 | 0 | 3 | 2 | 2 | 2 | 0 | *15* |
| | Fatalities | 10 | 0 | 7 | 1 | 0 | 10 | 10 | 8 | 7 | 0 | *53* |
| Agriculture | Accidents | 6 | 8 | 10 | 9 | 13 | 10 | 4 | 8 | 5 | 3 | *76* |
| | Fatal Accidents | 1 | 1 | 3 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | *9* |
| | Fatalities | 1 | 1 | 3 | 1 | 0 | 0 | 2 | 1 | 0 | 0 | *9* |
| Flying Training | Accidents | 4 | 9 | 6 | 4 | 5 | 6 | 10 | 6 | 3 | 4 | *57* |
| | Fatal Accidents | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | *2* |
| | Fatalities | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | *2* |
| Other Aerial Work | Accidents | 6 | 12 | 9 | 15 | 6 | 9 | 14 | 8 | 7 | 4 | *90* |
| | Fatal Accidents | 2 | 3 | 1 | 1 | 1 | 0 | 2 | 1 | 1 | 1 | *13* |
| | Fatalities | 3 | 4 | 2 | 2 | 2 | 0 | 6 | 1 | 1 | 3 | *24* |
| Private/Business | Accidents | 23 | 34 | 26 | 22 | 25 | 12 | 16 | 18 | 14 | 17 | *207* |
| | Fatal Accidents | 2 | 5 | 4 | 2 | 6 | 4 | 1 | 3 | 0 | 1 | *28* |
| | Fatalities | 2 | 9 | 8 | 3 | 10 | 6 | 1 | 5 | 0 | 5 | *49* |

| | | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOTALS | Accidents | **55** | **76** | **65** | **64** | **66** | **46** | **55** | **51** | **36** | **35** | 549 |
| | Fatal Accidents | **7** | **9** | **11** | **5** | **7** | **7** | **7** | **8** | **3** | **3** | 67 |
| | Fatalities | **16** | **14** | **20** | **7** | **12** | **16** | **19** | **16** | **8** | **9** | 137 |

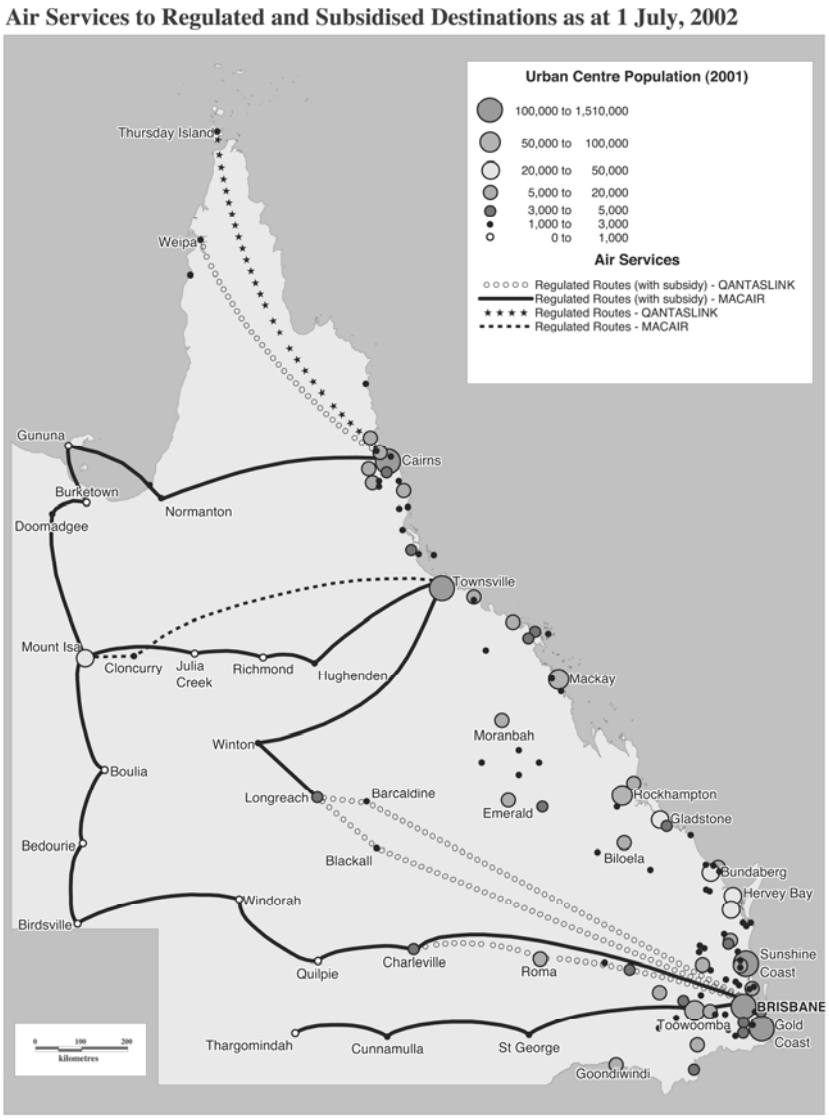
*Source: Australian Transport Safety Bureau July 2004*
*(www.atsb.gov.au/aviation/stats/1994-2003_qld.pdf*

### 4.6.2 Convenience of Travel

The Air Services Unit of QT in its role of regulating and subsidising selected air routes provides a convenience of access to rural and remote areas of Queensland. This process provides air services to localities that are disadvantaged through large distances to regional communities as well as access during the wet seasons of Far North Queensland Remote areas. Table 9 below shows the QT regulated and subsidised air routes within Queensland that provide coverage across the western expanse of the State. Coupled with this are the major routes (not shown in the figure) serviced by Qantas, Virgin Blue and Alliance Airlines, which predominantly cover the eastern coastline of the State.

The other factor in convenience of travel is the options a traveller has to travel intrastate, interstate and overseas. Within Queensland, a passenger has the option of flying Qantas, Virgin Blue, Jetstar, Alliance Airlines and Macair. To travel overseas, a traveller can either travel Qantas, Australian Airlines or a number of overseas carriers serving Queensland from either Brisbane, Gold Coast or Cairns airports or Pacific Blue from Brisbane Airport.

**Figure 8 Queensland Transport Regulated and Subsidised Air Routes**




*Source: Queensland Airports and Regulated Air Transport Plan, Queensland Transport 2002*

### 4.6.3 Community Expectations

The community expects to travel by air in a safe manner and that travelling via this mode minimises their travel time when compared to the other modes of transport. Additionally, with the introduction of two low cost carriers of Virgin Blue and Jetstar, passengers are now expecting cheaper airfares.

In terms of travel time minimisation, the measurement of on time arrival and departures shows the broad trend of airlines providing a service that is on time. Table 8 provides a snapshot for March 2004 showing the averaged on-time arrivals and departures from selected airports along the east coast of Queensland. These figures are the averaged percentage figures combining all airlines that service those airports.

**Table 8 On Time Arrivals and Departures in March 2004 for Queensland's Major Airports**

| Airport | Percentage On Time Arrivals | Percentage On Time Departures |
|---|---|---|
| Brisbane | 92.8% | 91.4% |
| Gold Coast | 91.0% | 92.3% |
| Cairns | 92.1% | 92.1% |
| Mackay | 95.2% | 95.8% |
| Sunshine Coast | 87.2% | 88.5% |
| Rockhampton | 89.5% | 94.8% |
| Townsville | 83.6% | 88.1% |

*Source: DOTARS – Bureau of Transport and Regional Economics (BTRE) March 2004*

## 4.7 Existing Infrastructure

### 4.7.1 Statistics

Table 9 shows the passenger and freight statistics for the major and regional airports in Queensland that received greater than 100,000 passengers per annum in the last three years.

**Table 9 Recent Passenger and Freight Statistics for Queensland's Major Airports**

| Airport | Total Revenue Passengers | | | Total Freight (tonnes) | | |
|---|---|---|---|---|---|---|
| | 2000-01 | 2001-02 | 2002-03 | 2000-01 | 2001-02 | 2002-03 |
| Brisbane | 12,466,593 | 11,773,681 | 11,841,196 | 124,557 | 114,165 | 102,955 |
| Gold Coast | 1,888,008 | 1,736,004 | 2,177,602 | 1,174 | 767 | 1,690 |
| Sunshine Coast | 237,981 | 216,314 | 318,813 | – | – | – |
| Gladstone | 101,187 | 102,962 | 132,666 | – | – | – |
| Rockhampton | 286,817 | 217,539 | 309,077 | – | – | – |
| Mackay | 282,651 | 296,132 | 371,831 | – | – | – |
| Hamilton Island | 313,702 | 248,323 | 281,480 | – | – | – |
| Townsville | 731,908 | 695,866 | 778,370 | 2,038 | 1,613 | 1,428 |
| Mount Isa | 134,589 | 89,433 | 88,793 | – | – | – |
| Cairns | 2,890,752 | 2,642,498 | 2,900,472 | 20,712 | 20,113 | 18,940 |

*Source: DOTARS Air Transport Statistics 1992-93 to 2002-03*

During the 2003-04 financial year, several of the major airports experienced sharper growth increases in passenger throughput. Gold Coast Airport, for example, experienced passenger number increases of a further 16.5% from 2002-03, which represents an increase of 50% over the last two years. Of these numbers at least 80% are tourist travellers to the Gold Coast. Brisbane Airport is also experiencing rapid growth in both their international and domestic terminals. This growth in travel may be attributable to the increased availability of cheaper airfares from the low cost carriers as well as air travel becoming a more accepted mode of transport.

### 4.7.2 Funding and Investment

The main issue arising from the passenger movement increases is the ability of the airport to match the growth rate with capital investment in infrastructure. Airports are finding that increased levels of capital

works are required to meet the demand. For example, Gold Coast Airport will further pursue additional expansion of the terminal and carpark areas at the airport. Brisbane Airport will be embarking on expansion of their international terminal in a number of phases commencing in the next few years.

In addition to this is the requirement for those international airports to move to 100% Checked Bag Screening as a requirement of DOTARS by 2005. This will also require investment in capital works.

Coupled with this is the requirement of airports, particularly the certified and registered aerodromes to continue with ongoing maintenance of the airport to satisfy safety and technical inspections by CASA.

So it is a combination of meeting travel demand as well as regulatory requirements that tend to force ongoing expenditure on airport assets.

***Major Works in the last 5 Years***

The following airports listed provide a snapshot of the larger airports in Queensland with identified projects over the last 5 years that have improved operational capacity of the airport as well as improving passenger comfort in some cases.

***Brisbane Airport***

During 2003, Brisbane Airport undertook the following projects; $9 million on runway overlay, $10 million on maintenance and contract services, various landside and industrial park investment and supporting works to accommodate the new Qantas Maintenance hangar and Virgin Blue's Maintenance facility.

***Gold Coast Airport***

An upgrade of the Common User Terminal at the Airport is occurring in 2004 to satisfy capacity demand and to provide improved levels of comfort for passengers. Additionally, a runway extension project has also commenced for the airport. The runway extension project consists of a 458m extension to the south with a parallel taxiway also being considered as a part of this project. The project is at the planning stage in 2004 with a Major Development Plan (MDP) submitted to the DOTARS. Other infrastructure upgrades at the airport include recent landside improvements to the carpark as well as $1.8 million for a new international terminal and permanent facilities for Customs and Australian Quarantine Inspection Services in 2001 – 2002.

***Sunshine Coast Airport***

The Airport's terminal was upgraded in 1996/97 at a cost of approximately $9.2 million. It has the capacity for three B737 aircraft arriving or departing simultaneously or approximately 850,000 passenger movements per annum. The main runway cannot be extended (or widened) which limits future larger aircraft and some limitations on long range B737 flights. The Airport has identified a new runway orientation within the airport boundary to overcome this limitation.

***Townsville Airport***

AAL has recently undertaken a $12.3 million upgrade of Townsville Airport. The redevelopment involved the installation of three new aerobridges, an extended ground level area, escalators, stairs, lift facilities and an elevated walkway with airside views.

***Rockhampton Airport***

In 2000, Rockhampton Airport completed a major runway extension and overlay project to allow the larger aircraft (to B747 and C5 Galaxy) to operate at the airport. A major driver for this was that the Department of Defence is undertaking exercises in the area. Apron expansions have also been undertaken. The airport is now embarking on upgrading the terminal for part-time international operations.

### 4.7.3 Asset Management

At the privatised Federal airports, building development and environmental control is regulated through the Airports Act. The Act and Regulations are administered by private sector consultants appointed by the DOTARS as Airport Building Controllers (ABC) and Airport Environmental Officers (AEO).

Master Plans must be developed by the new airport operators, within a prescribed period to cover the next twenty years and reviewed and updated at no more than 5 yearly intervals. Master Plans are required to be approved by the Minister for Transport and Regional Services. Major development plans are required for certain types and scale of developments, such as runway extensions, terminal expansions and capital works over $10 million.

All of the major airports within Queensland have completed their Airport Master Plans with Brisbane Airport currently finalising its updated Master Plan.

### 4.7.4 Environment

Airports purchased under the 99-year lease arrangements are required to prepare and maintain an Airport Environment Strategy (AES). The Airports Act 1996 requires that each airport is to prepare an environment strategy that is reviewed and updated every 5 years. The main intent of an AES is to demonstrate to the Federal Government, key stakeholders and the surrounding community how an airport will manage environmental issues on the airport for that 5 year cycle. The Act requires that an airport is to undertake consultation with key stakeholders and the community prior to submission of the AES to the Government.

Environmental issues on the leased airports are administered principally by Federal legislation, the Airports Act 1996, the Airport (Environment Protection) Regulations 1997 and the Airport (Building Control) Regulations 1997 (the Regulations). The Airport Building Controller (ABC) and the Airport Environment Officer (AEO) are the on-site regulatory representatives for the DOTARS who administer the Act and Regulations on behalf of the Federal Government.

The larger airports in Queensland, by their very nature of operations, tend to produce noise and hydrocarbons from aircraft. As such, the implementation of various elements of the environment strategy is important to displaying proactive approach to managing the impact on the environment.

The AES's prepared for each capital and large regional airports in Queensland normally address the following issues and propose monitoring and mitigation strategies:

- Air Quality Management
- Noise Management
- Surface Water Quality Management
- Waste Management
- Contaminated Site Management
- Vegetation Management
- Bird and Wildlife Management
- Water and Energy Conservation
- Mosquito Control
- Heritage and Cultural Management
- Chemical Management

The smaller airports, including the rural and remote areas, do not normally prepare such detailed documents for their airports, however, generally they have an informal strategy in place for the likes of fuel spills and other occupational health and safety requirements.

### 4.7.5 Social

Airports in Queensland play an integral part in the social support to the community. For example, the Royal Flying Doctor Service (RFDS) is an important service to the rural and remote communities

throughout Queensland with the large distances that need to be covered for medical treatment. The ability of airports to receive these aircraft at any time is important to the community it serves.

In addition to access by the RFDS, ferrying services by air, to span the large outback distances, is important in supporting remote communities. To this end, the Air Services Unit of QT, in its role of regulating and subsidising selected air routes, provides a convenience of access to rural and remote areas of Queensland. This process provides air services to localities that are disadvantaged through large distances to regional communities as well as access during the wet seasons to remote areas.

### 4.7.6 Security

***Australian Government funding for improved security measures.***

The advent of the new Federal enacted security legislation (Aviation Transport Security Bill) in 2003 has resulted in an additional 137 airports to the original 38 covered by the Act. To assist airports reflect the new requirements to enhance aviation security, the Australian Government announced the Enhanced Aviation Security Package in December 2003. In the 2004 budget, the government announced changes to this package, increasing the net funding available for airports to $35 million. Additionally, it is now no longer a requirement that airports match the funding provided by the Federal Government.

These funds will be provided for airport owners and operators to purchase capital items for improved security measures. Actions conditional to being a beneficiary of a grant for improved security measures are:

- The Conduct of a risk assessment.
- The Development of a transport security plan demonstrating:
  - An ability to manage and co-ordinate aviation security activities.
  - Equipment and procedures to be used to maintain aviation security.
  - How airports will respond to aviation security incidents.

## 4.8 Future Needs

### 4.8.1 Introduction of the A380 Aircraft

The introduction of the Airbus A380 aircraft has airports currently undertaking works to allow the operation of the aircraft. In Queensland, it is likely that only Brisbane Airport will see this aircraft operate within the first few years. As such, aircraft pavement works associated with widening, as well as gate expansions at the international terminal, will occur to accommodate this new large aircraft. Sydney Airport is expecting the first arrival of the A380 in late 2006.

### 4.8.2 Infrastructure Expansion

The following airports provide a snapshot of proposed significant projects to improve the future operations of the airport generally through capacity demands.

***Brisbane Airport***

To satisfy increased demand, Brisbane Airport will require a parallel runway to the main runway by approximately 2012 to ensure that the existing runway system does not reach its capacity. In line with this are planned expansions to both the international terminal and the domestic terminal. In 2000, a major planning review project was undertaken with an Airport Development Strategy being prepared discussing various options to expand both the domestic and international terminals.

***Gold Coast Airport***

The airport will focus on continuing with the runway extension project to allow significant increases to the loading capacity and range for B737, B767, B777 and A330 aircraft. The extension will also allow direct

operations for B767 aircraft to Singapore, Japan and Hong Kong and more distant Australian cities such as Perth. Additionally, the development of a multi-modal transit centre at the airport is planned to improve passenger ground transportation to and from the airport.

***Cairns Airport***

The future for Cairns Airport is development of the International and Domestic Common User Terminal to meet the future needs of travellers and increased capacity requirements forecast for the airport.

## 4.9 Report Card Rating

The assessment criteria used in the Report Card included the following elements:

- Asset Condition – Condition and Fitness for purpose.
- Asset Availability and Reliability – Capacity and convenience.
- Asset Management – Strategic System Management.
- Sustainability – Funding, environmental, social and community and safety.
- Security – Risk Management.

In general, the condition of assets at airports throughout Queensland is assessed as being in good condition with a large number of capital works programs occurring at the privately owned airports and the larger council owned airports. In addition to this, the certified and registered airports have requirements placed upon them to undertake annual technical and safety inspections under CASA requirements.

As such they are heavily regulated by CASA and DOTARS for safety and security given the nature of the operation and this tends to mean that assets are in good condition in order to satisfy the requirements of these Federal regulators ensuring the safe and well being of passengers.

The assessment of airports has been undertaken through an assessment of major and regional/small airports. As such, there are two ratings that arise from this assessment.

In essence the asset condition of the major airports needs to be at a level to satisfy the regulatory requirements to conduct air transport operations whilst the smaller regional airports don't have the same requirements for the large jet aircraft operations. However, the capacity/reliability of several of the larger airport terminals will require expansion over the next five years to support increased passenger movements both from domestic and international travel.

The major privatised airports are required by the Federal Government to prepare and maintain Master Plans for their airports. As such, the environmental, social/ community and safety issues are generally continually addressed. Several council-owned airports have taken this master planning approach.

Security has become a major focus for both the major and regional airports and whilst this has been addressed at the major airports (with continuing security works occurring), the regional airports have implemented some measures with greater intensity to occur in the next one to two years.

The report card rating for the airports in Queensland are:

**Major Airports B+**

**Regional Airports C+**

The overall rating for Queensland's aviation infrastructure is a **B**.

***Case Study***

**Gold Coast Airport Development to Meet Demand**

Gold Coast Airport was privatised by the Federal Government in May 1998. It is now operated by Gold Coast Airport Limited (GCAL), a company wholly owned by Australian based investors, particularly superannuation funds and specialist infrastructure investment managers.

At the time of the privatisation and through until the collapse of Ansett, passenger movements growth through the airport was stationary or negative. The two established airlines, Qantas and Ansett, were generally unprofitable on leisure based routes with lower fare yields because of their high cost structures.

GCAL developed a new strategic direction to capitalise on the potential to grow traffic using the emerging "low cost" carriers. In 1999 the Gold Coast was serviced by domestic flights from Sydney and Melbourne, regional services to Newcastle and Brisbane and international services from Hamilton, New Zealand.

The growth potential of the airport has been limited by;

- The imposition of a curfew on the airport the day before the sale was completed
- Relatively high Airservices Australia costs for air traffic control and rescue and fire fighting services
- The relatively short runway
- High cost of bringing Customs officers from Brisbane
- Improved access to Brisbane Airport through road and rail infrastructure development
- Operation of low cost carriers Impulse and Virgin Blue through Brisbane (where the latter had been attracted by Government incentives) and more recently Jetstar

Through the development of suitable international terminal facilities, GCAL was successful in attracting a permanent Customs and Quarantine presence on the Gold Coast. The improved facilities and lower costs attracted a significant increase in services and destinations by Air New Zealand owned low cost carrier, Freedom Air.

Following the collapse of Ansett, GCAL resumed control of the terminal area leased to that airline and developed it as a unique domestic/international common user facility. This facilitated the introduction of more frequent services by Virgin Blue and new international services from Asia via Cairns with Qantas owned, all economy carrier, Australian Airlines.

This investment strategy accompanied by an aggressive marketing effort has seen a significant increase in frequency of services on established routes and new services to Canberra, Adelaide, Perth, Cairns, Auckland, Christchurch, Dunedin and five Asian cities via Cairns.

Total passenger movements have grown from 1.72 million in 2001 /02 t o 2.58 million in 2003/04. International passenger movements have grown from 15,000 in 1998/99 to 221,000 in 2003/04. Due to increasing competition from low cost carriers Virgin Blue and Qantas owned Jetstar, domestic passenger throughput continues to grow strongly. This growth, together with the requirements for more comprehensive aviation security measures, has necessitated a new stage of expansion of terminal and carparking facilities.

The airport's Master Plan recognises the importance of integration with surface transport. It has provision for a Southern Gold Coast transportation hub integrating heavy rail, light rail, long distance coach, airport and local transport modes. Road infrastructure development has a significant impact on the attractiveness of the airport to potential users within the catchment area. Examples are:

- Initially the opening of the Brisbane - Gold Coast Motorway increased the accessibility from the Gold Coast to Brisbane Airport, increasing congestion on the Gateway Motorway is now working against that access.
- The frequent congestion at the Pacific/Gold Coast Highway merge at Tugun often results in missed flights. This problem would be alleviated following completion of the Tugun Bypass project.
- The opening of the Pacific Highway motorway south of Tweed Heads has increased usage from Byron Bay.

International passenger growth through the airport will level off until the extension of the main runway from 2042m to 2500m. This extension is currently going through the approval process and will allow a B767 aircraft to carry full passenger load direct to Japan, Hong Kong and South-East Asia. This runway extension will be developed in parallel with the proposed Pacific Highway Tugun Bypass which passes through the airport. Approvals for these projects are complicated because the airport is Federal land bisected by the Queensland / New South Wales border. Coordinating the approvals process through agencies from three different governments is very complex.

To maintain its attractiveness to low cost carriers, GCAL has been careful to ensure the infrastructure development is functional, comfortable and affordable with capital and operating costs management being key parameters in facility planning. This is essential if the airport is to maintain a competitive position in light of high Airservices Australia, Air Traffic Control and Airfield Rescue and Fire Fighting costs. These costs levied on airline users are much higher than Brisbane because of economies of scale, higher than at Ballina because it does not yet require those services and higher than at Maroochydore because the Federal Government subsidises smaller regional airports.

*Note: Information and statistics supplied by Gold Coast Airport Ltd.*

# 5. Ports

## 5.1 Overview

### 5.1.1 System Description

Queensland ports are an integral part of the national transport system and trade activities. They handle significant quantities of Australia's international merchandise and are therefore essential for the operation of Queensland and the wider Australian economy. Ports are a major driver for economic development and play a major role in job creation.

The Queensland coastline hosts 15 trading ports, two community ports and a number of non-trading ports located from Brisbane in the South-East to Karumba in the North West. Within these categories there is significant variation between ports in terms of traffic levels, port facilities and institutional arrangements.

### 5.1.2 Port Industry Description

The definition of the port industry incorporates all activities that are required for the movement of ships and their cargoes and passengers through the port. Ships include, commercial trading vessels and passenger vessels, excluding intra port activities. This definition provides the basis for assessing and rating the quality of Queensland ports infrastructure. Table 10 lists typical components of the port industry. These components describe the function of a port facility and assists in the assessment of the infrastructure.

**Table 10 Typical Components of the Port Industry**

| Categories | Activities/components |
|---|---|
| Port Authority/Corporation operations | • Planning, co-ordination and promotion<br>• Security<br>• Land and property management<br>• Safety and emergency response<br>• Shipping channels and navigation aids for access to and from sea<br>• Port authority wharves, berths, jetties etc<br>• Infrastructure for roads, utilities, and intermodal facilities |
| Ship Operations | • Shipping lines/agents<br>• Pilotage<br>• Towage<br>• Line boats<br>• Mooring/unmooring<br>• Bunkering<br>• Ship supplies<br>• Ship repairs and maintenance<br>• Container repairs and servicing |
| Ship loading and unloading | • Private wharves, berths, jetties<br>• Container and break bulk stevedoring (not all ports)<br>• Livestock stevedoring (not all ports)<br>• Bulk cargo loading/unloading<br>• Passenger terminals |
| Cargo services | • Customs brokers<br>• Freight forwarders |

| Categories | Activities/components |
|---|---|
| | • Container packing/unpacking<br>• Cargo surveyors<br>• Wool dumping<br>• Fumigation |
| Land Transport and storage<br>(Land Side Access) | • Road transport<br>• Rail transport<br>• Transfer between road/rail and storage facilities<br>• Storage |
| Government agencies | • Customs<br>• Quarantine<br>• Ship safety<br>• Port safety<br>• Environmental management<br>• Port policy and administration |

*Source: Regional Impact of Ports – Report 101 BTRE*

### 5.1.3 Governance

Queensland port authorities principally operate under the provisions of the Government Owned Corporations Act 1993, the Transport Infrastructure Act 1994, and the Financial Administration and Audit Act 1977. This legislative regime enables the Queensland Government to retain ownership of the port authorities through the shareholding ministers (Minister for Transport and the Treasurer), and to set overall strategic direction. Each port authority has a Board of Directors and reports regularly to the shareholding ministers. However the legislation enables port authorities to operate as commercial entities.

In addition several Federal agencies undertake port related activities at the ports. The Australian Customs Service is involved in cargo examination, clearance of ships, and cargo and enforcement activities. The functions of the Australian Maritime Safety Authority (AMSA) include ship surveys and certification, ship safety standards, and inspection of foreign ships. The Australian Quarantine and Inspection Service (AQIS) undertake quarantine inspection.

Seven Port Authorities administer Queensland ports. The Ports of Brisbane; Bundaberg; Gladstone and Port Alma (Central Queensland Ports Authority); Mackay; Townsville; and Cairns are each managed by a local port authority, while the Ports Corporation of Queensland (PCQ) generally administers the bulk commodity or single user ports. Trading ports administered by PCQ tend to be single commodity bulk ports with highly specialised, sophisticated and mechanised operations catering for commodities such as coal from Central Queensland, sugar from north Queensland and bauxite from the Gulf of Carpentaria.

The port authorities are responsible primarily for the long-term strategic objectives, asset management and efficient planning, co-ordination and promotion of the use of wharves berths and infrastructure for roads, utilities and intermodal facilities.

Ship size is measured in three main ways

- Dead weight tonnes (dwt) – usually wet and dry bulk carriers.
- Gross register tones (grt) – usually general cargo and passenger liners.
- Twenty-foot equivalent units (TEU) – container ships.

In this report, all vessel sizes will be quoted in dwt. Vessel sizes in grt or TEU carrying capacity can be determined from the dwt size.

***Brisbane Port Corporation***

The Port of Brisbane Corporation (PBC) is a government owned corporation established in 1994. The Port of Brisbane is a deep-water port providing container terminals and bulk cargo facilities for a diversified range of commodities, 30 berths and 7.5 km of quay line. It is able to handle 128,000 dwt ships. The present declared navigable depth to Fisherman Islands is 14.0m below Lowest Astronomical Tide (LAT) datum.

***Port of Bundaberg***

The Bundaberg Port Authority operates two main wharves for the shipment of sugar and general cargo users up to 45,000 dwt with a navigable depth of 9.5m below LAT. The Port of Bundaberg is a first port of call for customs and quarantine purposes, with the Authority operating its own quarantine incinerator.

***Port of Gladstone and Port Alma***

The Port of Gladstone is Queenslands largest multi-commodity port that has recorded steady trade results for the 2002/03 financial year. Gladstone Port Authority (GPA) was recently "re-badged" to become the Central Queensland Ports Authority (CQPA), incorporating Port Alma. Port of Gladstone operates unloading and ship-loading facilities at a number of terminals at Gladstone, namely RG Tanna, Barney Point and Auckland Point and can handle vessels up to 230,000 dwt. The navigable depth for the outer harbour is 16.3m below LAT and is 10.6m below LAT for Targinie Channel.

Port Alma holds in the order of 21,000 ha of leasehold, freehold and reserve land near Rockhampton. Port Alma provides port and cargo handling facilities for vessels up to 36,000 dwt. The entrance channel has a navigable depth of 7.0m below LAT whilst the swing basin has a navigable depth of 5.8m below LAT.

***Port of Mackay***

The Mackay Port Authority is responsible for the management of the Mackay seaport (including a breakwater), Mackay Airport and small craft harbour with neighbouring development. The seaport can handle vessels up to 68,000 dwt and has a navigable depth into the harbour of 8.5m below LAT.

***Port of Townsville***

The Townsville Port Authority (TPA) is a statutory government owned corporation that manages a diverse port, a breakwater harbour with a land and sea jurisdiction access of 400 $km^2$, and able to handle vessels up to 85,000 dwt.

***Port of Cairns Authority***

The Port of Cairns Authority manages a multi-purpose regional seaport and the sixth busiest (ie passenger numbers) airport in Australia. It has a strong focus on tourism, with a large fleet of vessels going to the Great Barrier Reef, and numerous other world-class facilities for tour operators. The seaport can handle vessels up to 50,000 dwt and has a navigable entrance depth of 8.3m below LAT.

***Ports Corporation of Queensland (PCQ)***

PCQ is a multi-port authority responsible for managing and developing trading ports which are primarily dedicated to the handling of single commodity exports as well as community ports which service the needs of local commuters.

The corporation has responsibility for multiple port locations, which handle a variety of cargoes. It controls:

- Trading Ports: Hay Point (230,000 dwt; 13.0m below LAT); Abbot Point (200,000 dwt; 17.2m below LAT); Lucinda (50,000 dwt; 13.3m below LAT); Mourilyan (45,000 dwt; 9.6m below LAT); Cape Flattery (65,000 dwt; unrestricted); Weipa (75,000 dwt; 10.8m below LAT); Karumba (5,000 dwt; 3.4m below LAT); Skardon River (n/a; 0.0m below LAT).

- Community Ports: Thursday Island (20,000 dwt), Quintell Beach.
- Non-trading Ports: Maryborough, Cooktown, Burketown.

PCQ is primarily focused on strategic planning, operational issues and infrastructure development within its ports, as well as security, emergency response planning and protection of environment.

### 5.1.4 Port Operations

The ports identified in Section 5.1.3 manage land use and may lease land or facilities to private sector companies for the services that are required for the operation of a port including towage, pilotage, stevedoring, customs broking and bunkering. Port authorities are responsible for:

- Strategic port planning.
- Port business development.
- Infrastructure/asset management.
- Environmental management and marine pollution.
- Port security and safety.
- Port efficiency.
- Maintaining navigable port depths.

## 5.2 Level of Service

### 5.2.1 Efficiency

Ports are key strategic assets and significant investments for the State and it is important that they operate at high levels of efficiency to maximise benefits to the community. The efficiency of Queensland's ports is best measured by their ability to respond to current and emerging demands to transfer cargo from land to sea (and sea to land) forms of cargo.

### 5.2.2 Key Statistics

Trade through most ports has changed with volumes increasing, some ports more substantially than others. In terms of tonnes of cargo handled in Australia, for example, during 2000-2001, Hay Point, Gladstone and Brisbane were the fourth, fifth and eighth busiest ports respectively based on mass tonnage throughput. (BTRE Information Paper 50)

***Volume/Capacity***

The volume of trade that passes through Queensland ports is measured in mass tonnes. The majority of the trade volumes summarised are in bulk cargo. However the value per tonne of general cargo is significantly higher than that of bulk trade (Australian Association of Port and Marine Authorities, AAPMA). Over 93% of general trade Australia wide is shipped in containers, reported in 20-foot equivalent units (TEU's). The Port of Brisbane, largely a container throughput port, is extremely important for Queensland's economy. It is presently in the process of expanding its container facilities.

An examination of the volume/capacity of Queensland ports provides an insight into the relative importance of these ports to Queensland economy.

Markets for commodities naturally dictate the throughput for Queensland ports. Consequently infrastructure development will only be considered to meet the anticipated trade. Presently port infrastructure appears to meet the present market needs with several Queensland ports showing evidence of spare capacity. This spare capacity could be further increased with the introduction of operational efficiency or maintenance improvements, although ports such as Lucinda and Mourilyan have spare capacity, their facilities are geared for a single user (ie sugar).

Port related infrastructure development requires long lead times and consequently developments must precede trade growth. Thus ports need to be more proactive rather than reactive in delivering

measurable improvements. Gladstone and particularly Hay Point are consistently increasing their total throughput and running at their upper limits.

**Table 11 Summary of Queensland Ports Key Statistics (2002/2003)**

| Ports | Import (mass tonnes) | Export (mass tonnes) | Total Throughput (mass tonnes) | Primary Commodity |
|---|---|---|---|---|
| Brisbane | 13,807,672 | 10,800,279 | 24,607,951 | Petroleum products & Containers |
| Bundaberg | 71,923 | 359,789 | 431,712 | Sugar |
| Cairns | 608,417 | 591,140 | 1,199,557 | Petroleum products & general cargo |
| Gladstone | 10,875,633 | 43,590,515 | 54,466,148 | Coal |
| Mackay | 660,757 | 1,334,005 | 1,994,762 | Sugar |
| Port Alma | 28,733 | 126,138 | 154,871 | Salt |
| Townsville | 5,499,970 | 4,318,733 | 9,818,703 | Nickel ore, sugar |
| *PCQ* | | | | |
| Abbot Point | | 12,791,903 | 12,791,903 | Coal |
| Cape Flattery | | 1,658,200 | 1,658,200 | Silica Sand |
| Hay Point | | 74,672,173 | 74,672,173 | Coal |
| Karumba | | 1,078,629 | 1,078,629 | Zinc, lead, cattle |
| Lucinda | | 600,606 | 600,606 | Sugar |
| Mourilyan | | 785,316 | 785,316 | Sugar |
| Weipa | 65,741 | 12,899,088 | 12,964,829 | Bauxite |
| Quintell Beach | 1,448 | | 1,448 | General cargo |
| Thursday Island | 76,176 | | 76,176 | General cargo |
| *PCQ* | *143,365* | *104,781,453* | *104,924,818* | |
| **Queensland Total** | **31,696,470** | **165,606,514** | **197,302,984** | |

*Source: Trade Statistics for Queensland Ports For the 5 Years Ending 30 June 2003*
*http://transport.qld.gov.au/ports*

**Table 12 Summary of Yearly Compound Growth in Queensland Ports for the 5 years ending 30 June**

| Ports | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| Brisbane | 11.1% | 0.4% | 0.2% | 6.1% |
| Bundaberg | 25.9% | -26.7% | -9.2% | -22.1% |
| Cairns | 2.6% | -9.1% | 7.1% | 5.9% |
| Gladstone | 7.9% | 13.4% | 2.7% | 1.2% |
| Mackay | -6.5% | -14.9% | 10.6% | -1.8% |
| Port Alma | 25.5% | -28.9% | 22.9% | -13.7% |
| Townsville | 4.6% | 8.4% | 0.2% | 6.1% |
| *PCQ* | | | | |
| Abbot Point | -13.1% | 18.8% | 12.5% | 7.7% |
| Cape Flattery | 3.1% | 6.5% | -8.0% | 1.5% |
| Hay Point | 19.6% | 7.6% | 2.0% | 5.5% |
| Karumba | 333% | 170% | 14.1% | 9.4% |
| Lucinda | 10.2% | -30.0% | 31.5% | 26.5% |
| Mourilyan | -3.6% | -22.7% | 16.9% | 28.4% |

| Ports | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|
| Weipa | 13.7% | 0.2% | -3.6% | 1.5% |
| Quintell Beach | -13.9% | -14.0% | 59.5% | -61.4% |
| Thursday Island | 20.7% | 5.5% | -21.6% | 8.6% |
| *PCQ* | *14.1%* | *7.7%* | *2.5%* | *5.5%* |
| **Queensland Total** | **11.2%** | **7.7%** | **2.2%** | **4.2%** |

*Source: Trade Statistics for Queensland Ports For the 5 Years Ending 30 June 2003*
*http://transport.qld.gov.au/ports*

## 5.3 Existing Infrastructure

### 5.3.1 Regulation

Port corporations remain owned by the State Government, with no national regulatory regime. The existing ownership arrangements directly affect the ongoing management activities and investment decisions of port corporations.

### 5.3.2 Port Business Development

Income is generally derived from levying port charges relating to shipping and trade volumes and through licensing agreements with port users for land and port facilities. The funds generated from the income derived from operations is typically used for operation and maintenance of port facilities, with a proportion of profits returned as dividends to the shareholding Ministers. With this funding model the Port is dependent on the shareholders' vision to reinvest profits in the future development of the asset.

### 5.3.3 Technology

A range of technologies affect the development of ports:

- Ship sizes continue to increase as a result of increased trade growth and efficiencies in ship transport operations. The implications of which impose demands on port infrastructure to accommodate these vessels. The impacts on infrastructure include the need to upgrade berths/wharves, deepening and widening of entrance channels and to provide larger container cranes.
- Dynamic under keel clearance (DUKC) is a computer based modelling system that monitors the physical conditions of a port entrance, namely tidal movements and wave action/climate to reliably report safe under keel clearances. The benefits of DUKC are relevant to ports handling large ships for either bulk or container trades. The ability to reliably predict physical conditions achieves confidence in ship safety with deeper drafts, for instance 300 mm on an average sized iron ore carrier of 150,000 Dead Weight Tonnes (dwt) equates to an increase of 4,000 tonnes or $100,000 per shipment.
- Electronic tracking of containers, from the point of origin through to destination. The tracking of containers facilitates efficient movement of containers.
- Electronic manifests for customs to be able to do pre clearance.
- Provision and receipt of electronic regulatory clearances, and other information to various organisations including port corporations, the Australian Quarantine Inspection Service, the Australian Customs Service etc.
- Automated Container Yards are presently on trial at the Port of Brisbane. Automated container yards use robotic equipment to handle and process containerised freight.

Technological developments facilitate more efficient use of existing port infrastructure, thus reducing the need for investment in civil works.

### 5.3.4 Environment

Queensland ports have assumed proactive roles in ensuring environment compliance. Environmental divisions typically form part of port corporation management structures. Development of integrated

Environmental Management Systems (EMS) and environmental training programs certified to, or progressing toward ISO 14001 certification are an integral part of the port operations.

Key environmental issues include:

- Dredging and spoil relocation. This involves issues associated with sea dumping or land disposal of sediments that generally have poor physical characteristics, are unsuitable for economic reuse, and in some cases are contaminated.
- Noise – Port operations are around the clock and noise is generated by all aspects of the operations including cargo-handling machinery, and cargo delivery operations by road and rail.
- Dust – Ports often are constructed on land in various stages of reclamation. Exposed sections of this can dry and generate dust due to the poor suitability of reclamation materials for plant growth.
- Lighting – For safe operations at night, high lighting intensities are required, particularly in container handling areas.
- Oil Spills – While in the port discharging or loading cargo, ships often have to receive bunkering from a barge or shoreline. While a lot of care is taken in the transfer of fuel and oils to the ships the frequency with which the operation is undertaken means that there is a reasonable risk of some spills occurring.
- Marine incursions – Ships travel across oceans and have the potential to transport marine flora and fauna from one location to another, either in ballast water or attached to the ships hull. Regulations require that ballast water be exchanged in deep ocean to minimise the risk of transporting marine organisms from one location to another, but this does not give an absolute guarantee that this will not happen.

### 5.3.5 Social

The social issues related to port operations are defined in the interface between urban areas and the port. Residential developments and port operations with noise and lighting tend not to co-exist comfortably. Landside freight access to the port (road and rail) needs to be accommodated in appropriate corridors away from residential development and other incompatible land use. There are also many tangible and intangible economic benefits (GDP) to the general economy and significant employment for the local community.

### 5.3.6 Economic

The threat of competition from alternative transport modes (ie road and rail) creates conflicting demands of facilitating trade and maximising return on investment creating difficulties in setting competitive access prices. Furthermore, the viability of smaller ports is threatened with the introduction of larger vessels, which require less port calls with bigger entrance channels.

### 5.3.7 Security

Security has emerged as a key issue during the past few years as a result of heightened threat of global terrorism. A changing regulatory environment has resulted in a demand to improve maritime transport security. The Department of Transport and Regional Services (DOTARS) is the regulatory body. These developments have led to changes in port operating procedures with new stringent targets set by AAPMA and the International Maritime Organisation (IMO), effective from July 1st, 2004.

Queensland ports have assumed proactive roles in preparation for these new targets conducting risk assessments, liasing with State and Federal Government agencies and realigning security arrangements with Australian customs to move cargo more securely (ie 100% x-raying of containers).

It is important to note that Port Security post 1 July 2004 has seen DOTARS advise ports of the suitability of respective plans and appointments but is yet to adequately define what is the requirement for physical security measures. This has been left to the owners and operators who have been tasked by DOTARS to

make an industry determination. This is a process that is currently being undertaken nationally with DOTARS as the facilitator.

## 5.4 Future Directions

### 5.4.1 General

General future considerations include:

- Improved integration of intermodal transport is required to remove bottlenecks and improve the efficiency of freight movement between wharf and road, rail and air networks.
- Strong need for incorporation of port related infrastructure into integrated planning.
- Control the urban development on port owned or port related land.
- Maintaining adequate landside access (capacity) though adjacent urbanisation creates many of the community problems facing ports.
- The maintenance of port infrastructure and safe and efficient movement of ships, cargo and passengers are vital for the nations continuing economic prosperity. Deterioration in global security situation has resulted in national legalisation designed to improve maritime transport security.
- Dredging/deepening of the port facilities and navigation aids in line with world trends for increased ship sizes to assist industries in marketing exports.
- Authorities to concentrate on core business and developing new approaches.
- Ensure that more of the operating surplus (profit) is available for future infrastructure development.

### 5.4.2 Long-Term Integrated Planning

Ports are being affected by a lack of long term planning arrangements that recognise ports' role in the transport system and what they require to be able to fulfil that role. Landside access is essential for effective port operation. With increased urbanisation, landside access problems can seriously impair the capacity of the port.

The development of port infrastructure needs to precede actual trade growth and other changes dictated by market trends. Essentially long term planning horizons can minimise the effect of problems associated with overall transport needs and related social and environmental impacts with the formulation of environmental buffers and related transport corridors.

### 5.4.3 Future Investment

The extent of future investment in port infrastructure will be driven primarily by trade growth, developments in the transport sector such as Government policy changes that drive the shift of freight from one transport mode to another, and compliance with increasing environmental issues.

The majority of this investment will be directed towards:

- Development of efficient intermodal transport facilities to ensure adequate access corridors for road and rail transport.
- Expand throughput.
- Maximising efficiencies and throughput to maximise and develop port pricing arrangements by working with port customers.
- Facilitate new Queensland infrastructure projects such as landside transport storage.
- Mooring and berth development to meet trade growth to support efficient services that balance the cost of operation and support new industries.
- Security and customs facilities.
- Dredging – channel deepening projects to ensure ports are able to accommodate larger ships. Ship sizes are progressively growing to meet trade growth needs, effectively lowering unit operational costs. Fisherman Islands at Port of Brisbane is now able to take the new generation 4,100 TEU container ships, the world's largest refrigerated container vessel.

- Specific purpose developments to allow new industries and existing ones to expand, requiring storage, loading and unloading facilities and possibly specific berthing arrangements, eg Townsville. sugar mill – 400,000t sugar shed.

### 5.4.4 Port-Specific Future Directions

***PCQ***

- Further growth in bulk commodity exports is expected in the short term, ie minerals.
- Enhancement of existing assets by improving port related business, eg multi-modal terminals.
- Further implementing under keel clearance.

***Brisbane***

- Expansion of container terminal with the construction of berth 9 to handle 70,000 dwt container vessels.
- Construction of a 4.5 km seawall to enable the Port of Brisbane to reclaim an additional 230 ha of land at Fisherman Island over the next 20-25 years from maintenance dredging.
- Rationalising leases to allow existing Patrick Container terminal for use for motor vehicle imports and the handling of general cargo.
- Rationalise internal port layout to improve off road transfer of cargo from road/rail to dockside.

***Gladstone***

- Construction of Comalco Alumina Refinery, Aldoga Aluminium Smelter, and strong interest in the region from prospective industrial stakeholders and the proposed development of further Central Queensland coal reserves all signal further growth for the Port of Gladstone.

***Mackay***

- Port development plan and harbour deepening project was postponed due to advice in 2002, however there has been renewed interest with the commencement of the business case for shareholders.

***Townsville***

- Studies have been undertaken regarding the construction of an ocean terminal as well as development of port land on eastern and western sides of Ross Creek, a commercial marina on Ross River and further development of the western side of Ross River.
- Future diversification has seen negotiations for developing and leasing vacant land.
- A number of projects are proposed, including security upgrades to international ship and port security code.

***Cairns***

- The Cairns Port Authority is looking to capitalise on the north Queensland economy and tourism industry but the prospects for new trade through Cairns seaport are limited.

***Bundaberg***

- The Port Authority is continuing its investigations into potential cargo users of the port, and seeking to encourage additional cargo throughput from its existing users.
- Stage III area of the port is being investigated for further development over the next 12 months.
- Discussions are continuing with ongoing requests for leases on the authorities industrial land.

## 5.5 Report Card Rating

The current level and maintenance of port infrastructure varies from port to port and terminal to terminal, and is currently rated as acceptable to very good.

Major expansion and rationalisation are required to satisfy projected demand in several industries. However, master planning is generally well advanced and funding programs are developed.

For the purposes of rating Queensland ports, the facilities were defined as major or minor ports by current mass tonnage of 1 MTPA. The major ports generally performed slightly better, with the high throughputs generating higher revenues and more stable funding environments.

The asset condition of major and minor ports has been rated as good, with a B for major ports and a B- for minor ports. Similarly, the availability and reliability of Queensland's ports is reasonably good, although some of the minor ports are not as efficient as they could be. In this respect, major ports have scored a B- and minor ports a C+. The asset management of the ports is more than adequate, though there is some room for improvement. Major ports have been rated as B- and minor ports C+. In terms of sustainability, Queensland's ports are reasonably good, although a lack of committed funding for major and minor ports reduces this rating to B and B- respectively. The lack of a consistent approach to security and risk management has also reduced the rating of the major ports to a B and the minor ports to a C-.

In summary, major ports in Queensland scored a B rating, while the minor ports earned a rating of C+. Therefore the overall rating for ports infrastructure in Queensland is **B-**.

***Case Study***

**Enhancement of Port Infrastructure Technology**

Brisbane is the third largest container and general cargo port in the eastern part of Australia. The port handles more than 53 million tonnes of cargo a year.

Patrick Technology and Systems with Kalmer Industries of Finland have developed and proved the use of Automated Straddle carriers for container handling. The Stevedore has 14 driver-free straddles at Brisbane Wharf 7 and has begun building a new facility, which incorporates the Wharf 7 site and Wharf 8 and 9. When completed in late 2004 the new facility will have a capacity of 850,000 TEU's per year.

Major benefits have been delivered throughout the Brisbane trial, they include:

- Increased performance and reliability.
- Savings on fuel and maintenance.
- Increased productivity of 15-20% per hour.
- Up skilling of workers to computer orientated work.

The fully automated self-guiding straddles operate by Global Positioning Systems (GPS), radar waves and lasers. The nature of the operation, which occurs in a sealed off yard results in increased security and safety.

The end result is the enhancement of existing assets and creates many opportunities to improve competitiveness by ensuring operation with high productivity and utilisation of invested capital, eventually leading to reduced costs and lower service and access charges.

This technology represents a significant advancement in the management of containers within terminals and has positive flow on effects for other port operations as well as other ports throughout Queensland, Australia and the even the world. However unions and workers see it a threat to their future as the use of robotic technology represents a significant change in the role of wharf workers and employee numbers.

# 6. Water – Potable, Wastewater and Irrigation

## 6.1 Overview

### 6.1.1 System Description

Drought has been the dominant influence in the water sector over the past three years. Consequently, many areas are facing significant water shortages and a number of significant water capital projects are being considered.

Virtually all urban areas across Queensland are provided with water and wastewater services and almost all are delivered by local government. Urban water supply services are provided for approximately 99% of the State's population, and wastewater services are provided for about 96% of the State's population. (Department of Local Government and Planning, 2001) There are approximately 340 separate water supply schemes and approximately 190 wastewater schemes. The construction of water supply schemes can be traced back to the establishment of Brisbane in 1824, while most of the wastewater schemes were commenced in the 1950s and 1960s.

### 6.1.2 Governance

***Local Government***

Local government is charged by virtue of the *Local Government Act* with front-line responsibility for the delivery of water and wastewater services in Queensland. Relatively recent changes under the *Water Act* make provision for non-government "water service providers", but there are only a few non-government suppliers at present, largely servicing private developments. In some areas, joint local government organisations have been formed under the provisions of the *Local Government Act* to assist in the provision of water. Examples include AquaGen (Caloundra City / Maroochy Shire) and NQ Water (Townsville and Thuringowa Cities).

Many of the larger water service providers have adopted a commercialised business unit model, creating a "purchaser-provider split" in line with National Competition Policy reforms. Some have become corporatised such as Wide Bay Water. The intent of the commercial approach is to improve the transparency of any cross-subsidies between the water businesses and other local government activities, and also provide the opportunity for the water businesses to operate and compete on a business footing.

***State Government***

The services provided by local government are affected by a wide range of State Government legislation and related requirements. These include:

- Water resource management requirements.
- Administrative requirements of water service providers under the *Water Act.*
- The *Integrated Planning Act* and associated infrastructure planning requirements.
- Environmental licensing by the EPA.

***Water Resource Management***

Except for some uncontrolled groundwater areas, the abstraction of water is managed by the Queensland Government. In the past, water has been allocated through various mechanisms, notably as licences under the former *Water Resources Act* or as Orders-in-Council under the *Local Government Act*. In 2000, the new *Water Act* was introduced, and this provides for a much more comprehensive water planning and allocation regime in line with water reforms agreed by the Council of Australian Governments (COAG).

Under the *Water Act*, the Queensland Government is progressively preparing a series of Water Resource Plans for major catchments across the State. The preparation of a Water Resource Plan (WRP) generally takes several years. To date, nine out of 21 plans have been completed, while eight others are in progress.

Planning for four WRPs are yet to commence including the Moreton WRP which covers the Brisbane River and affects most of South-East Queensland. Water entitlements arising from WRPs are known as allocations. Allocations are generally made as either “High Priority” or “Medium Priority”. Supplies for human consumption are generally high priority.

WRPs are implemented through Resource Operation Plans (ROPs). ROPs have been completed for three catchments so far – the Boyne, Burnett and Fitzroy – and it is expected that the Warrego/Paroo/Bulloo/Nebine catchment ROP will be finalised soon.

***Administrative Arrangements under the Water Act***

Chapter 3 of the *Water Act* is the major administrative tool affecting water service providers from a State perspective. This sets out a variety of requirements for water service providers and most importantly includes provisions that require water service providers to prepare Strategic Asset Management Plans (SAMPs). SAMPs have become a key tool for enhanced asset management approaches in the water sector, including better planning for the monitoring, maintenance and renewal of assets over time. As a result of the legislative requirement, virtually all water service providers across the State have established and maintain SAMPs. The level of implementation varies, however, and this is a source of some concern.

The Department of Natural Resources and Mines has responsibility for administration of the administrative provisions of the Act. While there is a group within the Department that fulfils this function on a routine basis, its resources are limited and it does not generally have the capability to ensure that the SAMPs developed by water service providers are properly implemented or maintained.

***Integrated Planning Act***

The *Integrated Planning Act* (IPA) commenced in 1998, and represented a significant shift in the urban and regional planning regime across Queensland. The IPA has provided new impetus for water and wastewater planning. The most important issues arising from the IPA relate to the provisions for infrastructure planning and the development of infrastructure charging regimes. Infrastructure charging regimes allow local government to levy charges on developers to help pay for trunk infrastructure that new development will use.

For some time, local government has had the specific ability to charge for water and sewerage “headworks” through earlier provisions of the *Local Government Act*, and it can reasonably be stated that the planning and charging regimes for water and sewerage are well advanced compared to other forms of local government infrastructure.

The IPA has stringent requirements applied to the methodology for the development of charges and the time frames in which this needs to be done. Initially, local governments were required to complete updated infrastructure charging regimes within five years of the commencement of the IPA (ie by March 2003), but various factors have led to extensions to this date, most recently set to March 2006.

Implementation of the infrastructure charging regime in Queensland has been frustratingly slow. The process of developing charges is dependent on guidelines that are being prepared by the State Government, which will be subordinate legislation to IPA. Although draft guidelines were initially issued in 1998, the guidelines had not been finalised some six years later at the time of writing. There has been lengthy discussion and debate regarding the content of the guidelines, all of which has led to significant scepticism and concern amongst both local government and the development industry.

In some cases, the impending deadline for the development of infrastructure charges has caused local governments to increase their efforts in planning new infrastructure to support growth. In other cases, local governments have become so frustrated by the delays in the development of guidelines that they have deferred planning activities in anticipation of the guidelines being issued. Notwithstanding this, a number of local governments are well advanced in implementing infrastructure charging regimes.

***Environmental Licensing***

Environmental licensing by the EPA is of critical importance to the wastewater industry. Under the *Environment Protection Act* 1994 and related Environmental Protection Policies, the EPA issues environmental authorities. In the wastewater sector, these primarily relate to the operation of wastewater treatment plants and associated collection systems.

Over the past ten years, environmental authorities have generally become much more stringent, particularly in the area of nutrient removal – nitrogen and phosphorus – from wastewater effluent discharged to waterways. There has been very significant expenditure on wastewater treatment across Queensland as a result of increased nutrient removal standards, and this has been supported by increased subsidy from the State Government through the Local Governing Bodies Capital Works Subsidy Scheme.

In line with increased community expectation, there has also been increased focus on nuisance noise and odour arising particularly from wastewater treatment facilities.

***Federal Government***

The Federal 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 which is provided via a number of Ministerial Councils.
- Reform of the water industry in Australia which is provided via the Council of Australian Governments and the National Competition Council.

***Water Quality and the Environment***

Water quality goals are given direction by the National Water Quality Management Strategy, which is a joint strategy of two ministerial councils, ANZECC and ARMCANZ. The two councils represent environment and water resource interests respectively.

The current Australian Drinking Water Guidelines were developed by ANZECC, ARMCANZ and the National Health and Medical Research Council (NHMRC). 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 being reviewed by ANZECC.

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

***Reform of the Australian Water Industry***

In February 1994, COAG issued a Communiqué for reforms required in the water industry. From this framework a set of generic national milestones were developed as the basis for negotiating the specific milestones for each State. As a reward for achieving these milestones the Federal Government will make substantial payments to the States. Payments are made under the Competition Policy Reform Act 1995, which provides the legislative empowerment to the National Competition Policy.

The reforms under the National Competition Policy focus on moving the water industry towards one that is economically viable and ecologically sustainable. Objectives of the reform are that:

- The industry becomes efficient, flexible, sustainable and capable of delivering a higher quality of water with greater security of supply.
- Water will be properly priced and water's scarcity value will be better appreciated.
- Water treatment and disposal, and recycling will form a large component of the industry.

The reforms are having the most impact on rural customers (non-urban) through the allocation and trading in sustainable water entitlements. One of the main sources of improved economic performance is anticipated to be the gains from water trading.

The more significant impacts of the reforms on urban water supply are in the areas of:

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

- Allocation of water for the environment.

Efficient delivery and meeting best practice standards normally results from competition within an industry. Utilities within the water industry are in most instances monopolies and therefore competitor pressures are not felt by the utility. Benchmarking, through inter-agency comparisons, is used to set standards of performance and levels of customer service for monopolies. The Water Services Association of Australia (WSAA) compiles comparative information for Australia. WSAA is the peak body of the Australian urban water industry and its 22 members provide water and wastewater services to approximately 13 million people. Since 1995, WSAA has compiled comparative information on the major urban water industry and the industry's achievements with regard to the requirements of the National Competition Policy. The compiled information is published in WSAAfacts and provides information on:

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

***National Water Initiative***

In June 2004, COAG agreed to implement the National Water Initiative (NWI) with the objective of developing "a nationally-compatible market, regulatory and planning based system of managing surface and groundwater resources for rural and urban use that optimised economic, social and environmental outcomes."

The NWI is a continuation of the reforms previously agreed by COAG. Elements of the NWI that are particularly relevant to urban communities include:

- A framework that assigns the risk of future reductions in water availability.
- Continued implementation of full-cost recovery pricing for water in both urban and rural sectors
- National standards for water accounting, reporting and metering.
- Actions to better manage the demand for water in urban areas, including a review of temporary water restrictions, minimum water efficiency standards and mandatory labelling of household appliances, and national guidelines for water sensitive urban design.

As part of the NWI, COAG will also establish a National Water Commission (NWC), which will be responsible for assessing the progress of implementation of the NWI and producing an assessment in 2005 of progress of water reform commitments under the National Competition Policy.

### 6.1.3 Sector Trends

***Funding***

The water and wastewater infrastructure sector is predominantly funded by government. The State Government provides significant subsidies (40-50%) for the construction but not maintenance of various system components, especially treatment facilities and core trunk systems via the Local Governing Bodies Capital Works Subsidy Scheme. These arrangements are subject to review by 2006.

System augmentations to accommodate growth are funded through infrastructure charges under the *Integrated Planning Act*, although local governments are able to "cross-subsidise" trunk system components provided that this is done transparently.

There is limited private investment in water and wastewater infrastructure with the notable exception of Nathan Dam on the Dawson River. Sudaw Developments Ltd has an agreement with the Queensland Government to construct the Nathan Dam, although this has been delayed by court actions relating to the environmental impact of the dam. In its current form, Nathan Dam would significantly improve water availability for rural purposes in the Dawson Valley, but would have limited impact on urban water supplies.

***Spending on Infrastructure***

There has been increased expenditure on water and sewerage infrastructure across Queensland over the past five years and this trend appears to be continuing. The primary drivers of increased expenditure are:

- Improved planning as a result of the implementation of the Integrated Planning Act.
- Drought, particularly its influence in Gladstone and on the Gold Coast.
- Enhanced effluent quality requirements for wastewater treatment.
- An increased recognition of the limitations of existing water resources.

Increased spending has also occurred in the planning phase, with State and local government promoting the development of regional water supply strategies for South-East Queensland, Central Queensland and North Queensland.

***Water Recycling and Integrated Water Management***

Recognising the limitations exposed by drought, several local governments have undertaken extensive investigations into prospects for recycling water in the urban environment and the implementation of Integrated Water Management. Some of these investigations have shown that, considered on a holistic basis, integrated water management can significantly reduce water consumption at minimal additional cost. The economics of individual schemes depend upon the particular configuration of trunk infrastructure. Queensland has an advantage over some other states in respect of integrated water management because local government has control over water supply, wastewater, stormwater management and urban planning functions.

Integrated Water Management can be most effectively implemented “from the ground up” in greenfield development. This means that decisions need to be made now to address water supply issues in 20 years time. The work undertaken in South-East Queensland needs to be extended to other parts of the State, and further work needs to be done on a number of regulatory and legislative issues particularly in respect of the reticulation of recycled water.

## 6.2 Assessment Criteria

To assess the “fitness for purpose” of water and wastewater infrastructure, the factors in Table 13 are used. For many factors considered in the evaluation of the fitness for purpose, 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 releases 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.
- Demand management.
- Infrastructure maintenance and renewal.

**Irrigation**

- Availability of supply.
- Delivery efficiency of irrigation systems.
- Planning for water allocations.
- Infrastructure maintenance and renewal.

**Table 13 Assessment Criteria for Water**

| Factor | Potable Water | Wastewater | Irrigation |
|---|---|---|---|
| Asset Condition | Structural soundness of headworks and reticulation | Structural soundness of sewage reticulation and treatment plants | Structural soundness of dams, distribution systems and appurtenant infrastructure |
| 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. | Availability of assets to deliver water entitlements to irrigators, but excluding reliability of supply. |
| 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. | The availability of data on the system, and the existence of forward planning programs of maintenance and renewal. |
| Sustainability | Environmental: the impact on downstream waters; the impacts of treatment by-products.<br>Economic: the level of investment for maintenance and renewal; the cost to customers; concerns that pricing is not reflecting actual costs, and demand management.<br>Social: impact of lack of supply; health impacts of deficiencies in quality, meeting of community expectations on appropriate treatment and use of water. | Environmental: the impact of discharges on downstream waters; the impacts of treatment by-products.<br>Economic: the level of investment for maintenance and renewal; the cost to customers.<br>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. | Environmental: the availability of flows to sustain downstream ecosystems.<br>Economic: the level of investment for maintenance and renewal; recovery of costs from users and other sources to sustain the assets.<br>Social: impact of lack of supply. |

## 6.3 Potable Water

### 6.3.1 Overview

***Water Sources***

Coastal Queensland is predominantly supplied from surface water storages (dams) located on coastal rivers. There are a small number of groundwater abstraction systems on the coast, most notably those on North Stradbroke Island and Bribie Island operated by Redland Shire Council and Caboolture Shire Council, respectively.

West of the Great Dividing Range, communities are more dependent on groundwater although there are still many small dams and run-of-river sources used for supply. Groundwater salinity is a concern in a number of areas, and in the case of Dalby a reverse-osmosis desalination plant has been installed to allow

surface water storages to be supplemented by groundwater that was previously too saline for domestic purposes.

As a result of recent drought conditions, the reliable supplies available from several surface water sources has been reassessed. This has been assisted by the concurrent development of updated hydrological models in association with the water resource planning process. The reassessment has resulted in some significant reductions in the yield of existing and potential surface water sources. Most notably, this has included Awoonga Dam (Gladstone), Hinze Dam (Gold Coast) and the Wivenhoe/Somerset system (South-East Queensland).

There is also discussion regarding the methodology that is applied to determine the amount of water that should be assumed to be available from surface water sources for major urban areas. This may result in a further reduction in the amount of water that is assumed to be available.

As a result of reductions in yield estimates and concern about the environmental impacts of new dams, the drought has led to significantly more activity in the areas of source substitution and water use efficiency. These activities are consistent with the National Water Initiative and are likely to have a significant impact on water supply strategies across Queensland in the next five to ten years.

Another issue facing dam owners is the sizing of spillways to accommodate estimated flood flows. Flood estimates have tended to increase with changed methods of hydrological analysis, and this has led to an apparent need to upgrade the spillways of many dams to continue to comply with ANCOLD guidelines. There is still some debate regarding the need for these upgrades. Current upgrade projects include Wivenhoe Dam near Brisbane (approximately $70 million) and Ross River Dam in Townsville (between $60 and $90 million).

***Water Treatment***

Most surface water and groundwater tends to be of good quality requiring relatively low levels of treatment for potable use. In general, conventional treatment processes are used incorporating coagulation, filtration and chlorine disinfection. Additional processes are used in some locations, most notably at Lake Macdonald (Noosa) and Landers Shute (Caloundra/Maroochy) Water Treatment Plants on the Sunshine Coast where treatment with ozone and biologically activated carbon has been added to improve the product water from a taste and odour perspective and provide better protection against toxins from blue-green algae blooms. It is anticipated that there will be increased application of this technology over the next five to ten years for major urban supplies.

Water service providers routinely monitor product water quality against the Australian Drinking Water Guidelines. A number of major providers such as Gold Coast Water have also implemented HACCP (Hazard Analysis and Critical Control Point) systems that are derived from the food industry. There is some concern, however, that there is limited regulatory monitoring of product water quality for smaller communities. This could have serious health implications in the event that supply is contaminated. There are salient lessons to be learnt from experience in Walkerton, Canada, where seven people out of a population of 5,000 died as a result of water supply contamination in 2000.

Water in Queensland is not generally fluoridated, although there are a small number of supplies where fluoride is added to treated water to assist in the prevention of dental caries. The only major urban supply where fluoride is added is Townsville, where water from the Ross River Dam is fluoridated.

***Distribution Systems***

Treated water is generally supplied by gravity from storage reservoirs throughout the service areas. The storages are used to buffer peak demand and to provide emergency supply in the event that supplies from the treatment plant are disrupted. Distribution mains are sized to accommodate peak flows arising from routine use, and for fire-fighting purposes. Water mains are generally laid in the streets and are fitted with in-ground spring hydrants for fire-fighting purposes.

The main issues with distribution systems are:

- Water quality.
- Leakage (non-revenue water).
- Main breaks.
- Water pressure.

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

### 6.3.2 Existing Infrastructure

A summary of the assets owned and operated by some of the larger utilities is provided below.

**Table 14 Summary of Water Assets**

| Utility | Water Treatment Plants | Pumping Stations | Mains (km) | Properties connected per km | Written Down Asset Value ($M) |
|---|---|---|---|---|---|
| Brisbane | 4 | 96 | 5,893 | 68 | $1,387M |
| Cairns | 1 | 38 | 1,766 | 28 | |
| Gold Coast | 2 | 61 | 2,835 | 70 | $678M |
| Ipswich | 1 | 29 | 1,318 | 37 | $160M |
| Logan | 1 | 17 | 1,216 | 54 | $152M |
| Mackay | 6 | 26 | 706 | 41 | |
| Rockhampton | 1 | 22 | 596 | 42 | |
| Thuringowa | 2 | 4 | 547 | 33 | |
| Townsville | | 15 | 1231 | | |
| Toowoomba | 1 | 10 | 821 | 44 | |

Allowing for infrastructure in regional Queensland, the estimated total written down value of water supply assets across the State is approximately $4 billion.

### 6.3.3 Operational Data

***Water Consumed***

The volume of water consumed per property over the four-year period 1997/98-2000/01 is provided in the Table 15 for major urban and a range of non-major urban water service providers. This data includes industrial and commercial consumption which can skew individual statistics, and care should be taken in directly comparing the numbers in Table 15.

Nationally, the average annual consumption over the same period was around 430kL per property. The average for Queensland is similar. The most notable feature of the data in the above table is the variability between water service providers. In part, this reflects different industrial and commercial water use regimes, but it also reflects varying strategies for the management of urban demand. Water metering and associated pricing regimes, for example, have not yet been universally adopted across Queensland. Nonetheless, the State Government continues to promote (but not mandate) the universal adoption of urban water metering across Queensland as part of its response to the COAG agenda.

Recent work completed for the South-East Queensland Regional Water Supply Strategy has highlighted the lack of uniformity in measurement and reporting methodologies for water consumption across

Queensland. There is no reporting or benchmarking regime in place for non-major retailers, although the major retailers (Brisbane, Gold Coast, Logan, Ipswich, Maroochy) do this through WSAA.

Losses arising from leakage are generally in the range of 10-20% of total supply volume. There is much inconsistency in measurement regimes and therefore the reliability of loss data. Detailed data is available in the references cited above, but is not reproduced here because of the level of uncertainty. It is clear, however, that reporting of non-revenue water (NRW) in accordance with WSAA and International Water Association (IWA) standards should be part of a broader reporting regime for water service providers across Queensland.

**Table 15 Average Annual Consumption (kL / property)**

| Utility | 1997/98 | 1998/99 | 1999/2000 | 2000/01 | 2001/02* | 2002/03* |
|---|---|---|---|---|---|---|
| Brisbane | 451 | 423 | 404 | 437 | 425 | 411 |
| Bundaberg | 495 | 409 | 421 | 468 | | |
| Caboolture | 336 | 318 | 315 | 346 | | |
| Cairns | 526 | 460 | 448 | 455 | | |
| Caloundra | | 284 | 271 | 316 | | |
| Gladstone | | | | 704 | | |
| Gold Coast | 360 | 329 | 324 | 350 | 375 | 293 |
| Hervey Bay | 301 | 242 | 260 | 298 | | |
| Ipswich | 575 | 531 | 522 | 596 | 547 | 510 |
| Logan | | 293 | 343 | | | 291 |
| Mackay | 535 | 447 | 566 | 457 | | |
| Maroochy | 302 | 291 | 280 | 308 | | |
| Noosa | 335 | 321 | 332 | 275 | | |
| Pine Rivers | 631 | 626 | 574 | 727 | | |
| Redcliffe | 253 | 272 | 333 | | | |
| Redland | 423 | 359 | 368 | 314 | | |
| Rockhampton | 1187 | 825 | 915 | 968 | | |
| Thuringowa | 658 | | 623 | 632 | | |
| Toowoomba | | | 346 | 403 | | |
| Townsville | 981 | 724 | 937 | | | |

** Data only available for WSAA members*

*Sources: WSAAFacts 2003, Water Services Association of Australia, 2003 and Australian Non-Major Urban Water Utilities Performance Monitoring Report, Australian Water Association, 2002*

***Compliance with Drinking Water Quality Guidelines***

Water service providers monitor drinking water quality on a regular basis at locations throughout the distribution system. Water quality is measured against the Australian Drinking Water Guidelines (ADWG). On average, in excess of 99% of all samples meet the ADWG and this is considered to be a good outcome. As mentioned previously, however, there is a greater concern in relation to small providers who cannot afford to have comprehensive testing regimes in place. At least some level of audit is desirable on these providers.

***Service Delivery***

As part of the mandatory Strategic Asset Management Plans, and also as part of the infrastructure planning regime, water service providers are required to document a series of desired standards of service. The

larger providers report against these standards on an annual basis, but the smaller providers generally do not.

***Pricing***

In response to the COAG-led reforms, water service providers are progressively introducing full-cost pricing. This means that end users are paying the full cost of service provision, including allowances for asset renewal and replacement. In most cases there is a two-part tariff, with a fixed connection fee and a variable consumption cost. Typical charges across Queensland are around $0.80/kL consumed and $100/year connection fee.

The most significant concern with current pricing regimes is the degree to which they may inhibit the potential for future major infrastructure expenditure. Many of the coastal resources are essentially fully developed and future sources will be much more expensive. The existing cost-reflective price regime does not necessarily provide adequate incentive for investment in demand reduction measures, including the implementation of recycled water systems that will become much more expensive to implement over time.

***Renewal Expenditure***

Renewal expenditure across most of Queensland is relatively low. Between 1998 and 2001, the non-major urban water utilities in Queensland collectively spent less than 1% of total revenues on asset renewals. Given an average asset life of 30-50 years, this would appear low. It is recognized, however, that many of the assets are less than 30 years old and are still reaching an appropriate time for renewal. The SAMPs that the utilities are required to develop recognize the ageing of assets, and renewals of these assets are included in the long-term financial plans. Water service providers are generally making appropriate provision for renewals in their long-term plans.

***Demand Management***

Levels of demand management vary across the State. Demand management is generally achieved through public awareness campaigns such as the “WaterWise” program, which is supported by the State Government. The Australian Water Association has also placed significant weight on demand management and contemporary approaches to recycling through its “We All Use Water” project.

Most but not all water service providers have permanent garden watering restrictions (such as an odds/evens approach) to assist in managing demand. The State Government is also understood to be preparing a sustainable housing policy that will require all new houses to be more energy and water efficient.

Because of the recent drought, some water service providers such as the Gladstone Area Water Board and Gold Coast City Council have had to introduce severe restrictions on water use. These have been temporary drought management measures, but it is to be expected that the frequency with which such restrictions are imposed will increase as we reach the limit of the capacity of existing resources.

### 6.3.4 Infrastructure Security

Following recent international events, there has been increased awareness of the susceptibility of water supply infrastructure to terrorist and related activities. Most of the major water service providers have reviewed their security arrangements. As a general rule, the potential for large-scale contamination of water supply systems is low, given the concentrations of most contaminants that would be required to have any significant impact. Localised effects could, however, be significant.

The loss of major infrastructure elements, however, could have much broader effects because of the long lead times to replace major equipment. Major utilities are well aware of these risks and some are beginning to put contingency plans in place. A much more detailed consideration of contingency measures is required, however, not only as a response to terrorism risks but also as a response to the potential for natural disasters that are more severe than previously predicted and possible climate change.

## 6.4 Wastewater

### 6.4.1 Overview

***Sewage***

Sewage is waterborne 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 an unacceptable impact if discharged to the environment. Treatment processes have improved significantly over the last fifty years and water can now be treated to a sufficiently high standard that the water can 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 Queensland are old and damaged, allowing water infiltration during wet weather and inflow where illegal connections are made from the roof and yard drainage systems. Inflow and infiltration also occurs in the utility's reticulation system. 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, particularly in the reticulation system. 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. Different levels of treatment are sometimes provided to allow effluent reuse, or 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, with or without additional nutrient removal. Tertiary treatment[1] further treats the effluent to reduce the nutrient content, nitrogen and phosphorus, where discharge to sensitive waters is occurring.

### 6.4.2 Existing Infrastructure

A summary of the assets owned and operated by the major utilities, as at 2002/03, is provided in Table 17. Allowing for infrastructure in regional Queensland, the estimated total written down value of wastewater assets across the State is approximately $5 billion.

[1] The definition of tertiary treatment varies. Tertiary treatment sometimes refers to additional processes of coagulation and filtration.

**Table 16 Summary of Wastewater Assets**

| Utility | Wastewater Treatment Plants | Wastewater Pumping Stations | Mains (km) | Properties connected per km | Written Down Asset Value ($M) |
|---|---|---|---|---|---|
| Brisbane | 11 | 194 | 6,646 | 59 | $1,346M |
| Cairns | 6 | 151 | 986 | 46 | |
| Gold Coast | 4 | 556 | 2,774 | 65 | $673M |
| Ipswich | 5 | 55 | 1,154 | 37 | $163M |
| Logan | 1 | 55 | 1,433 | 43 | $265M |
| Mackay | 3 | 147 | 593 | 37 | |
| Rockhampton | 3 | 32 | 518 | 49 | |
| Thuringowa | 5 | 46 | 276 | 46 | |
| Townsville | 5 | 100 | 723 | 43 | |
| Toowoomba | 2 | 41 | 768 | 43 | |

### 6.4.3 Operational Data

***Wastewater Collection***

The volume of wastewater collected per property over the four-year period 1997/98-2000/01 is provided in Table 17 for major urban and a range of non-major urban water service providers. The volume of wastewater collected is measured at the treatment plants and therefore includes inflow and infiltration. In most cases there is very limited information or understanding of the actual performance of sewer systems, especially during wet weather.

**Table 17 Wastewater Collected (2000/01 or *2002/03)**

| Utility | Average Flow (L/property/day) | Average Daily Flow (L/person/day) |
|---|---|---|
| Brisbane* | 758 | |
| Bundaberg | 487 | 216 |
| Caboolture | 692 | 258 |
| Cairns | 1033 | 372 |
| Caloundra | 640 | 245 |
| Gladstone | 721 | 292 |
| Gold Coast* | 764 | |
| Hervey Bay | 618 | 238 |
| Ipswich | 799 (685*) | 229 |
| Logan* | 726 | |
| Mackay | 1002 | 285 |
| Maroochy | 772 | 273 |
| Noosa | 442 | 240 |
| Pine Rivers | | 220 |
| Redland | 725 | 234 |
| Rockhampton | 824 | 362 |
| Thuringowa | 811 | 202 |
| Toowoomba | 801 | 307 |
| Townsville | 1113 | 392 |

** Data only available for WSAA members*

*Sources: WSAAFacts 2003, Water Services Association of Australia, 2003 and Australian Non-Major Urban Water Utilities Performance Monitoring Report, Australian Water Association, 2002*

***Asset Performance***

Details of the average number of overflows and odour complaints for the major utilities are provided in Table 18. Similar information is available for non-major urban water utilities. The number of confirmed sewer chokes for Brisbane and the Gold Coast (the only reported data) are relatively low compared to national averages, while the number of sewage overflows for Brisbane is relatively high. The number of odour complaints is small, and generally typical of statistics across Australia.

The number of sewage overflows from a sewerage system is not easily measured, and the quoted data must be considered approximate and a "lower bound" outcome. Few water service providers have a good understanding of their system's performance under wet weather conditions, and there are no broadly accepted indicators of inflow and infiltration performance that are routinely reported or monitored. Environmental Authorities from the EPA to operate sewerage systems are generally based on being able to accommodate an assumed wet weather flow. The more stringent overflow frequency parameters adopted in some other parts of Australia – most notably Sydney – are not used in Queensland.

**Table 18 Overflows and Odour Complaints (annual average of published WSAA and AWA data)**

| Utility | Confirmed Sewer Chokes (per 100km of main) | Sewage Overflows (per 100km of main) | Odour Complaints (per 1000 properties) |
|---|---|---|---|
| Brisbane | 5.2 | 20.0 | 0.9 |
| Cairns | 14 | 2.3 | 0.6 |
| Gold Coast | 2.8 | 11.7 | 1.8 |
| Ipswich | | 2.6 | 0.7 |
| Logan | | 7.5 | 1.2 |
| Mackay | 20 | 1.3 | 1.0 |
| Rockhampton | 54 | 1.1 | 0.7 |
| Thuringowa | 4 | 1.1 | 1.5 |
| Townsville | 8 | 6.0 | 1.2 |
| Toowoomba | 85 | 27.2 | 0.1 |

*Source: WSAAFacts 2003, Water Services Association of Australia, 2003*

***Effluent Reuse***

An increasing proportion of effluent from wastewater treatment plants is being reused. It is important to consider, however, what proportion of effluent reuse is helping to preserve potable water sources. In general, these details are not reported. A recent survey in South-East Queensland indicated that approximately 6% of all wastewater effluent in South-East Queensland is reused. Of this, more than half is used for irrigation of golf courses and sporting fields. (South-East Queensland Regional Water Supply Strategy)

There have been investigations into the re-use of effluent for various applications, including irrigation in the Lockyer Valley and on the Darling Downs. To date, the major studies undertaken into these options have shown that the cost of constructing recycling schemes to the Lockyer Valley and the Darling Downs is significant, and not justifiable from an economic perspective.

Moreover, there is increased focus on the re-use of effluent locally as recycled water in urban areas. Investigations undertaken by Brisbane City Council and Gold Coast City Council, for example, have shown that the adoption of recycled water systems and other sources such as rainwater tanks can reduce potable

water demand by between 60% and 80%. On this basis, it would appear that the most cost-effective recycling strategies involve re-use occurring in the vicinity of treatment facilities.

***Pricing***

For urban users, pricing is generally via a fixed rate. In some instances, sewerage charges are based on water consumption, but this is uncommon. Fixed annual sewerage charges are typically around $300/property. As for water supply, water service providers are progressively introducing full-cost recovery. This means that end users are paying the full cost of service provision, including allowances for asset renewal and replacement.

***Renewal Expenditure***

As for water supply, renewal expenditure across most of Queensland is relatively low. Between 1998 and 2001, the non-major urban water utilities in Queensland collectively spent less than 1% of total revenues on asset renewals. Given an average asset life of 30-50 years, this would appear low. It is recognized, however, that many of the assets are less than 30 years old and are still reaching an appropriate time for renewal. The SAMPs and financial reporting standards that the utilities are required to use recognize the ageing of assets, and renewals of these assets are included in the long-term financial plans. On this basis, water service providers are generally making appropriate provision for renewals in their long-term plans.

The biggest challenge in long-term financial modelling of wastewater assets is developing appropriate estimates of the life of each asset. In most cases, asset depreciation is determined in the basis of age rather than detailed condition assessment. This leads to some level of uncertainty about the provisions that are being made for asset renewals in future.

### 6.4.4 Infrastructure Security

Wastewater systems are generally considered to be a relatively low risk in respect of infrastructure security. This is because the human health risks arising from system failures are relatively low, although the environmental risks are high.

Queensland has already experienced infrastructure security breaches in wastewater reticulation systems. Maroochy Shire Council experienced what is quoted worldwide as one of the notable cases of “cyber-terrorism” when a person (who was subsequently convicted) randomly turned off a number of wastewater pumping stations by illegally accessing the Council’s radio control system resulting in system overflows to the environment.

The industry as a whole in Queensland is now becoming more responsible, to varying degrees, for the protection of its infrastructure, personnel and clients. This has seen disaster emergency planning, contingency planning for heightened security alert levels, and security policies procedures and guidelines designed an implemented.

## 6.5 Irrigation

### 6.5.1 Overview

***Irrigation Infrastructure***

Irrigation in Queensland can be divided into two categories:

- irrigation from groundwater supplies.
- irrigation from surface water supplies.

Infrastructure for groundwater irrigation includes bores, pumps, and open drains. This infrastructure is generally owned and maintained by individual irrigators, although these supplies may be augmented through groundwater recharge weirs (weirs constructed to increase groundwater recharge from surface water systems).

Surface water irrigation supply infrastructure consists of dams, weirs, pump stations, pipelines, open channels and distribution works. There are 29 irrigation water supply schemes in Queensland. Out of the 29 schemes, 26 are owned and managed by SunWater, the major provider of irrigation water supplies in the State. The remaining schemes are operated by various water boards. Many of the water supply schemes supply water for urban and industrial use as well as irrigation purposes.

SunWater's water storage and distribution infrastructure has a replacement value of $2.7billion and includes:

- 25 major dams.
- 81 weirs and barrages.
- 72 major pumping stations.
- More than 2,500 km of pipelines and open channels, and 730 km of drainage works.

Details of Queensland's irrigation water supply systems are provided in Table 19.

**Table 19 Queensland's irrigation water supply systems**

| | |
|---|---|
| Number of systems | 29 |
| Number of irrigation customers | 6,057* |
| Reported area in all irrigation systems | 384,923 ha |
| Reported area irrigated | 86,362 ha |
| Reported water entitlement | 1,929,616 ML |
| Dominant crops | Sugar cane, cotton, cereal crops |

* *Only includes customers of privately managed water supply schemes.*

*Source: Australian Irrigation Water Provider Benchmarking Report for 2002/2003 (ANCID, May 2004).*

***Regulation***

The *Water Act 2000* vests all rights to the use, flow and control of water in Queensland to the State. The Department of Natural Resources and Mines (NR&M) is the State agency with the responsibility to exercise the State's rights. In exercising this responsibility, NR&M manages access to water by water users through a system of water entitlements under the *Water Act 2000* that include water licences, water permits, interim water allocations and water allocations.

A water entitlement under the *Water Act 2000* does not allow the physical construction of works to take or interfere with water. These works are authorised under the *Integrated Planning Act 1997*.

In 1994, the Council of Australian Governments (COAG) identified six major areas where the Australian water industry needed reforming. The COAG Water Resources Policy's key concerns related to:

- Natural resource management.
- Pricing.
- Future investment.
- Water trading.
- Institutional reform.
- Public consultation.

COAG required the separation of the regulatory and service provision roles of the irrigation water supply industry and this led to the formation of SunWater (government owned corporation) from the corporatisation of State Water Projects (a commercialised business unit within the NR&M). SunWater is the main service provider of irrigation water, while the NR&M acts as the regulator.

The *Water Act 2000* sets out the two regulatory functions of NR&M in relation to SunWater and other water service providers. Firstly, water service providers have Interim Resource Operations Licences (IROLs) or Resource Operations Licences (ROLs) that define how the water supply schemes are to be operated. The IROLs/ROLs are issued and administered by the Chief Executive of NR&M. The *Water Act 2000* also sets

up NR&M's separate function of a regulator in respect of the dam safety and asset maintenance requirements of water service providers.

Water service providers are required to prepare and submit to NR&M independent audited strategic asset management plans. The asset management plans ensure that the water service providers do not compromise their service standards and long-term asset maintenance in the pursuit of short term profit. Water service providers must ensure that customers are protected by standards relating to the supply of registered services under their obligations to the regulator (NR&M). The standard contract must detail the level of service, the process for service connections, billing, metering, accounting and customer consultation.

In relation to dam safety, the obligations on water service providers include a comprehensive monitoring and inspection program, a detailed risk assessment of each dam, the requirement to report to NR&M, and a review by independent third parties.

The *Queensland Competition Authority Act 1997* provides for the Queensland Competition Authority to be involved in the oversight of pricing in the water industry. The role of the Queensland Competition Authority is to provide oversight of government monopoly business activities making recommendations and undertaking investigations at the direction of the Premier and Treasurer.

(The above information was sourced from *Talking Water Reform – sharing information and views on rural water pricing*, Department of Natural Resources and Mines, November 2002).

***Stakeholders***

Key stakeholders in Queensland's irrigation water supply industry include:

- The Department of Natural Resources and Mines (Regulator).
- SunWater (main water service provider).
- Various Water Boards that also own and operate water supply infrastructure.
- Customer Councils (groups of SunWater customers that provide advice and feedback to SunWater in relation to management of the schemes, customer relationship issues and strategic matters).
- Queensland Irrigators Council (irrigators representative organisation established with the support of Queensland's major agri-political bodies including, the Queensland Farmers' Federation, CANEGROWERS, Queensland Dairyfarmers' Organisation, Queensland Cotton and Queensland Fruit and Vegetable Growers).
- Various national industry groups including the Irrigation Association of Australia (IAA), Australian National Committee on Irrigation and Drainage (ANCID), and the Australian Water Association (AWA).
- Queensland Competition Authority (oversight of water pricing).
- Individual irrigators.

### 6.5.2 Existing Irrigation Water Supply

***Water Entitlements***

The main types of water entitlements that are used for irrigation are:

- Water harvesting licences that permit irrigators to take water from natural drainage systems when certain minimum flow thresholds are exceeded. Water harvesting licences are issued and administered by NR&M and are attached to a land title.
- Interim Water Allocations that apply in water supply schemes for which an Interim Resource Operations Licence (defined below) has been issued. Interim Water Allocations are attached to the land title on which the water is used. They cannot be permanently traded, however owners of Interim Water Allocation, can temporarily transfer the allocation to another irrigator for periods of 12 months duration using a Seasonal Water Assignment. The supply of water through an Interim Water Allocation is managed by the operator of the water supply scheme.

- Water Allocations that apply in water supply schemes (or larger basins incorporating several different water supply schemes) for which a Water Resource Plan (defined below) has been approved and implemented. Water allocations are not attached to a land title and can be bought and sold separately from land. The supply of water through a Water Allocation is managed by the operator of the water supply scheme.

The availability of water through a water harvesting licence depends entirely on the occurrence of stream flow events that are significant enough to exceed the minimum flow thresholds. The availability of water through Interim Water Allocations and Water Allocations is determined by the Water Service Provider through an Announced Allocation system. With this system, the water availability in any year is defined as a percentage of the Interim Water Allocation/Water Allocation. The Announced Allocation percentage is determined by considering factors such as the volume of water stored in the system, likely minimum inflows to the system, storage losses and water transmission efficiencies.

***Interim Resource Operations Licences***

Interim Resource Operations Licences (IROLs) were issued by NR&M to water service providers. IROLs describe the requirements for the operation of storages, environmental flow requirements, allowance for losses, as well as defining additional water allocation that can be sold to customers. IROLs contain details of the licence holder; details of water infrastructure that is covered by the licence; operating arrangements for the water infrastructure; details of the water managed under the licence, including interim water allocations that are to be managed under the licence; water sharing rules; and monitoring and reporting requirements. There are currently 25 water supply schemes in Queensland for which IROLs are issued. In the future, IROLs will be replaced by Resource Operations Plans (ROPs) and Resource Operations Licences (ROLs) as Water Resource Plans are developed for the different river basins in the State.

***Water Resource Planning***

As a part of the water reform program, the Queensland Government has introduced a water resource planning process designed to plan for the allocation and sustainable management of water to meet Queensland's future water requirements, including the protection of natural ecosystems and security of supply to water users. Outcomes of this planning process are Water Resource Plans (WRPs). These plans, which become subordinate legislation under *Water Act 2000* involve consulting with the community and stakeholders to identify water allocation and management issues within river catchments.

Once finalised, WRPs are implemented as Resource Operations Plans. Preparation of a ROP occurs in conjunction with community consultation, public submissions on a draft ROP and recommendations from a ROP Referral Panel. Resource Operations Licences (ROLs) are granted in accordance with a ROP and contain similar information to an IROL.

There are currently seven ROLs issued for Water Supply Schemes in Queensland. Two other ROLs are defined for future planned infrastructure.

***Water Pricing***

Irrigation water prices are determined by the Water Service Provider, but are generally based on a two-part tariff scheme. The first part of the tariff is a fixed charge based on a nominal water allocation, while the second part is a variable charge based on the volume of water actually used throughout the year. The principle behind the tariff is to cover the fixed and variable costs of maintaining a water supply.

### 6.5.3 Water Reforms

(Information in this section was sourced from *Talking Water Reform – sharing information and views on rural water pricing*, Department of Natural Resources and Mines, November 2002).

The COAG Water Resources Policy of 1994 identified a number of major areas where the Australian water industry needed reforming. These areas included natural resource management, pricing, future investment, water trading, institutional reform and public consultation.

The purpose of the reforms was to provide a basis for the water industry to move forwards on an environmentally and economically sustainable basis. The reforms are designed to provide a better arrangement for the supply of water by implementing the most appropriate structures and accountabilities in water service businesses.

***Institutional Reform***

The *Water Act 2000* establishes many of the arrangements for reforming the relationships between water institutions in Queensland. COAG required the separation of the roles of water resource management, standard setting, regulatory enforcement and service provision. The need to separate regulatory and commercial functions saw the Queensland Government in May 1999 agree to the corporatisation of State Water Projects, a commercial business unit within the Department of Natural Resources. SunWater was created as a separate entity in October 2000.

In addition to the separation of the water service provider and regulator functions, the institutional reforms included the provision for the Queensland Competition Authority to be involved in the oversight of pricing within the water industry.

***Water pricing***

The COAG agreement requires rural water prices to cover, as a minimum, the lower bound costs of irrigation schemes. These costs include operations and maintenance, refurbishment, taxes and overheads, interest on debt and externalities. However, the agreement also states that wherever practicable the prices should reflect the full cost of water service and delivery. Full costs include, in addition to the minimum costs, a return on assets. The return on assets framework provides the incentive to the service provider to invest and innovate.

For rural water supply, COAG agreed that where charges do not currently cover the costs of supplying water, both charges and costs must be progressively reviewed so that, by no later than 2001, they do so, with any subsidies made transparent. Queensland was successful in negotiating through COAG additional time up to 2005 for these price rises to occur.

***Resource Management and Water Trading***

COAG identified the need for “comprehensive systems of water entitlements, backed by separation of water property rights from land title and clear specification of entitlements in terms of ownership, volume, reliability, transferability and, if appropriate, water quality”. It was also agreed that water must be allocated to the environment.

To meet the COAG agreement, the *Water Act 2000* provides for the conversion of existing licences into new transferable water allocations. Water allocations are listed on a Water Allocation Register, similar to that used in land titling. Water allocations can be dealt with in ways similar to land (eg bought and sold, sub-divided, leased and mortgaged). In Queensland, the Registrar of Titles is also the Registrar of Water Allocations. Water allocations are being progressively implemented throughout Queensland as ROPs are implemented as part of the water resource planning process.

The strategic allocation of water will be governed by Water Resource Plans, while water delivery will be implemented through ROPs. Resource Operations Licences will include rules to ensure certain environmental flow objectives are met consistent with WRPs and ROPs.

### 6.5.4 Infrastructure Condition

***Depreciated Value***

The condition of Queensland’s irrigation infrastructure is better to the majority of the other States as identified in Table 20. It is considered that the condition of Queensland’s irrigation infrastructure is generally fit for its current purpose.

**Table 20 Condition of Australia's irrigation related assets**

| State | Estimated Depreciated Value as % of Replacement Value |
|---|---|
| Queensland | 71 |
| Victoria | 61 |
| NSW and ACT | 27 |
| Western Australia | 14 |
| South Australia | 41 |
| Tasmania | 78 |

*Source: Australian Irrigation Water Provider Benchmarking Report 2000, ANCID.*

***Investment for Infrastructure Renewal***

Investment for infrastructure renewal is managed through the Strategic Asset Management process required under the *Water Act*. The Strategic Asset Management Plans (SAMPs) provide a planning and implementation framework for all asset management activities including condition assessments, operations and maintenance manuals, renewals and backlog work, performance/service standards and emergency action plans.

In the 2002-03 year the major provider, SunWater, completed a $15.4 million program of renewals and backlog work. Revenue for infrastructure renewal and maintenance is derived primarily from water sales. SunWater also spent $5.5 million during the 2002-03 year on investigation and development of new commercially viable infrastructure.

The adequacy of other water service providers' investment for future infrastructure renewal has not been assessed as part of this review.

### 6.5.5 Service Delivery

***Level of Service***

Recent years have been characterised by low rainfall in many parts of the State. This has resulted in increased irrigation water demand, low inflows and an overall drawdown of water storage levels. Several of the Queensland's water supply schemes have had little or no availability of water for medium priority (irrigation) users in recent years. Drought management strategies have been developed for the worst affected schemes in consultation with customers to maximise the availability of water. Water delivery from SunWater's schemes for the 2002-03 year is shown in Table 21.

**Table 21 Water delivery from SunWater schemes for 2002-03 year**

| | |
|---|---|
| Nominal Allocation (GL) | 1,877 |
| Announced Allocation (GL) | 1,758 |
| Volume Delivered (GL) | 1,559 |

*Source: SunWater Annual Report 2002-03*

***Regulatory Appropriateness and Compliance***

Queensland's *Water Act 2000* is considered appropriate legislation to achieve the recommended COAG water reforms.

The NR&M provides the regulatory role of ensuring that water service providers are complying with their water delivery and dam safety obligations. In the last 2 years, NR&M have commissioned independent audits of water service providers compliance with the Interim Resource Operations Licence (IROL) for more than half of Queensland's water supply schemes. A number of additional IROL audits are scheduled for the

2004-05 year. Current regulations also require independent audits of the water service providers Strategic Asset Management Plans and Dam Safety Reviews.

***Planning Processes***

SunWater has a number of planning processes in place to ensure that it continues to meet its corporate objectives. These include:

- A risk management process based on AS/NZS 4360:1999.
- Annual production of a corporate plan with a five year outlook.
- Environmental management systems (EMS) that are accredited under AS/NZS ISO14001.
- A three-year strategic audit plan that is approved by the Audit and Corporate Governance Committee.
- A Strategic Asset Management Plan (SAMP) that is reviewed on a three-yearly basis and includes a 30 year renewals program.
- An Asset Management Strategy for all 27 schemes that defines actions such as asset identification and valuation, strategic planning, asset condition assessment, risk evaluation, asset renewal identification, maintenance optimisation, writing of operations and maintenance manuals, implementing operations and maintenance strategies and monitoring the performance of these strategies.

The adequacy of other water service providers' planning processes has not been assessed as part of this review.

## 6.6 Report Card Rating

### 6.6.1 General Issues

There is significant regulation in the water and wastewater sector arising from COAG initiatives and State Government legislation. All water service providers are required to develop Strategic Asset Management Plans (SAMPs) that incorporate financial plans that make provision for asset replacement. Most of the major water service providers have been commercialised, and provide a "return" to their parent government. The commercialised entities are generally more capable of preserving appropriate funds for future asset renewals, provided that excessive dividends are not demanded by their shareholders.

The major water service providers, therefore, are considered to be relatively low risk and generally demonstrate a high level of commitment to appropriate management regimes. This has been demonstrated by the enthusiasm of several major providers to join the Water Services Association of Australia, which maintains a relatively high standard of performance reporting.

The smaller water service providers are of greater concern, and their accountability is limited. Recent drought conditions have demonstrated that a significant number of smaller providers are not properly prepared for unusual conditions. There is also evidence that many of the SAMPs prepared by smaller providers have not been adequately followed through. Increased surveillance of the performance of smaller water service providers, in particular, would appear warranted.

### 6.6.2 Potable Water Issues

***Water Availability and Contingency Planning***

Apart from the immediate drought issues, the most significant potable water issue is the reduction in the assessment of the water available from some of the major water sources across the State. Significant reductions in the available yield from Hinze and Awoonga Dams, for example, will have a major impact on the future of water supply in their respective supply areas.

Given the levels of population growth in South-East Queensland, it is imperative that new sites for water harvesting infrastructure be identified and secured. A study undertaken by the Infrastructure Association of Queensland entitled *"The Day After Tomorrow"* reported that whilst some work had been done in the south-

east of the State, it had been largely through the historic planning processes undertaken by the NR&M and that there was no current mechanism to secure sites for future use.

In addition, there is an increased need to consider alternative methods of supply in the event that primary sources of water supply fail. Most schemes rely on a single source of supply. This is especially important in major urban and industrial centres but few, if any, water service providers have considered contingency supply in any detail.

***Integrated Urban Water Management***

It is increasingly evident that integrated urban water management (IUWM) will be a necessary part of future green-field development, taking a holistic view of the water cycle to provide more water-efficient communities. Significant reductions in potable water demand of 60-80% have been estimated in South-East Queensland. Such reductions will be an essential part of future sustainable growth.

The implementation of IUWM will require considerable community consultation and education, and will also require a number of legislative and regulatory changes. These changes need to be addressed in a coordinated approach between local and State Government.

***Monitoring of Demand Performance***

There is no broadly accepted standard for the measurement and reporting of water demand. Such statistics will become increasingly important as demands reach the sustainable limits of existing sources. At present, there is no overall coordinating responsibility for demand data, or for monitoring the performance of water service providers in this regard. It is considered that the State Government should take a lead role in coordinating these activities.

### 6.6.3 Wastewater Issues

***Treatment Standards***

Wastewater treatment standards in Queensland are generally very good. By population, the State has a very high ratio of tertiary treatment facilities, which to some extent reflects the sensitivity of coastal waters. There are no major treatment plants operating at less than secondary treatment standard, and of the order of half of these have been upgraded to tertiary standards.

***Effluent Recycling***

Although there was a promising boost with the release of the Queensland Water Recycling Strategy in 2001, the uptake of water recycling in Queensland has been disappointingly slow. There is a need for greater impetus for recycling, potentially taking better account of the real cost of alternative water sources and increased awareness of the risk and contingency measures that need to be implemented for the State’s water supplies.

***Wastewater Reticulation***

Wastewater reticulation asset renewals are occurring at a slow rate across Queensland because of the poor understanding of asset performance and the licensing approach based on particular flow levels rather than overflow frequency. A better understanding of wet weather flows and inflow/infiltration characteristics combined with overflow-based licensing is likely to lead to a more effective and comprehensive approach to wastewater reticulation renewals. It may also lead to reconsideration of the balance between expenditure on treatment facilities and reticulation.

***Load-Based Licensing***

Existing wastewater effluent licences are generally based on nutrient concentrations rather than total mass loads. This situation is not necessarily reflective of the impact on the environment. Broader implementation

of mass-based licences may lead to better uptake of water recycling opportunities because it places less pressure on treatment standards.

### 6.6.4 Irrigation Issues

***Water Resource Planning***

The preparation of Water Resource Plans under the *Water Act* provides increased certainty to irrigators in relation to the probable availability of water for irrigation purposes. It also provides the necessary basis for water trading regimes in Queensland's catchments, which are intended to improve water use efficiency. Completion of the Water Resource Planning process with appropriate recognition of environmental flows (most notably in the Murray-Darling Basin) is a critical issue to Queensland's irrigation industry.

***Interaction between Rural and Urban Demand***

Many water supply schemes provide water for both urban and rural applications. Typically, the urban users are provided with "high priority" water while rural users have "medium priority" water. With continued urban growth, there is increased emphasis on the provision of high-reliability supplies for urban applications, and there is concern that this may be at the expense of rural users. The cooperative sharing of resources between the urban and rural sectors is increasingly important.

***Sustainability of Groundwater Resources***

Historically, groundwater use has been largely based on immediate availability of water without detailed consideration of long-term sustainable groundwater yields. This has led to the development of apparently unsustainable groundwater abstraction regimes in some areas, such as parts of the Lockyer Valley. The unsustainable use of groundwater resources may lead to significant losses of production and contamination of aquifers.

***Rural Water Use Efficiency***

Many on-farm irrigation schemes use old technologies (such as some forms of spray irrigation) that do not use water efficiently. Some irrigation distribution systems also have significant losses, through seepage and evaporation. The introduction of more efficient on-farm water use methods and water management practices offers an opportunity to significantly improve water use efficiency to improve the sustainability of existing water resources.

### 6.6.5 Ratings

***Urban Water Treatment: B***

Treated water generally meets the Australian Drinking Water Guidelines. The larger urban water service providers have generally implemented comprehensive water quality monitoring programs, including HACCP systems. The rating generally reflects concern about the level of monitoring and reporting undertaken by the smaller water service providers.

***Urban Water Reticulation: B –***

There is some concern over the level of asset renewal investment. A consistent approach to monitoring system leakage and implementation of loss reduction measures such as pressure control would result in better asset performance.

***Urban Wastewater Treatment: B***

There have been significant improvements in the standard of wastewater treatment across the State in the last 10 years, and this has been encouraged by increased State subsidy. The rating reflects the fact that there still remain a significant number of plants across the State that are yet to be upgraded to nutrient removal standards, including some major plants in South-East Queensland that are planned to be upgraded in the near future.

***Urban Wastewater Reticulation: C –***

Wastewater reticulation systems remain the area of greatest concern in the water sector. The rating reflects the relatively poor understanding of asset condition, limited investigation of inflow and infiltration in existing systems, and the significant number of wastewater overflows that occur during wet periods.

***Irrigation: C$^{+}$***

Minor changes are generally required to enable the infrastructure to be fit for its current and anticipated future purpose. The greatest opportunities for improvement of irrigation systems are in the water resource planning processes, on-farm water use methods and rural water use efficiency generally.

***Case Study***

**GOLD COAST WATER SUPPLY**

The Gold Coast has been significantly affected by the recent drought. Hinze Dam, the city's primary source of supply, dropped to 28% of capacity in 2003 and severe water restrictions were introduced across the city in conjunction with a major publicity campaign.

Gold Coast Water undertook broad investigations into alternative sources of supply that could be implemented on an emergency basis. This work showed that the best method of augmentation was to construct a major pipeline from the Wivenhoe/Somerset system, requiring major investment in the order of $150 million.

At the same time, the reliability of Hinze Dam and previous assumptions regarding the effectiveness of water restrictions were reviewed. The outcome was that there was a 20% reduction in the estimated yield of Hinze Dam, which resulted in the planned augmentation of bulk supply systems being brought forward by up to five years. This was not an isolated case – the yield of Awoonga Dam at Gladstone has been reduced by about 10%, while the yield of future sources in the Gold Coast hinterland have reduced by similar amounts.

Recognising the magnitude of this expense and the long-term limitations of supply to the Gold Coast, the Council has invested significantly in the development of alternative approaches to urban water supply and other demand management measures. This has included the well-regarded Pimpama-Coomera Integrated Urban Water Management (Waterfuture) project and introduction of trial pressure-reduction measures to reduce demand and system leakage. By considering their water supply system in a more holistic fashion, Gold Coast Water is projecting reductions in potable water consumption in new development areas of up to 75%, which will significantly reduce the expenditure required for bulk water supply systems and contribute to the sustainable development of limited water resources.

# 7. Stormwater

## 7.1 Overview

### 7.1.1 System Description

The stormwater system comprises a number of different elements. Whilst the common perception is that it just consists of pipes, its elements are more varied and include:

- Stormwater pipes and culverts.
- Open channels (man-made).
- Natural creeks, rivers and other waterways.
- Overland flowpaths (including roadways).
- Detention basins.
- Water quality devices.

Water quality controls are now a major component of the stormwater system. These are represented by a significant array of different devices, which encompass those pertaining to storage, infiltration, trapping and vegetation. They include:

- Swales and bio-filtration devices (reliant on overland flow and contact with vegetation).
- Infiltration filters and pits.
- Rainwater and underground tanks.
- Gross-pollutant traps.
- Artificial lakes and wetlands.

Stormwater systems should be regarded as an integral component in terms of managing the water cycle, with conveyance no longer the sole objective to be satisfied. Conveyance does remain important, particularly in the urban setting, but under a framework of sustainability. The principal functions of a stormwater system should therefore be regarded as:

- Providing a means to convey storm events, without adversely impacting upstream or downstream users.
- Treating and maintaining appropriate water quality, suitable for discharge (return) to the environment.
- A potential water supply source.

Stormwater is generally catered for in terms of minor (typically 1 to 10 yr design event), and major (10 to 100 year design interval). In the urban environment, conveyance systems for minor flows comprise stormwater pipes and associated infrastructure, including kerb and gutters, inlet pits (gullies), manholes, small culverts and headwalls. Energy dissipation devices and surcharge pits also exist. The major system is more frequently associated with overland flowpaths, major cross-drainage structures and channels.

Knowledge of system details remains sketchy, with the perennial issue of “out of sight” equating to “out of mind”. Data pertaining to the overall asset value of stormwater systems is therefore difficult to obtain, though better records are maintained for systems built over the past 10 to 15 years.

Traditionally, flood mitigation infrastructure is not considered part of the stormwater drainage system. Whilst there are obvious differences between say a road drainage network and a flood mitigation dam, they could be considered as lying at opposite ends of a continuum separated essentially by scale (both physical and hydrological). These scale differences are used by authorities administering flood mitigation infrastructure subsidy programs, such as the Regional Flood Mitigation Program (a joint State and Federal Government program) and the Local Governing Bodies Capital Works Subsidy Scheme (State Government program) to specifically exclude stormwater or drainage from such programs.

At the smaller end of the scale, difficulties in defining stormwater infrastructure assets also arise because of their close association with “road” infrastructure.

On the basis that it will provide consistency, this assessment of stormwater infrastructure in Queensland has adopted the differentiation between stormwater and flood infrastructure used by Government. It has however included road drainage infrastructure.

### 7.1.2 Governance

The management of stormwater assets is the responsibility of local authorities. Unlike other States, regional water authorities do not have responsibility for the co-ordination of stormwater assets. The only real exception to this is for main roads, where the Department of Main Roads retains responsibility, though in some areas, this is contracted back to the relevant local authority. Queensland has some 125 local authorities, with a significant range of populations serviced. This in turn has a direct bearing on how stormwater is managed in different regions. Large local authority areas (eg Brisbane and the Gold Coast) have a correspondingly large technical workforce, which tends to undertake many of the design and planning studies required to manage stormwater throughout their geographic area of responsibility. Separate groups are responsible for development assessment, construction (works) and maintenance.

Whilst the size and diversity of these workforces provides significant “in-house” technical expertise, responsibility for an asset can be spread over more than one directorate, with consequent in-house communication problems, and conflicting objectives (eg preservation of water quality vs. maintenance costs vs. aesthetics). Gold Coast City Council has attempted to address this through the creation of a Total Management Plan for Stormwater and Catchments, though implementation has yet to occur.

In smaller local authorities, there is greater reliance on a significantly smaller workforce, often charged with responsibility for many different technical areas (eg stormwater, roads, water, and wastewater). The implication is that in smaller regions, Councils are forced to focus primarily on dealing with the stormwater system in a reactive manner, as called for by the local community and in response to specific flooding problems. Resources for planning studies, and other strategic studies called for by legislation are limited. As the size of the urbanised area (and hence financial resources) under Council control increases, so to does the focus on all aspects of stormwater, including planning studies, water quality and the creation of more detailed guidelines.

The lack of resources in smaller councils can also tend to stifle innovation, with insufficient technical skills available to assess all implications.

***Legislative requirements***

Legislative requirements have become more complicated in the last 10 years, with a range of Acts, underlying policy and guidance documentation, (all having direct implications for stormwater) now in existence. These include both Federal and State Government requirements, as described below.

**Federal Legislation and Guidelines**

- National Strategy for Ecologically Sustainable Development (1992).
- National Water Quality Management Strategy.
- Environmental Protection and Biodiversity Conservation Act (1999).

**State Legislation**

- Environmental Protection Act 1994 Qld.
- Environmental Protection Policy (Water) 1997 (EPP Water).
- Integrated Planning Act 1997 (IPA).
- Integrated Planning and Other Legislation Amendment Act 2003 (IPOLAA).
- State Planning Policies (SPP).
- Water Act 2000.

Of these, the EPP Water, and IPA tend to exert the greatest influence on stormwater systems.

The EPP (Water), which is administered by the Environmental Protection Agency (EPA), requires that all local authorities prepare and maintain an Urban Stormwater Management Plan (USWQMP). At the time of writing, a large number of Councils are yet to prepare these plans. There are also provisions for the protection of waterways, in terms of mandatory requirements not to place sediment or litter in areas where it may reasonably be expected to flow into a watercourse.

The Integrated Planning Act affects the governance of stormwater in several distinct ways; namely planning schemes, infrastructure charges, and the development assessment process.

Of primary importance is the requirement for all local authorities to prepare an IPA compliant planning scheme. These schemes are supported by codes, which provide guidance as to minimum requirements and acceptable solutions in relation to the development process. For example, Brisbane City Council's Planning Scheme contains a number of enforceable codes, which pertain to stormwater. These include the Stormwater Code, the Wetland Code, the Excavation and Filling Code, and the Waterway Code. Codes are supported by guidelines, which whilst not enforceable, do provide additional information to facilitate responsible stormwater management, and a consistency in standard.

IPA also provides a means to set and levy infrastructure charges, though the implementation of this has proven complex.

### 7.1.3 Sector Trends

***Ecological Drivers***

Much of the legislation described above has been drafted in order to encourage the preservation of ecology and habitat, in keeping with the principles of ecological sustainability.

***Water Quality and Water Sensitive Urban Design (WSUD)***

The trend over recent years for water quality to be regarded as equal in importance to water quantity continues to grow. However, implementation of the trend is not consistent. Larger local authorities have been practicing and promoting WSUD for up to 8 years, whilst some of the smaller and/or less well funded local authorities have yet to consider the adoption of WSUD, or any form of water quality control. Key issues identified within this trend include:

- A small but increasing rate of installation of stormwater quality improvement devices.
- Many Council administrations slow to realize and plan for likely maintenance burden.
- There are few Urban Stormwater Quality Management Plans in place (current EPA reporting indicates only 9 of the 36 local authorities who have responded to the annual questionnaire have a plan in place).
- Rainwater tanks now allowed in most areas, though few Councils provide any financial incentives to encourage use of tanks.
- Many Councils have expressed concerns in relation to the lack of detailed design guidelines for WSUD measures, or in-depth knowledge of the long-term effectiveness of these measures.
- Although few Councils specify water quality objectives for the management of water quality, the trend is already changing from the specification of concentrations to consideration of total pollutant loads generated, and the assimilative capacity of the receiving environment.

***Total Water Cycle Management***

In keeping with the trend towards greater environmental awareness, and adoption of the principles of sustainability, total water cycle management is seen by many as not only the next major trend, but an absolute necessity in countries such as Australia. Total water cycle management provides the long overdue recognition that water is one of the most important resources, and hence water in all its forms should be seen as something to be conserved and reused wherever possible. It is likely that total water cycle management will also be the catalyst that brings the often-disassociated fields of water supply, sewage and stormwater together. Another consequence will be associated changes in terminology, with words such as drainage and wastewater being replaced with references to alternate sources of water.

***Guidelines***

In most parts of the State, the Queensland Urban Drainage Manual (QUDM) is the default guideline, in conjunction with Australian Rainfall and Runoff (1987). Other guidelines that apply to the entire State include the Road Drainage Design Manual (RDDM) and the Erosion and Sediment Control Guidelines (EA).

These are supplemented by local requirements, typically contained within Development Guidelines or Manuals for each local authority area. Detailed guidelines tend to be written for larger Councils only, with

subsequent adoption by surrounding areas, whilst smaller Councils tend only to rely on those documents previously mentioned.

The EPA has developed guidelines in the form of model urban stormwater quality management plans. These model plans essentially provide a methodology but do note include detailed technical guidelines.

The increased emphasis on stormwater quality management and sustainability has led to an ever-expanding number of guidelines, with Australian Runoff Quality recently published as a draft. However, this does not provide detailed instruction for the design of water quality measures, and its impact on the design of stormwater quality infrastructure is yet to be gauged.

***Infrastructure Charges***

The determination of infrastructure charges in order to provide future stormwater infrastructure is an evolving trend, driven by the requirements of the Integrated Planning Act. To date the most appropriate method of calculation has been difficult to identify for individual Councils as widely accepted guidelines are yet to be developed. However, the Department of Local Government, Planning, Sports and Recreation has recently released a second draft of the IPA Infrastructure Guideline – Priority Infrastructure Plans (June 2004). It is hoped this document will provide Councils with the necessary level of guidance in this inherently complex area.

Issues arising from this document that could potentially be enhanced in the future include:

- Recognition that stormwater needs to be addressed on a whole of catchment basis, rather than priority infrastructure areas only.
- Equating charges to the impact of development.
- Providing more complex templates (the Department has noted that many Councils are not keen for overly prescriptive solutions).
- Non-Structural Stormwater Management.

Non-structural stormwater management focuses on the prevention of stormwater related problems at source. Typically applied in response to stormwater quality management needs, the approach comprises institutional practices to prevent or minimize pollutants from entering stormwater runoff and to reduce the volume of stormwater requiring management. Strategies include town-planning controls, strategic citywide stormwater management plans, better maintenance practices, enforcement, education programs and training. It is expected that education will be a particular priority.

***Erosion and Sediment Control***

The emphasis on erosion and sediment control preceded the more recent trend towards water quality management by some years. Nevertheless, it remains important, with the main trend being a better level of implementation during broad scale sub-division activities. However, on an individual house scale, ESC remains poorly implemented. The strongest trend in this sector is the focus on source control, rather than end-of-pipe solutions.

***Preservation of Habitat***

Many local authorities now have in place guidelines or policies that aim to reduce the amount of tree clearing associated with development, and to maximise the retention of riparian vegetation through the specification of buffer zones. Riparian restoration is also a more widely recognised tool associated with catchment and waterway management. These practices will reduce the requirement for conventional stormwater infrastructure, with greater use of natural (vegetative) solutions likely.

***Waterway Restoration***

In keeping with the trend to prepare catchment and/or waterway management plans, there is a greater focus on restoration. This may involve a range of activities, including reversing bank erosion processes, implementing natural channel design (NCD), and managing/treating stormwater inflows, such that receiving

waters are placed under less pressure of ongoing degradation. A number of design manuals have been released to facilitate the design and construction of associated infrastructure or controls.

## 7.2 Level of Service

### 7.2.1 Standards of Service

Standards of service for stormwater infrastructure are dependent on a combination of factors, including safety, the potential for damage or nuisance, and cost. Throughout Queensland, the most commonly applied standards are those specified in the Queensland Urban Drainage Manual (QUDM). These recommend a design average recurrence interval (ARI) of 100 years for major flooding, and a range from 2 to 50 years (typically 2 to 10 year ARI) for the minor (stormwater) network, though many Councils have adopted a 5 year ARI standard for minor drainage.

Existing levels of standard vary significantly, representing the change in standards over the past 100 years. For example, in Pine Rivers Shire, the standards changed in 1996 from 10 year for the minor event and 50 years for the major, to 5 and 100 years respectively. Similarly, the City of Ipswich used to have a 20 year ARI standard prior to amalgamation with Moreton Shire, which had adopted a 100 year ARI standard. In all locations where such changes have occurred, Council is left with an expectation to raise the standards of service in older areas to match current standards. This is often an expensive exercise, and hence programs need to be established over a number of years.

Cross drainage standards are based more on safety, and the need to convey the design flood without causing adverse impacts to adjoining properties. Where a road represents the only access for residences, the applied standard will typically be that a vehicle can pass with safety during the 100 year ARI event.

Standards of service also apply to stormwater quality, and are generally expressed in terms of water quality objectives (WQOs), though to date these have not been specified in most local authority areas. Based on the preservation of environmental values, WQOs are most frequently defined for nutrients (eg total nitrogen at 0.5 to 0.75 mg/L, total phosphorus at 0.05 to 0.08 mg/L) and sediments (50 mg/L).

Measurements of level of service are reproduced below from the 2003 NSW Infrastructure Report Card.

**Table 22 Level of Service Measurements**

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

### 7.2.2 Safety and Nuisance

The management of safety and nuisance is strongly linked to adopted design standards. The unpredictable nature of severe rainfall generally dictates that stormwater systems must cater for those events that can put

the community at risk, eg the 100 year ARI event. This represents a minimum desirable safety standard that can and should be provided at a cost the community (society) can bear.

For the design event, a number of criteria must be satisfied in order that safety and nuisance are not compromised. These include:

- Control of flood levels. Flood levels should not be allowed to increase above pre-defined limits, where such increase will cause harm or nuisance to upstream or adjoining properties. In some areas within the Gold Coast and Brisbane in particular, the allowable increase is zero.
- Control of flow volume. The urbanisation process, with associated increases in impervious area, tends to lead to greater flows in a waterway, and hence higher flood levels at downstream locations. Increasing runoff volumes must be minimized at source (eg by restricting the proportion of runoff surfaces that are impervious), or through detention or infiltration. The use of detention basins remains prevalent, though these are subject to increasingly stringent criteria, including maximum depth of inundation (typically 1.2m for the 50 year ARI event), safe access/egress, spillways to cater for events larger than design, and careful consideration of impacts associated with altering the time to achieve peak flows and levels.
- Minimisation of hazard (as defined by depth, velocity and the velocity-depth product). Actual values vary, though common practice is for the velocity-depth product to be restricted to 0.4 to 0.6 in value.

### 7.2.3 Community Expectations

No data was obtained in relation to community expectations with respect to the level of service. However, as Australian society tends towards higher density living in many regions (eg large houses on small blocks with high proportions of impervious surfaces, and higher value contents), it would be reasonable to expect that Queensland residents will become less tolerant of flooding on their property, and the resultant damage. Hence, the expectation of high levels of immunity from flooding are likely to continue to increase, particularly in the more densely populated areas of the State.

A stronger community trend is that pertaining to the need to improve water quality in order to protect the receiving environment. The community as a whole is demonstrating greater understanding of water quality related issues, and the implications associated with maintaining a higher standard of water quality.

## 7.3 Existing Infrastructure

### 7.3.1 Funding and Investment

Funding for stormwater is generally reliant on Council rates, with few subsidy schemes available compared to those for roads, water supply or sewage. From time to time, various schemes are created at a Federal level, though these have tended to focus on environmental health (water quality) or flood mitigation (safety and damage) rather than stormwater.

Up until about 1993, the State Government provided a 10% funding subsidy for local government stormwater assets. This was subsequently “rolled up” with the State’s road grants to local government, though there is no audit process to track what component of the roads and drainage grant is spent on stormwater. Furthermore, the grant is generally determined on a “pro-rata” basis, rather than focussing on planning criteria.

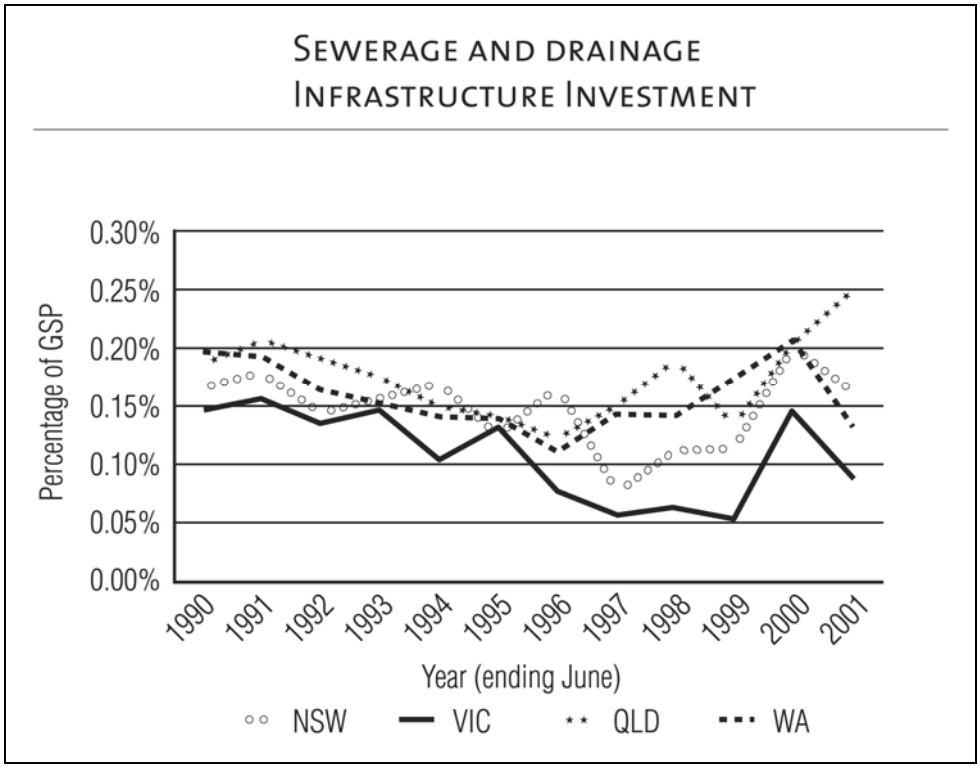
It is fair to say that stormwater funding remains a low priority in comparison to other types of water infrastructure. The principal reason for this is undoubtedly one of perception, associated with the visible nature of sewage effluent. That is, to most members of the community, sewage is a more obvious source of pollution than stormwater. However, when consideration is given to the actual pollutant loads transported by stormwater (diffuse loads) in comparison to those associated with effluent, the need for increased funding becomes clear.

Stormwater and sewer networks are generally similar in length, yet the quantity of stormwater transported is potentially much greater. For example, in Pine Rivers Shire, the largest sewer main has a diameter of 900

mm. The largest stormwater trunk line comprises three 1800 mm pipes in parallel. The stormwater pipes in this instance possess a flow area 12 times that of the sewer pipe. When likely flow velocities are taken into account, the stormwater pipes offer of the order of a 30-fold increase in peak flow capacity. This comparison is offset by the infrequency of stormwater flows, the incremental relationship between post and pre development catchment behaviour and the prevailing conditions in receiving environment, however the point remains that the stormwater system has the potential to transport significant quantities of pollutants on an annual basis.

Expenditure can also be compared to other states. Layton and Morton (2004) illustrated the comparative expenditure for sewage and drainage between New South Wales, Victoria, Queensland and Western Australia. Figure 9 shows that Queensland spends a greater proportion of the “gross state product” than the other three states, and that in recent years, the rate of expenditure has increased. This may well be attributable to the combination of Queensland’s relatively high rainfall, investment in higher levels of sewage treatment and a growing emphasis on stormwater quality controls.

**Figure 9 Sewerage and Drainage Infrastructure Investment**




*Source: Building our Future: The Need for Increased Infrastructure Investment in Queensland, February 2004*

### 7.3.2 Asset Management

In the past, the asset value and maintenance requirements for stormwater infrastructure have not always been well understood. This is starting to change, with relatively good data now available for stormwater quantity infrastructure. Asset values are significant, with estimates ranging from $7 million for a small local authority, up to $1.5 billion for the city of Brisbane. Of this, the vast majority of asset value relates to managing stormwater quantity. It is interesting to note that some of the estimates received are likely to undervalue assets, as the data excludes features such as detention basins and wetlands.

In addition, there is a trend in some areas (particularly Brisbane) for water quality controls to remain under the control of body corporates, and hence the value of these assets will not appear in estimates. This is

potentially an item of significant concern, as many body corporates are unlikely to have asset management practices in place. Keeping this practice in mind, it is quite conceivable that in Brisbane, the actual value of stormwater quality infrastructure being constructed may be an order of magnitude greater than that listed in Council's records.

Maintenance figures appear to be less well documented, with some less well-funded regions dealing with maintenance on a reactive basis only. This approach is likely to lead to long-term problems as assets reach their design, life.

For those Councils with data, average maintenance costs ranged up to $500,000 per year (excluding Brisbane), with most Councils nominating the component for stormwater quality maintenance as minimal. The principal exception was Pine Rivers Shire, who currently spends an estimated 30% of their stormwater maintenance budget on stormwater quality devices.

### 7.3.3 Infrastructure Charges

Determining infrastructure charges applicable to the provision of stormwater infrastructure is perhaps the single most contentious issue facing local authorities in Queensland. Within the current legislative framework, the need for charges is driven by the Integrated Planning Act. The overall driver however, is how to provide stormwater infrastructure to a consistent standard, whilst funding the infrastructure in an open and equitable manner.

A number of key issues exist including:

- Transparency and appropriateness of the charging mechanism.
- Equitable distribution of costs between existing and future development.
- Defining the nexus between the assessed charge and the infrastructure provision.
- Paying for the raising of standards in areas that are already fully developed.
- Providing infrastructure for development that is out of sequence.

A series of tensions exist in the debate over infrastructure charges. These include:

- The need for plans to allow infrastructure charges to be applied to developing areas, versus the time and cost of producing plans to calculate charges.
- The conflicting demands of existing residents vs. new development.
- The differing requirements (and budgets) of small vs. large local authorities.

The vast majority of Council staff spoken to have indicated that a key problem has been the absence of consistent and clear guidelines from the State Government. The Department of Local Government, Planning, Sport and Recreation has recently released new guidelines to rectify this situation, but have noted that there appears no single set of guidelines that will satisfy all local authorities. Therefore, and in response to feedback concerning the original document, the revised draft is somewhat less prescriptive.

The guidelines reference the need to determine Priority Infrastructure Plans (PIPs) and also make mention of State Infrastructure Plans, though there has been some debate as to the value of the latter in relation to stormwater.

One key change is the opportunity for Councils to implement either infrastructure charges schedules (ICS) or regulated infrastructure charges (RIC), with the latter specifically targeted towards smaller local governments. The draft guidelines for PIP (DLGPSR – 2004) dictate that "*The regulated infrastructure charge (RIC) allows a local government, by resolution, to adopt infrastructure charges up to, and including, the maximum charge amounts set out in the Integrated Planning Regulation 1998."*

This approach may help to overcome one commonly quoted concern, in that smaller Councils can find it very difficult to fund the pre-requisite studies needed to allow the determination of infrastructure charges.

In general stormwater infrastructure is poorly funded in relation to other water infrastructure (ie water supply and sewerage), and that this is partially attributable to the lack of urgency associated with failures of the system. A broken water supply line or sewer will still generate greater concern than a failed stormwater system, other than when that system fails during a major storm event.

This is supported by evidence to the 2002 Senate Inquiry – "The Value of Water: Inquiry into Australia's management of urban water". At it the Stormwater Industry Association (SIA) stated that the dominant reason for road maintenance expenditure is stormwater impact on pavements and roads. The real problem with stormwater management is lack of funding. Funding can be driven by political and socio-economic agendas resulting in resources not being spent to their best effect. Stormwater charges do not take catchment areas or impervious surface percentage into account.

### 7.3.4 Environment

The environment now receives a great deal of attention when stormwater is considered. Organisations such as the Moreton Bay Partnership (with over 20 South-East Councils as members) are compiling significant databases in relation to water quality, and are working with various Co-operative Research Centres (CRC) to develop greater levels of understanding and appropriate tools.

This, in combination with the requirements of the EP Act and the EPP (Water), is helping to generate a stronger demand for the implementation of stormwater quality management practices. The proportion of stormwater assets that exist for reasons of stormwater quality is therefore slowly increasing, although in most areas the value of this infrastructure is not recorded or known. Of the seven local authorities queried as to the value of stormwater quality infrastructure, only two had any data. Of the others, most do not yet have stormwater quality devices regularly installed, other than by developers with a strong interest in sustainability. Outside the South-East corner of the State, uptake is much slower, though larger regional centres such as Townsville and Cairns have made good progress in a number of areas.

## 7.4 Future Needs

There are a number of areas in which action is required in order to allow a raising of the standard of stormwater infrastructure. These include:

- More funding (for capital works and maintenance).
- Better guidelines and standards.
- A broader approach to stormwater management, based on catchments and total water cycle management.
- Greater adoption of non-structural solutions.

***Water Quality Guidelines and Standards***

Standards defining targets for water quantity and quality designs will need to be further developed. Some local councils already possess standards, but these vary across local government areas, and do not necessarily represent a consistent approach. Some proponents of WSUD have suggested a move away from unrealistic water quality objectives and standards of water quality treatment towards more realistic levels. However, it is not considered practical to prescribe national or statewide stormwater standards and it is likely that provision will need to be made for recognition of local climatic factors. Of most value will be guidelines that facilitate sound design, thereby providing a basis for consistently applied standards, with proponents and assessors equally familiar with the expected outcomes.

***Funding and Adequate Provision for Maintenance***

Funding levels remain significantly lower than required to allow the introduction of appropriate water quality controls, without further detracting from the funds available for building and maintaining stormwater quantity measures. It is expected that where appropriate asset management techniques are applied, the lack of funding will become far more apparent to all Councils.

In keeping with the above, there is a real need to recognize the role that stormwater currently plays in terms of delivering pollutants to Queensland's receiving waters, and the funding is required to adequately manage this problem. It is suggested that stormwater funding subsidies should not be hidden within subsidies for other types of infrastructure.

***More Holistic Approaches – Integrated Water Cycle and Total Catchment Management***

The approach to consider stormwater as part of an integrated water cycle is gaining strong momentum in capital cities throughout Australia. Whilst this trend is not as apparent in smaller centres (where resources and a lack of development pressure have meant that even WSUD is still an untried approach), it remains the most likely trend to affect all regions.

Better integration of WSUD and entire water cycle management, considering water supply, wastewater and stormwater is required. To this end funds and resources will be required for comprehensive research efforts of stormwater BMP, to investigate alternative means of stormwater quantity and quality management and investigate amongst others integrated urban water management, stormwater re-use and water quality issues. Ecological Sustainable Development will drive the increased integration of the entire water cycle management, and BMP water-reuse strategies to mitigate the ever-increasing demand on potable water.

For the medium and long-term, it is essential to continue the development of stormwater strategies to meet development growth, and changing standards. Urban growth such as being experienced along the Queensland coastline, and in particular, the south-east corner from the border with NSW to the northern end of the Sunshine Coast is putting increased pressure on the environment, particularly from a water quality perspective;

***Non-Structural Stormwater Management***

Non-structural solutions such as education and a reduction in the creation of impervious areas need to be strongly considered. These will become increasingly important as the trend for urban areas to densify continues.

## 7.5 Report Card Rating

The Senate Standing Committee on Environment, Communications, Information Technology and the Arts Inquiry into Australia's Urban Water Management concluded that much of Australia's stormwater infrastructure would reach the end of its useful life over the coming twenty years. Furthermore, modern 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 (Senate 2002).

In preparation of this report, an understanding has been obtained of the state of stormwater infrastructure in Queensland through a series of interviews with industry bodies, local authorities and State Government agencies. Contributors include the Stormwater Industry Association (SIA) of Queensland, the Local Government Association of Queensland (LGAQ), seven local authorities (Bundaberg, Burnett, Jondaryan, Roma, Pine Rivers, Whitsunday and Brisbane), and three State Government agencies (Department of Local Government Planning Sports and Recreation, NR&M and Environmental Protection Agency). The local authorities contacted cover a range of different climatic regions and populations and included:

- Coastal and inland councils.
- Large, medium and small centres of population (and hence rates base).
- Urban and rural context.

In comparison to other parts of Australia, Queensland has probably paid greater attention to stormwater management, owing in part to the relatively high rainfall intensities that occur. Hence, whilst standards do vary significantly across the State, the overall rating for stormwater is higher than in other States.

The average condition of stormwater infrastructure was rated as a B. Ratings pertaining to asset management, investment, planning processes and sustainability varied across the board, but on average were assigned ratings of B or C. Within individual local authority areas, performance standards were subject to high levels of variation, with the main factor being the age of the infrastructure. Ratings for this category varied from B to D.

In terms of funding, smaller councils are clearly at a disadvantage, whilst larger councils tend to have to deal with much higher population densities and the problems of retrofitting. However, with none of the

survey respondents having stormwater as a separate item on their rates notices, and the full implications of maintaining stormwater quality devices yet to become apparent, funding can only be assigned a C or C-grade.

A major concern is that many Councils having either no stormwater quality infrastructure, or little understanding of their stormwater quality assets. This needs to be rectified as well as increased recognition for the need for major progress in relation to funding, maintenance, guidelines, monitoring and implementation.

The overall rating for stormwater infrastructure is therefore a **C**.

***Case Study***

**Mackay City Urban Stormwater Quality Management Plan**

The City of Mackay is currently preparing its Urban Stormwater Quality Management Plan. The process has involved a number of steps including:

- The identification of environmental values.
- Consideration of the legislative framework.
- Preparation of a stormwater management policy.
- The creation of a template for preparing catchment and waterway management plans.
- Community consultation.

The consultation allowed all stakeholders to provide input on the values they place most highly, and to comment on potential causes of problems and solutions.

Participants were provided with an overview of the project, before being asked to identify and rate key values and stormwater management issues. The vast majority of participants demonstrated a keen awareness of environmental issues, and the role stormwater management plays in protecting identified values.

However, of particular interest was the community's recognition that protection of stormwater quality and waterways requires a change in the process of urbanisation. Key processes that were identified included:

- Retention of buffer zones.
- Control of sediments.
- Better controls for new developments.
- The need for maintenance.
- The need for more monitoring data.

Whilst none of the above issues are new to seasoned industry practitioners, the identification and support of these by community members provides a strong indication that the importance of stormwater management is now more widely recognized. With this recognition in place, increased funding and the raising of standards appear likely to follow.

# 8. Electricity Supply

## 8.1 Overview

Electricity usage in Queensland has grown strongly in the last 10 years and this trend is expected to continue, with Queensland presently experiencing the highest growth in the National Electricity Market (NEM). The Energy Supply Association of Australia (ESAA) Electricity Annual Report 2003 shows Queensland leads the field in adding to Australia's generation capacity and is catching up on New South Wales and Victoria in power infrastructure provision. The assets to produce and distribute electricity were valued in 2000/2001 at $15.2 billion with approximately 8,000 people employed by major electricity companies (ESAA 2003).

More information on the NEM "An introduction to Australia's National Electricity Market" is available at http://www.nemmco.com.au/publications/whitebook/introbook.htm

Queensland, like other Australian states has undergone significant restructuring in the electricity supply industry. However, unlike Victoria and South Australia where privatisation has occurred, the majority of the electricity in Queensland is generated, transmitted and distributed by Government owned corporations. The number of privately owned power stations in Queensland is however increasing, with their output accounting for approximately one third of total electricity generation.

Queensland participates in the National Electricity Market, which covers Queensland, NSW, ACT, Victoria and South Australia, with Tasmania to also join when Basslink is complete.

The majority of the electricity in Queensland is generated from large power stations, many located adjacent to major coal deposits in Central Queensland. The Queensland transmission grid is characterised by a long narrow network located predominantly along the east coast and its hinterland.

The Queensland grid is connected to NSW via two interconnectors. A smaller distribution network is based at Mt Isa and this is not connected to the main east coast network. Queensland also has a number of small communities with reticulated electricity supply isolated from the main and Mt Isa grids. A number of these have generation facilities and networks that are owned by Ergon Energy, one of the Government owned electricity distribution companies.

Queensland, like larger Australian states produces most of its electricity from coal, a fuel that has been the target for criticism due to its greenhouse gas production. However coal is a low cost fuel with large reserves ensuring that it will continue to have a predominant role in electricity supply.

In addressing the greenhouse environmental issues, Queensland has set an Energy Policy that recognises the need for cleaner energy resources. One key initiative is the 13% Gas Scheme to start on 1 January 2005. At that time, electricity Retailers in the Queensland market will be required to source 13% of their electricity from Generators using an eligible gas fuel.

### 8.1.1 System Description

***Generation***

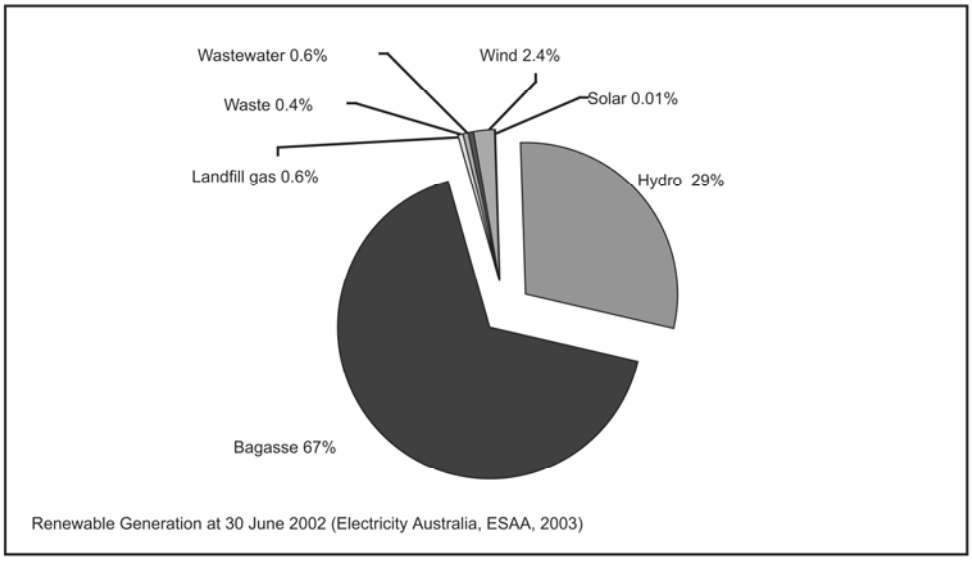
Queensland has added more than 3400 MW of generation plant capacity between 1998 and 2002 (ESAA 2003). In 2002 the Queensland electricity market had 10,200 MW of installed generation capacity with a consumption of 39, 544 gigawatt hours (GWh).

A record peak demand of 7,934 MW was set in February 2004, which is still approximately 2,200 MW less than installed capacity. This present surplus of generation over demand can best be seen in the power flows on the Queensland – NSW Interconnector (QNI). In 2003 the power flow was southward, into NSW, 90% of the time and averaged 418 MW.

In their 2004 Statement of Opportunities, the National Electricity Market Management Company (NEMMCO) projects that generation reserves in winter will be adequate until 2012, while summer reserves will be adequate until 2009/10.

The energy source for approximately 95% of the fuel consumed for generation of electricity in Queensland is black coal. The more recently constructed coal-fired generating units utilise advanced technologies that have improved efficiency over the older plant. The other sources of generation are hydro, natural gas, liquid petroleum based fuels, bagasse, wind and solar. The renewable energy generation installed capacity in Queensland accounts for approximately 2.3% of the total installed capacity.

**Figure 10 Renewable Generation at 30th June 2002**




*Source: Electricity Australia, ESAA, 2003*

***Transmission***

Powerlink Queensland is the Queensland Government owned corporation that owns, develops, operates and maintains Queensland's extra-high-voltage transmission network. The $3 billion network extends 1,700 km from north of Cairns to the New South Wales border. They have 92 substations and switching stations that operate from 110 kV to 330 kV[2]. The network transports electricity from the power generators to the Distribution Network Service Providers (DNSP) and large industrial customers.

Powerlink is a Transmission Network Service Provider (TNSP) in the National Electricity Market (NEM). Powerlink is a regulated monopoly business and acts as an agent for NEMMCO assisting in the secure operation of the power system.

Powerlink produces an Annual Planning Report as required by the National Electricity Code (NEC). The purpose of the report is to provide information about the Queensland electricity transmission network to Code participants and interested parties. This report is also an input into NEMMCO's Statement of Opportunities (SOO).

Powerlink has identified in its 2004 Annual Planning Report that the existing transmission infrastructure has been meeting the network requirments and that ongoing augmentation is required to meet future growth in loads and inter-regional power flows.

The existing transmission network does have limits or is subject to constraints depending on the magnitude of power to be transferred, critical outages and generation availability. In some areas of the network, Powerlink has entered into Network Support Agreements with local generators to manage power flows when limits might be exceeded and reliability of the electrical supply compromised. These arrangements have been a cost effective alternative to capital works to augment the existing network.

Powerlink's network is connected to the NEM via QNI, a double circuit 330 kV transmission line, and indirectly through the Country Energy distribution network in north eastern NSW and the Direct Link 180

[2] Powerlink 2003 Annual Report

MW DC interconnection. Powerlink have been working with TransGrid, the NSW TNSP, to improve the southward maximum transfer capacity of the QNI.

***Distribution***

Distribution of electricity in Queensland is primarily the responsibility of DNSP's, namely the two Government owned corporations ENERGEX and Ergon Energy.

The Government owned distribution system assets totalled over $7,190 million in June 2002 with over 1.69 million customers consuming over 39,544 GWh of electricity. There are over 167,000 circuit kilometres of overhead and 14,500 circuit kilometres of underground power lines in Queensland.

The Ergon network in particular covers a very wide geographic area with many of the lines being exceedingly long. Over much of the Ergon area of supply customer density is very low. Because of this the distribution network is sparse.

ENERGEX in its 2002/03 Annual Report reported that in December 2002 they had experienced the highest summer load growth for over 10 years. The increase was largely attributed to the large increase in domestic air conditioning.

Ergon Energy in its 2002/03 Annual Report also reported an increase in demand on the distribution network due to strong population growth.

Both distribution companies reported that the reliability performance of their networks had been worse in 2002/03 than the previous year. However, the trends were said to be relatively stable over the last 6-7 years.

### 8.1.2 Governance

***Regulator***

Under the Electricity Act 1994, the Regulator issues authorities (licences) for generation, transmission, distribution and retail activities undertaken in Queensland's electricity industry.

***Generation***

The generation industry consists of Government and privately owned assets. The generation industry is market driven, however to operate in the National Electricity Market, the generators need to be registered with NEMMCO. This places a number of administrative and regulatory requirements on the participant.

***Transmission***

Powerlink has responsibility for planning and operating the transmission network within Queensland. Market participants wishing to connect to the transmission network, such as generators, major loads and Distributors can apply to Powerlink for a Connection Agreement.

Powerlink is a Queensland Government owned and has a board appointed in accordance with the Government Owned Corporations Act. According to Powerlink's 2003 Annual Report, its board consists of five members; two of the current members have engineering qualifications, while a third has trades background.

The Economic Regulator under the NEC is the Australian Competition and Consumer Commission (ACCC). The ACCC regulates transmission access, revenue determination and transmission pricing. Under the NEC Powerlink is required to publish an Annual Planning Report that provides information about the transmission network to code participants and interested parties.

***Distribution***

The distribution network service providers ENERGEX and Ergon Energy are also Queensland Government owned corporations. ENERGEX has a board of seven, none of whom has any engineering qualifications[3]. Ergon has a board of nine, only one of which has engineering qualifications[4].

Under the NEC, the Queensland Competition Authority (QCA) carries out the regulation of distribution pricing and access for the Queensland region. The present four year regulatory period commenced in July 2001 and the QCA chose a revenue cap approach to regulate distribution service pricing. They have indicated that a similar system will be used for the next regulatory period that starts in July 2005.

The Distributors largely act in response to the regulatory framework within which they operate. The correct drivers must therefore be in place to ensure that the Distributors are encouraged to operate their networks efficiently, reliably and safely. The current regulatory mechanism contains no direct incentives to the DNSPs with regard to achieving minimum levels of service. Without such incentives, and in the absence of minimum required service standards, Distributors have not given reliability of supply issues the emphasis that they deserve.

The Electrical Distribution and Service Delivery in the 21st Century (EDSD) Review, commissioned by the Queensland Government in 2004, made a number of observations on the present QCA revenue cap approach, particularly:

- The lack of incentive for the distributors to make capital investment in excess of those allowed in the determination.
- The lack of incentive to improve service quality.
- The inflexibility of the system when circumstances change significantly from those predicted at the time of the determination. In particular the rigidity of the current system does not respond well at times of high load growth.

### 8.1.3 Sector Trends

***Load Growth***

Load growth in Queensland since the QCA determination of 2001 has been significant. At the time of the determination ENERGEX predicted an annual average demand growth for 2001/02 to 2004/05 of 4.2%. Actual load growth to date is slightly higher at 4.9%, however more significantly for the provision of infrastructure, the peak demand has grown at 9% per annum. The peak demand is highly affected by weather conditions, which can be statistically standardised with respect to weather, but even allowing for this, the peak demand has grown at a rate of 7.5%.

***Contestability***

Under the NEM, deregulation has led to customers being eligible to select their electricity retailers. This has been introduced with larger customers becoming eligible before smaller customers.

In NSW and Victoria all residential customers became contestable in January 2002. In Queensland, customers with electricity usage greater than 100 MWh per annum are contestable. The contestability of residential customers in Queensland has been delayed pending a review of costs and benefits.

***Sustainability***

An increasing environmental challenge for Australia is per capita greenhouse gas emissions and their management. Electricity will almost certainly continue to be largely generated from fossil fuels for the next 20 – 25 years with Queensland, like both NSW and Victoria, predominantly produces electricity from coal.

The Federal Government has in place legislation that mandated, on a user percentage basis, a goal of 9,500 GWh of electricity to be generated from new renewable sources by 2010. This has been recently

[3] http://www.energex.com.au/about_energex/about_energex_board.html
[4] http://www.ergon.com.au/about_us/meet_our_directors.asp

reviewed and the Federal Government has reconfirmed its commitment to the Mandatory Renewable Energy Target (MRET) already legislated. They will move towards improving the operational and administrative efficiently of the scheme.

Queensland has published its *Cleaner Energy Strategy* and as part of that is moving towards diversifying the State's energy use towards greater use of gas. This will reduce greenhouse gas emissions from the Queensland electricity sector and will be achieved through the Queensland 13% Gas Scheme. Like the Federal MRET Scheme, it will be a certificate base scheme by creation and surrender of Gas Electricity Certificates (GEC's).

***Availability of Power Engineers***

A recent report has highlighted a threat to electrical power supply in Australia as a result of a shortage of qualified and experienced electricity supply engineers. The report, *Assessing the future of electrical power engineering – A report on electrical engineering manpower requirements in Australian*, was produced by Engineers Australia in conjunction with the Electric Energy Association of Australia (EESA). The shortage of electrical power engineering expertise is attributed to a significant reduction in the number of people employed in the industry over recent years due to privatisation; a decrease in the number of electrical graduates specialising in power due to a reduction in incentives and restricted availability of jobs; and an ageing workforce.

Any reduction in the availability of electrical power engineers has obvious implications in the maintenance of electrical power systems, particularly in a high growth environment.

## 8.2 Levels of Service

### 8.2.1 Safety

Within the Department of Industrial Relations, the Electrical Safety Office is responsible for developing and enforcing standards for electrical safety and promoting strategies for improved electrical safety performance across the community. The Electrical Safety Act 2002 establishes the legislative framework for electrical safety in Queensland. The Act is directed at eliminating the human costs to individuals, families and the community caused through contact with electricity. The Act is Queensland's first standalone electrical safety legislation and came into effect on 1 October 2002. Performance against the Electrical Safety Plan for Queensland will be measured against key performance indicators in 2003-2004. This will be the first year in which the data will be captured and analysed in this way.

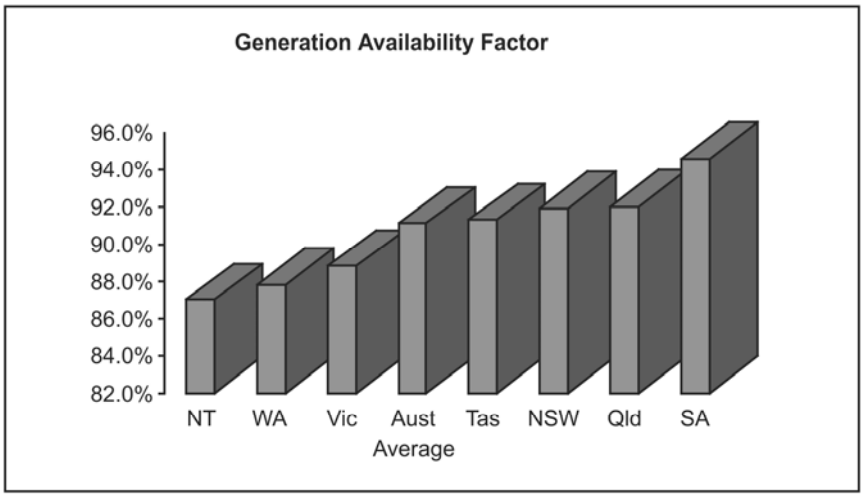
### 8.2.2 Reliability

Reliability of electricity supply refers to the proportion of time the electricity is available to the customer. It is separate to the Quality of the supply. The Quality of the supply refers to a composite measure of voltage level and the frequency and severity of voltage dips and surges, harmonics, etc. Both are important to the customer and achievement of high levels in both are a priority for the electricity supply industry.

***Generation***

Generation in Queensland in 2001/02 had an availability factor of 92%, which is higher than the Australian average of 91.1%. Availability is a measure of the time the unit is available for generation in a year after taking account of planned and forced outages. NEMMCO report that in Queensland, unlike other States, there have been no incidences where load shedding has been forced by a lack of generation capacity since the QNI was commissioned.

**Figure 11 Generation Availability Factor**




*Source: ESAA Electricity Australia 2003 – Table 2.10*

***Transmission***

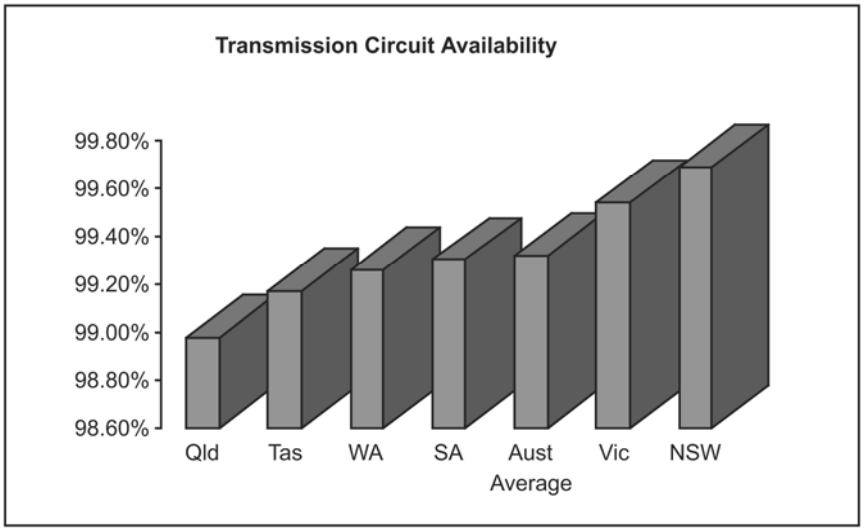
Transmission levels of service are regulated by the ACCC. In November 2003, it published Service Standard Guidelines. The ACCC aims to improve initiatives under a Revenue Cap by linking the Cap to the TNSP's performance or service standards. They are effectively rewarded for increasing service standards and penalised when performance standards decline.

The five core performance measures are:

- Transmission circuit availability.
- Average outage duration.
- Frequency of "off supply" events.
- Inter-regional constraints.

ESAA reported for 2001/02 that the transmission circuit availability for Queensland was 98.98%, the lowest of all States over that period. The current Powerlink capital works program is the largest in the NEM. Circuit availability does not differentiate between planned outages for maintenance and network extension, and unplanned outages. This has been recognised by the ACCC in setting Service Standards for the Queensland transmission network.

**Figure 12 Transmission Circuit Availability**




*Source: ESAA Electricity Australia 2003 – Table 3.5 – Circuit Availability 2001/02*

***Distribution***

In response to concerns regarding the performance of the distribution system in the face of severe storms and sustained hot weather in January and February 2004, the Queensland Government in March 2004 initiated a detailed independent review (the Electrical Distribution and Service Delivery for the 21st Century (EDSD) Review) of the reliability of the Queensland electricity distribution network. The concern from Government was that the electricity distribution networks in Queensland (particularly Ergon Energy) are among the longest in the world and have had to cope with a 12% increase in peak demand since the beginning of 2003, with a 40% increase since 1999-2000.

The review was critical of the lack of any mandatory service quality levels, for both availability and quality of supply, for the distribution network and the lack of sufficient focus on service quality by both distributors. The report concluded that the "networks have not had sufficient expenditure outlaid on them to adequately maintain them and to meet increased demand for growth".

In the case of Ergon Energy the report concluded that a significant factor in the present situation is the length of time it has taken the organisation (created in 1999 by the merger of six small regional corporations) to assess and organise remedial works for its present network. For ENERGEX, it concluded that there has been too much focus over an extended period on providing an improved financial result. This focus has led to over-utilisation of assets such that the assets are stressed, impacting on reliability.

Indices currently used by distributors to quantify reliability are:

- System Average Interruption Duration Index (SAIDI). This measures the total minutes interrupted per year divided by the total number of customers. Queensland allows distributors to exclude events that impact on more than 5% of their customer base from the interruption statistics, and this practice has been followed in Table 23.
- System Average Interruption Frequency Index (SAIFI). This measures the total number of customer interruptions per year divided by the total number of customers.

**Table 23 System Average Interruption Duration Index (SAIDI)**

| Year | ENERGEX | Ergon Energy |
|---|---|---|
| 2001/02 | 158 | 437 |
| 2002/03 | 187 | 497 |
| 2003/04 (incl. storms of 2004) | 163 | 520 |

*Source: EDSD Report 2004 – Tables 5.4A and 5.5A*

**Table 24 System Average Interruption Frequency Index (SAIFI)**

| Year | ENERGEX | Ergon Energy |
|---|---|---|
| 2001/02 | 1.9 | 4.2 |
| 2002/03 | 2.2 | 4.5 |
| 2003/04 (incl. storms of 2004) | 2.5 | 4.9 |

*Source: EDSD Report 2004 – Tables 5.4A and 5.5A*

It is obviously difficult to make direct comparisions between distributors in different geographic and climatic areas. Many of the other distributors operate networks that cover a much smaller goegraphic area and are not subject to the frequency of severe climatic events that can occur in Queensland. Notwithstanding this, it is possible to make some broad comparisons:

- Compared with other major Australian distributors, Ergon Energy exhibited the worst statistics for both duration and frequency of interruptions for 2002/03 (EDSD Review, Graph 5.3A). While this reflects to

some extent the length of its network and the tropical environment in which much of it is installed SAIDI was more than twice that of the average of its peers as identified in the report (EDSD Review, Graph 5.3B). This is considered unacceptably high.

- While the interruption statistics for portions of the ENERGEX network are comparable with similar distributors elsewhere, on average SAIDI was more than twice that of the average of its peers as identified in the report (EDSD Review, Graph 5.3C). This is considered unacceptably high.

During the current requlatory period the QCA put in place service quality monitoring arrangements with Distributors, covering reliability of service, quality of suply and customer services issues. These required them to collect data and report on a quarterly and annual basis – the intent being to look at whether this would be further developed into the next price determination. In April 2004, QCA released a final decision in relation to a service quality incentive scheme for electricity distribution services in Queensland. The decision was that a scheme would be developed and incorporated into the regulatory arrangements commencing on 1 July 2005.

## 8.3 Existing Infrastructure

***Generation***

There has been significant investment in generation by both Government and privately owned power stations. The increase in capacity has kept pace with demand and the plant has exhibited good levels of availability.

***Transmission***

Powerlink, in their 2002/03 Annual Report, reported a Capital Expenditure of $181.5 million for the year.

In the ACCC Revenue Cap Decision of November 2002, covering pricing up to 2005, they included $1,040.5 million of capital expenditure for the period 2001/02 to 2006/07 with over half being from 2004/05 onwards. The determination was based on setting a fixed revenue cap and took into account Capital Expenditure predictions.

Powerlink participates in international benchmarking through the International Transmission Operation and Maintenance Study. Much of the information returned in this study is confidential and is so not freely available, however Powerlink advise, “the 2003 report recognised them as a world leader in the operation and maintenance of transmission services, measured across cost and service levels”.

***Distribution***

ENERGEX reported in their 2002/03 Annual Report that they had invested more than was provided in the cap to cater for the higher than expected growth and to achieve maximum efficiency and improve reliability.

Ergon Energy in their 2002/03 Annual Report recorded that their expenditure program was greater than previous years with a total of $277.7 million spent on new infrastructure. This was reported to be largely as a result of a strong population growth in Queensland.

The amount of capital spending on the distribution network is clearly significant. Despite this the EDSD Review found that “the current state of the networks operated by Ergon Energy and ENERGEX dictates that they require greater levels of expenditure on capital and maintenance than they have been accorded in recent years” (EDSD Review, pp28).

In response to recent reliability problems former Energy Minister Stephen Robertson said ENERGEX and Ergon are "financially secure" and will be spending $1.17 billion this financial year to improve Queensland's distribution network.

The situation of each of the Distributors differs greatly and they will be considered in greater detail separately.

***ENERGEX***

As early as 1989 ENERGEX took a decision to implement a quantitative evaluation technique, known as Reliability Assessment Planning (RAP), into its planning approach. RAP is a probabilistic planning approach whose aim is to improve reliability of supply, quality of supply, safety and asset utilisation over the more simplistic 'N-1' planning.

While RAP was considered to be best practice it is only a tool, and like any tool it must be employed with due consideration. The combination of RAP and a focus since the late 1990s on reducing capital expenditure has resulted in ENERGEX assets presently functioning at 76% utilisation. This is a higher utilisation than is typical in the Australian distribution industry and is an indication that assets in the ENERGEX network are generally more heavily loaded. While ENERGEX has estimated that this has reduced capital expenditure over the last 10-12 years by $800 million to $1 billion, it has resulted in reduced spare capacity and hence lowered the ability to cope with failures within the distribution network. This lack of contingency capacity can be seen in that 69% of bulk supply substations and 79% of zone substations are not meeting the older N-1 criteria, with approximately 10% being overloaded at peak demand periods (EDSD Review, pp14). In the past year, ENERGEX has even chosen to run some transformers above their rating, rather than implementing alternative sources of supply or elective load shedding, resulting in insulation damage and a reduced life in about half of those transformers affected (EDSD Review, pp98).

Combined with a lack of adequate capital expenditure ENERGEX has not expended the full amount forecast for maintenance in its 2001 submission to the QCA. Two areas of concern are the low levels of expenditure on vegetation management and the abandonment of LV cross-arm inspection. The EDSD Review "believes that the underspend has clearly resulted in a greater incidence of outages" (EDSD Review, pp17). There are also clear safety considerations associated with the failure of cross-arms and vegetation associated overhead line conductor clashes.

These capital expenditure and maintenance issues have been acknowledged by ENERGEX and measures put in place to increase capital investment and maintenance expenditure. Expenditure on vegetation management in particular increased from $12.95 million in 2001/02 to $22 million in 2003/04, with a planned expenditure of $29.8 million in the current year.

***Ergon Energy***

Ergon capital expenditure planning is based on providing 'N-1' capacity for major assets. Being a largely rural system it has lower utilisation than urban networks.

Since being formed from six previous bodies in 1999, Ergon has been trying to come to terms with a diversity of different planning and work practices across its regions. The time taken to assess the network has clearly had an impact on the forward planning of capital expenditure, particularly in its QCA submission. However as the situation has become clearer they have not felt limited by the capital expediture agreed with the QCA but have increased capital expenditure so that the 2004/05 level will be more than double the 2001/02 level. Despite this capital expenditure levels have still not been adequate to result in overall improvements in supply reliability and to accommodate high load growth. This can be seen in that 22% of their bulk supply sub-stations and 47% of zone substations above 5 MVA do not meet their own N-1 criteria (EDSD Review, pp15).

In order to try and improve reliability Ergon has begun implementation of a new asset management system. When fully implemented this system will help identify and track maintenance issues within the network.

***Security***

The inherent security of assets in the electrical power industry varies greatly across the industry. On the one hand access to major generating plants is tightly controlled with full time security staff. On the other hand transmission lines traverse great distances, often through isolated areas with little to no security. The fact that most important transmission assets and substations are above ground; consequently, readily

identified, and the transmission assets are dispersed over a large area, highlights the difficulty of securing the network.

Similar security concerns exist within the distribution network, but because of the lower consequences (smaller areas that would be affected) the risk and impact are considerably lower.

Mitigating the threats are the contingency planning, emergency management arrangements and security measures implemented to protect the transmission system.

For the most part, the security measures in place throughout the Queensland network are commensurate with recognised risk, identified redundancy, and treated accordingly. There are a variety of security measures in place, consisting of structural enhancements, barriers such as fencing, the provision of guard services for after hours patrolling, improved utilisation of electronic security measures, and appropriate security planning and operating procedures with supporting emergency management planning.

## 8.4 Future Needs

***Generation***

With the continuing high level of load growth and the potential for export into adjacent markets additional capital expenditure on generation will ultimately be needed. In their Statement of Opportunities NEMMCO project a reserve capacity shortfall for 2009/2010. Should the current high levels of export into the NSW grid continue, a shortfall will occur earlier.

***Transmission***

Powerlink in its annual planning report 2004 have forecast that average summer demand will increase at an average annual rate of 3.2% per annum over the next 10 years [5]. In the shorter term this is expected to be to 5.84% per annum over the three year period to 2005/06. Much of this is expected to occur in southeast Queensland where its increase is expected to be 6.6% per annum[6]. Some of this increase is due to the increased domestic air conditioning load.

Powerlink concluded that this level of high growth in load and inter-regional power flows will require substantial augmentation of the capability of the transmission network to ensure the grid keeps pace with demand, particularly in the southeastern part of the State.

The emerging future needs for network augmentation identified by Powerlink are to the supply to

- North and Far North Queensland area.
- Gold Coast/Tweed area.
- South-East Queensland area.
- Gladstone in the Central Queensland area.
- Brisbane South and West.
- Townsville, Mackay, Rockhampton, Moura and Blackwater.

Powerlink have reported that the predominant driver for augmentation to the network capability will continue to be the need to maintain reliability standards.

Powerlink believes it can develop its network in time to meet the emerging future needs.

***Distribution***

The key issue to be addressed by the distribution sector is to increase reliability while further developing the network to accommodate load growth. This includes considerations of both the network and organisational aspects.

The performance of the network in the high temperatures and storms of the 2003/2004 summer has been a timely prompt.

[5] Powerlink Annual Planning Report 2004 – Table 4.4
[6] Powerlink Annual Planning Report 2004 – pp35

## 8.5 Report Card Rating

The state of Queensland's electricity supply infrastructure varies dramatically across the industry. The distribution sector has exhibited lower performance than the other sectors of the industry.

Each sector was rated based on the consideration of:

- Asset condition.
- Asset availability and reliability.
- Asset management.
- Sustainability (including economic, environmental and social issues).
- Security.

The overall ratings for each sector of the Queensland electricity infrastructure are as follows:

***Generation***

The **Generation** sector is given a rating of **B+**.

With the recent commitment of the Kogan Creek power station, generation capacity will be adequate for at least the next four years.

The sector has also exhibited good availability, being the second highest in the NEM, indicating that the assets are being used in an efficient manner. As an indication, in 2002 No.4 unit at Stanwell Power Station achieved a 'world record' for continous operation by a single generating unit.

***Transmission***

The **Transmission** sector is given a rating of **B**.

The state of the infrastructure is currently adequate but is rapidly reaching limits as very high levels of load growth occur. The infrastructure will require continued investment to meet this demand for electricity and to maintain the assets as they age.

***Distribution***

The **Distribution** sector is given a rating of **D+**.

The capacity and reliability of the distribution network are of serious concern. In the case of ENERGEX the current situation has been attributed to management practices over an extended period of time. For Ergon the failure is one of not quickly coming to terms with the state of its inherited network assets.

Both networks require major capital expenditure to bring them up to an acceptable standard, together with increased maintenance expenditure to maintain that standard.

***Overall***

The overall performance of the Queensland electricity supply infrastructure is determined by the performance of the weakest sector of its supply chain. From a overall system perspective it matters little if electricity is being generated if there are difficulties with delivery.

The weakest link in Queensland is the Distribution sector. It is appropriate to acknowledge that both the Generation and Transmission sectors are performing well.

As a **total system** the Queensland electricity supply infrastructure is given an overall rating of **D+**.

***Case Studies***

**Brisbane CBD Area – Network Augmentations**

ENERGEX and Powerlink have been undertaking a review of the electricity demand in the CBD area. As part of that review they are required under the National Electricity Code to evaluate and compare network and non-network solutions which can overcome the future supply requirements at the lowest cost to electricity consumers.

Electricity demand in the CBD area is growing strongly and it has been identified that steps must now be taken to maintain a reliable power supply to the Brisbane CBD area from late 2005 onwards.

As part of the analysis ENERGEX and Powerlink identified a number of relevant solutions which require augmenting the supply to the CBD area to keep pace with future load growth.

The analysis also considered non-network solutions such as:

- Demand side management options such as improved building energy efficiency, gas or solar in place of electricity for hot water.
- Better use of existing local generation.
- Implementation of new generation.

As part of the planning and review process, there was public consultation, particularly in relation to non-network alternative solutions.

After evaluating alternatives, including non-network solutions, the lowest cost feasible solution was found to be augmentation of the 275kV and 110kV networks to the CBD. ENERGEX is also investigating the potential for implementating demand side initiatives to defer some distribution network investment beyond 2006.

The estimated total cost of the works is $178.5 million with construction to start in 2004 for completion of first stages by late 2005 and final stages by late 2006.

**Renewable Energy**

In Queensland the sugar industry provides the major component of electricity generation based on renewable energy sources. It does this using bagasse as a fuel. Bagasse is the waste fibre material that is left following the crushing process. Typically the older style mills burn the bagasse to raise steam with the main mill drives being directly steam driven. Steam is also used to generate electricity for the mill, with surplus being exported to the grid.

A leading edge project in this area of renewable energy is the new 68 MW plant being constructed by CSR Limited at its existing Pioneer Mill at Brandon in North Queensland. The $100 million project involves electrification of the mill drives and other measures to improve overall efficiency, and includes the installation of a new boiler, turbines and emission control systems. The improvements and increased capacity will mean that 80% of the new plant's generation capacity will be exported to the grid. This will raise the electricity fed into the grid by CSR using renewable sources from 150,000 to 350,000 MWh per annum. At the time of commissioning this will be 12% of the target for increased electricity production from renewable sources required under the Federal Government's Mandatory Renewable Energy Target legislation.

Ergon Energy will purchase the electricity and Renewable Energy Certificates produced by the plant under a 10-year power supply agreement. The additional generation capacity will also help to meet the region's increasing energy needs, presently growing at 3.5% pa.

The project also provides a stable income stream for the sugar industry, which is otherwise highly exposed to movements in world commodity prices.

# 9. Gas

## 9.1 Overview

It is forecast that the use of natural gas throughout Australia will continue to grow strongly by approximately 3.4% per year over the next twenty-year period. This growth represents a substantial increase in the use of gas with a projected increase from 18% to 24% as a percentage of the total Australian energy consumption (ABARE, 2002).

The infrastructure in the Queensland Gas Industry involves production facilities, high-pressure transmission pipelines and low-pressure distribution networks. This report focuses on the core gas transmission and distribution infrastructure in Queensland and excludes infrastructure associated with the upstream production or retail components of the supply chain.

There are concerns about Australia's capacity to supply and keep pace with growing demand, particularly in the eastern States. These concerns were highlighted in the recent ABARE report commissioned by the Federal Department of Industry, Tourism and Resources (ABARE, 2002), which stated that "unless significant infrastructure investment is undertaken now, the demand / supply balance situation in eastern Australia will deteriorate quickly as natural gas resources are depleted in the face of strongly growing demand".

## 9.2 Gas Reserves

Australia has significant reserves of natural gas located throughout most Australian States, except for New South Wales and Tasmania. The estimated Australian gas reserves at January 2001 equated to 157,343 PJ. Geoscience Australia also estimated in January 2003, that the proven and probable Australian reserves amounted to approximately 160,000 PJ.

The majority of Australian gas reserves are from the Northern Territory and Western Australia basins where infrastructure to supply gas to Queensland is currently non-existent (ABARE, 2002; Geoscience Australia, 2003).

One of the key outcomes identified from the ABARE report was that "while the south eastern markets of New South Wales, South Australia, Victoria and Tasmania all continue to be supplied from existing eastern Australian sources, at the end of the study period the Gippsland, Otway, Cooper-Eromanga and Bass basins will be depleted or nearing depletion". The study period referred to above is till 2019-2020. Collectively, the eastern Australian basins are estimated to contain only 3 years of production in 2019-2020. Also, the depletion of the Bowen-Surat basin in Queensland is expected to occur as early as 2008-2009 (ABARE, 2002).

## 9.3 Coal Seam Gas, Queensland

Coal seam gas (CSG) has become the major focus for gas exploration in eastern Queensland. CSG or methane was extracted from coalmines for safety reasons, and vented direct to atmosphere. Since methane is a significant greenhouse gas this is no longer an acceptable activity. Methane gas is also a valued product and it can be used as fuel for general heating and to provide electricity generation. CSG is now a commercial reality and the major source of exploration in Queensland. In 2002, 25% of Queensland's gas demand was met by coal seam gas production (The State of Queensland, 2004).

Origin Energy Limited states that for Queensland, the proved plus probable coal seam gas reserves are in excess of 1300 PJ, and that there is potentially more than 25000 PJ of recoverable coal seam gas (Natural Resources, Mines and Energy, 2004). CSG production in Queensland currently occurs from fields at Fairview (Tipperary Oil and Gas [Australia] Pty Ltd), Peat (Oil Company of Australia Ltd/ OCA), Dawson Valley (OCA), Scotia (Santos Ltd) and at Moura coal mine (Anglo Coal Australia Pty Ltd/Mitsui & Co Ltd).

In the near future, these companies are considering further development and upgrade work (Natural Resources, Mines and Energy, 2004). A brief rundown of the proposed developments is provided below:

- Santos – Plans to further develop their Scotia Field and to also further investigate the Walloon Coal Measures near Roma.
- Tipperary Oil and Gas (Australia) Pty Ltd – Plans to drill eight exploration wells at Comet Ridge as well as to undertake a 400 km seismic survey. The company is also preparing to commence a 30 to 40 well-development program on their current operating petroleum leases.
- CH4 – Work at Grosvenor in Central Queensland has projected reserves of some 1000 PJ of gas and the company has commenced a further $5 million exploration program.
- Queensland Gas Company Ltd (QGC) – Plans to conduct further exploration and to undertake the technical and commercial evaluation of five potential development areas as part of its participation agreement with CS Energy. This commercial arrangement will allow power generator, CS Energy, to assess and commercialise the most prospective area, with an entitlement to purchase 60 PJ over a 15-year period.
- Arrow Energy NL – Plans to explore for CSG in the Walloon Coal Measures in the Clarence-Moreton Basin and to undertake additional exploration interests in the Surat Basin, Hillsborough Basin and Nagoorin Graben. Arrow also has a development agreement with CS Energy to assess the feasibility of projects and supply up to 4 PJ per annum over a 15-year period.

As mentioned in the overview, even with the proposed CSG development in Queensland mentioned above, there still remains some concern about the State's capacity to supply and keep pace with growing demand. These concerns were highlighted in the recent ABARE report commissioned by the Federal Department of Industry, Tourism and Resources (ABARE, 2002). The ABARE 2002 report also indicated that if only 20% of Australia's identified coal seam gas resources were recoverable, sufficient gas would be available to meet the needs of both New South Wales and Queensland for the next 40 years. The issue, therefore, is one of gas recoverability and ensuring sufficient infrastructure is put in place to cater for the forecast levels of gas consumption.

## 9.4 Gas Consumption

Gas consumption rates for Queensland are anticipated to grow from 69 PJ in 1999-2000, to 116 PJ in 2009-2010 and to 184 PJ in 2019-2020. This represents a compound growth rate of approximately 5.1%. In contrast the consumption growth for Australia is anticipated to grow from 861 PJ in 1999-2000 to 1,267 PJ in 2009-2010 and to 1,774 PJ in 2019-20, a compound growth rate of approximately 4.0 % (ABARE, 2002). In other words, Queensland has been forecast to experience a stronger growth rate than that forecast as the Australian average.

## 9.5 Transmission Pipelines

Australia currently has approximately 26,000 km of oil and gas transmission piping with Queensland having less than 20% of the total figure (APIA 2001 Directory Year Book).

The Victorian gas crisis in 1998 and the Adelaide supply disruption of January 2004 have had a negative impact on the Oil and Gas Industry and demonstrate the vulnerability of transmission systems that rely heavily on single source supply and single pipeline routes. The transmission pipelines supplying the Queensland market are similarly dependent on the Southwest Queensland Pipeline, with only recently a few alternate supplies becoming available. This dependency reinforces the need for additional infrastructure to safeguard the supply and distribution of gas from alternative natural gas sources.

The most significant increase in the Queensland pipeline infrastructure has been made only recently. Several other major pipeline projects have been under consideration in Queensland for some time, but no definitive time frames have yet been set for their construction. These proposed infrastructure upgrades include gas delivery from both the Timor Sea and PNG gas fields to markets within South-East Queensland.

The North Queensland Gas Pipeline (NQGP) supplies Townsville Power Station with CSG sourced from Moranbah and is due for completion September 2004. This project highlights the increasing developmental role that CSG will play within the Queensland gas supply and transmission market.

## 9.6 Regulation

The Parer review, completed for the Council of Australian Governments at the end of 2002, made the following three key findings with respect to the Australian energy sector:

- The energy sector governance arrangements are confused, with excessive regulation and perceptions of conflict of interest.
- There is insufficient competition in the east coast gas market.
- There is too much uncertainty surrounding new pipeline development (Queensland Power and Gas Conference, 2000).

One of the Parer recommendations was that Australia's 13 different electricity and gas regulators should be replaced by a single national energy regulator. As an outcome of the Parer study, an independent body, the Productivity Commission, conducted a review of the national Gas Regime and a draft report was issued for comment and public hearing (APIA, 2003). The draft report identified the following recommendations on gas regulation:

- Further measures to reduce regulatory risk (impact on investment). The Commission has recommended that the National Competition Council be able to provide prospective investors with certain binding rulings (for a period of 15 years). These rulings would help clarify the regulatory risks, prior to the commitment of investment.
- Draft Recommendation 7.3. The Gas Code should be amended to ensure that regulator requirements for establishing and maintaining information are standardised across jurisdictions and are as close to existing gas industry accounting or record keeping practices as possible.

One of the more significant findings from the Commission's review was that the current regulation of gas tariffs had led to a distortion in investment (towards low risk pipelines) and was inherently delaying the development of new pipelines. Consequently, the Productivity Commission also made a number of recommendations that would tend to reduce the extent of pricing regulation and help ensure that future pipelines were built with a degree of surplus capacity that could accommodate the predicted growth in the gas market.

## 9.7 Environment

There is a concentrated effort by industry to minimise the growth in greenhouse gas emissions. The Queensland government has developed a Energy Policy to specifically target initiatives that reduce the greenhouse intensity of Queensland's energy. Featuring highly in the Queensland Government's policies is a reduction in the use of coal for power generation. The Queensland 13% Gas Scheme (the Scheme) is a key initiative of the Queensland Energy Policy.The Scheme requires electricity retailers and other liable parties to source at least 13% of their electricity sold in Queensland from gas-fired generation from 1 January 2005.

Greenhouse gas emissions will be reduced by more than one million tonnes in the first year of operation of the Scheme.

The Scheme will also deliver on the Energy Policy's objectives of diversifying the State's energy mix towards a greater use of gas and encouraging new gas infrastructure in Queensland.

## 9.8 Report Card Rating

In 2001, the natural gas infrastructure was given a rating of 'C' in the Australian Infrastructure Report Card. A rating of 'C' means the industry is adequate but requiring major changes in one or more of the infrastructure conditions (ie committed investment, regulatory regime or the planning processes), before it can be deemed as being fit for its current and anticipated purpose.

Results from this review demonstrate that there is still an identified need for further gas infrastructure in Queensland. Existing gas fields within the State are expected to be depleted within the next twenty years and, although it is highly likely that new fields will open up in their wake, the existing networks will not keep pace with the expected growth in consumption. Additionally, Australia has received some timely reminders about the importance of security of supply to customers and economic performance (APIA, 2001), especially with the recent incidents at Longford and Moomba.

With Queensland's increasing use of CSG, it is conceivable that gas demand could be met by increased coal seam gas production. There is also a possibility that the supply increase may arise from reserves already identified in the PNG highlands and Timor Sea. Currently the Queensland gas industry is examining a variety of different options.

However given the State's current dependency on single supply lines and given the current state of gas field depletion, the overall Queensland report card rating for 2004 can only be graded at **C**.

***Case Study***

**North Queensland Gas Pipeline Project (NQGP)**

Queensland Power Trading Corporation trading as Enertrade is facilitating the development of a new gas fired power station in North Queensland. The project includes the development by BHP and gas supply company CH4, of a new coal seam methane production field near Moranbah in Central Queensland and the installation of a new 391 km long gas pipeline from the gas field to Townsville and the nearby Yabulu power station.

The project has a number of benefits. It is estimated that it will provide a significant boost to regional employment, increasing economic growth in north Queensland by more than 5% over its first 10 years of operation. The project will provide strategic gas pipeline infrastructure linking Townsville and the gas-rich coal fields of the northern Bowen Basin, and will also create the potential for commercial proponents to establish interconnection to Central Queensland markets such as Gladstone and Rockhampton.

The project will deliver competitively priced gas into the Townsville region, providing industry with a cost-effective alternative to expensive liquid fuels. Also, the project will, for the first time, provide north Queensland with a base load electricity generator.

The project is expected to result in the investment of up to $500 million in energy infrastructure in north and Central Queensland.

Excerpt from Department of Natural Resources and Mines, http://www.nrme.qld.gov.au

# 10. Telecommunications

## 10.1 Overview

### 10.1.1 System Description

The telecommunications network in Queensland provides a vital component for economic activity and growth.

In Queensland, telecommunication infrastructure and services contribute significantly to the overall State economy. Telstra estimates that the valued added contribution to the State's economy is about $3,800 million or about 2 percent of overall activity.

Australia's major telecommunications carrier, Telstra, through its historical position as a Government owned entity, has built an extensive Australia-wide network based primarily on copper. The long distance and main backbone infrastructure is optic fibre and optic fibre continues to be deployed throughout Queensland for these networks. The customer access network (CAN) infrastructure for the delivery of voice and data services is almost entirely copper.

Government utilities and other carriers have also constructed trunk networks utilising optic fibre in Queensland.

In recent years, the advent of mobile telecommunication services for voice and data has provided an additional demand for services and infrastructure throughout Queensland. All major mobile telecommunication carriers offer services in the major population centres of Queensland.

### 10.1.2 Governance

Telecommunication companies provide services in Australia in a largely financially deregulated market. However conduct of the carriers, particularly Telstra, is heavily regulated. Government authorities regulate the cost of calls and line rentals. Telstra which is 51% owned by the Federal Government operates under a Board of Charter and is subject to corporate governance laws.

Other carriers and some government utilities also provide telecommunication services in Queensland.

The Federal Government has established a regime whereby Telstra is funded to provide infrastructure to supply basic services to areas, where it would not be economically viable to do so.

The Universal Service Regime has two parts. These are the Universal Services Obligation (USO) and the Digital Data Service Obligation (DDSO). The Universal Services Obligation requires Telstra to provide a standard telephone service including the handset, payphone services and other services that may be prescribed by Government. The Digital Data Service Obligation (DDSO) consists of a General Digital Data Service and a Special Digital Data Service.

The General Digital Data Service requires a 64 kilobytes per second service to be made available to at least 96% of the population. The Special Digital Data Service requires provision of a 64 kilobytes per second satellite service to the remaining 4% of the population.

All telecommunications carriers and carriage services providers, with earnings above a prescribed amount, contribute to the cost of funding this scheme.

The Federal Government has also enacted a Customer Service Guarantee that nominates a minimum performance level of the telecommunications service for all Australians. Currently the Customer Service Guarantee is applied to AAPT, Optus, Telstra and Primus.

A more comprehensive level of monitoring called Network Reliability Framework (NRF) was introduced last year and applies only to Telstra. This index reports down to the individual customer level.

Other Government legislation such as the Telecommunications Act and associated regulations provides a further compliance regime in which telecommunication service provides must operate.

Part XIC of the Trade Practice Act confers on the Australian Competition and Consumer Commission (ACCC) a broad power to declare the set of telecommunications services that must be supplied to access seekers on terms and conditions that the Commission has the power to set in lieu of commercial agreements.

### 10.1.3 Sector Trends

The increase in broadband internet access in the past 12 months has been significant.

Telstra reports that in the 2003 to 2004 financial year, the number of broadband customers in Australia grew by over 100% (Telstra, 2004). This level of growth is also consistent with a report issued by the ACCC in March 2004 report (ACCC, 2004).

The number of new on-line customers for Telstra grew by 25%.

Optus report that compared to one year ago, broadband revenue in Australia has increased by 57% and the number of new connections has increased by 40%.

The ranking of the broadband takeup of OECD countries (shown in Table 25) show Australia is lower than comparable countries, which beliesAustralia's reputation as an early adopter of advanced communications.

In Brisbane the availability of broadband services is approaching 90% of residents, however the take up as measured by exchange lines varies between 3% and 15%.

One reason for Australia's slower uptake of broadband has been the recent lack of availability even in some parts of the capital cities. Another reason is that the predominant service utilised by consumers in Australia is 256 Kbps and this is chosen as a result of price, although a higher capacity ADSL service is available to most connections.

Both of the above points indicate that further improvement is required in Australia's telecommunications infrastructure capability if uptake of broadband is to increase.

New infrastructure has not been installed at a rate sufficient to meet the increased demand for data speed and quantity at a reasonable price.

Growth in mobile services continues to be strong. Telstra reports that at the end of June 2004, mobile subscriber numbers had increased by 14.5% compared at the end of 2002. Telstra's mobile minutes also grew by 38.4% between June 2002 and June 2003.

With the successful implementation of 3G mobile services by Hutchison in Brisbane and the Gold Coast areas, other carriers are planning to offer similar services that will provide competition in these market sectors. It is anticipated that 3G services will be offered in major regional centres in the near future.

Telstra plan to introduce EVDO mobile technology in the near future, which will allow Mbps of data to be transmitted.

Wireless is an area of technology that is developing as a viable means of providing internet access. Smaller service providers such as Veridas, Curl and iSage are able to offer broadband wireless services on unlicensed spectrum. Broadband satellite services are also currently offered by a number of service providers.

The Queensland Government recognises that Queensland is an immature market and has a policy of stimulating activity in e-commerce and e-business. In particular the Queensland Government is focussed on enabling the supply of these services to small and medium business enterprises. By stimulating demand and competition in this area, the government proposes to facilitate better prices and services for consumers.

**Table 25 Broadband Access per 100 Inhabitants, OECD Countries, June 2003**

| Rank | Country | Access/100 Inhabitants |
|---|---|---|
| 1. | Korea | 23.2 |
| 2. | Canada | 13.3 |
| 3. | Iceland | 11.2 |
| 4. | Denmark | 11.1 |
| 5. | Belgium | 10.3 |
| 6. | Netherlands | 9.2 |
| 7. | Sweden | 9.2 |
| 8. | Switzerland | 9.1 |
| 9. | Japan | 8.6 |
| 10. | United States | 8.3 |
| 11. | Austria | 7.0 |
| 12. | Finland | 6.6 |
| 13. | Norway | 5.4 |
| 14. | Germany | 4.8 |
| 15. | Spain | 4.2 |
| 16. | France | 4.1 |
| 17. | Portugal | 3.7 |
| 18. | United Kingdom | 3.6 |
| 19. | Italy | 2.8 |
| 20. | Australia | 2.7 |
| 21. | Luxembourg | 2.3 |
| 22. | New Zealand | 2.1 |
| 23. | Hungary | 0.9 |
| 24. | Ireland | 0.4 |
| 25. | Czech Republic | 0.3 |
| 26. | Mexico | 0.3 |
| 27. | Poland | 0.2 |
| 28. | Turkey | 0.1 |
| 29. | Greece | 0.0 |
| 30. | Slovac Republic | 0.0 |
| OECD Average | | **6.1** |

* includes DSL, cable modem and other platforms

*Source: OECD, 2004, www.oecd.org/sti/telecom*

## 10.2 Level of Service

Copper infrastructure, which forms a major component of the telecommunications voice and data network, is old technology.

Technology advances in recent years has provided copper infrastructure with some marginal increases in data quantity and speed. This has primarily been in the form of ADSL services (also known as ‘early broadband’) to consumers in urban areas. However, the speed provided by the ADSL services limits the user’s experience to simple consumer and business applications.

A major constraint using the existing copper based access network for broadband is its limited geographical and technological reach – that is, data speeds over voice grade copper cable are severely affected by distance. As business and consumer applications become more sophisticated, they also become more bandwidth hungry.

As the migration from dial up internet to broadband connectivity accelerates, so to will the demand for more sophisticated consumer and business applications. Within a short period of time it is predicted that bandwidth requirements of 100 Mbps will become common. The current access network capacity is inadequate to deliver such data speeds.

The proposed long term solution would is to replace the existing copper based customer access network with optic fibre, however the cost would be in the tens of billions of dollars and currently is commercially non-viable.

For voice telephony, the Telstra network, levels of service to customers are monitored through the Australian Communications Authority (ACA). In recent years, the ACA has reported an overall improvement in telephony services to consumers, although instances of delayed service to some customers are often reported in the media.

Telstra currently operates an ADSL demand register that monitors demand for services at individual exchanges. The installation of ADSL equipment is triggered when the minimum demand level for economic installation is reached.

## 10.3 Existing Infrastructure

An extensive copper access network with optic fibre for the trunk and backbone network currently services large areas of Queensland. The coastal centres of Queensland are serviced by optic fibre trunk routes, owned and operated by various carriers. Telstra also operates a coastal and an inland north-south optic fibre routes between Brisbane and Cairns, as well as inland fibre optic rings. Capacity also exists to transmit data on the digital radio network, such as SP Tel and Telecasters, along the Queensland coastal routes.

The existing Telstra trunk network is in good condition and outages caused by backbone failures are rare.

Improvement to Queensland's trunk network continues with fibre trunks recently being installed, for example from Mt Isa to Longreach through Boulia. The optic fibre trunk infrastructure has also been upgraded in the Torres Strait in recent times.

Currently Telstra has approximately 31,000 kilometres of backbone fibre throughout Queensland. Last year approximately 1,400 kilometres of optic fibre cable was laid at a cost of about $30 million.

Brisbane CBD businesses and business in Queensland close to an optic fibre cable can be connected to the fibre network and are able to access data at speeds up to 10 Gb/s. These services are relatively expensive and are not widely available to all businesses. This reflects the need for continued investment in the installation of fibre and high-speed data capability in the access infrastructure.

The copper network and a significant amount of fibre is owned and operated by Telstra. Other providers such as Optus, Reef Network, Powertel, Uecomm, Ergon Energy and Queensland Rail, have fibre optic cable networks, which are used for commercial data traffic. However, for some of these networks, robustness and alternative transmission paths if an outage occurs remains an issue.

Currently new technology is being tested which will extend the reach and data speed of ADSL on the Telstra copper network.

In recent years, extensive mobile telephone networks have been constructed in South-East Queensland.

There are currently five mobile networks operating in Queensland. These include:

- Telstra with a GSM and CDMA based network.
- Optus with a GSM based Network.
- Vodafone with a GSM based network.
- Hutchison 3G Australia with a 3G network.

An active wholesale market to third party service providers also exists in Queensland.

Mobile services are now available in major Queensland population centres and along the major Queensland road networks. The various mobile networks all offer data services at varying rates.

All three mobile GSM networks offer data services using GPRS. Through the Telstra CDMA mobile network, speed data access at speeds up to 144 kbps is available using 1xRTT technology.

Hutchison 3G Australia offers WCDMA 3G technology for data services.

Governments at Federal and State levels have facilitated the construction of mobile telephone infrastructure in Queensland in areas where it would not be commercially viable to do so. Some areas of Queensland, with populations as low as 100 people, now have access to mobile phone services.

Although 3G services are currently operational in South-East Queensland, they are not considered to be advanced to the level of providing a full business solution. An increase in coverage and bandwidth will facilitate wireless networks being more widely utilised in coming years.

The hybrid coaxial / optical fibre (HFC) networks operated by Optus and Telstra servicing many suburban areas of Brisbane for pay TV, internet and telephone services, is now considered old technology. This system currently operates as a broadcast network and has limited bandwidth due to its spectrum being shared across all users and content delivery.

## 10.4 Future Needs

The quality and capacity of Queensland's telecommunications infrastructure will directly affect the rate of economic development in the future. The installation of new technologies and infrastructure has a social and economic impact throughout Australia. Companies that are mostly focussed on shareholder value may not be able to meet the wider social and economic objectives required by the community.

Regulation of telecommunication can also act as a barrier to new investment. Currently the ACCC can regulate access pricing to any telecommunications infrastructure. As a result, the owner of the infrastructure may not be able to set prices to receive the required rate of return and therefore may be unprepared to invest.

The demand for increased applications on the wireless networks will require further upgrading of the existing infrastructure in the future. The key to future economic growth will be high-speed data access and mobility. Optic fibre access networks are a critical element required to provide these services.

The demand for increased services to the home, including high-speed data connection and video streaming will necessitate upgrading of 'last mile' capabilities in the existing networks.

One way in which the higher data rates will be achieved on the existing infrastructure will be to move to a packet data base backbone, rather than the current PSTN system used by Telstra. That is, there will be a convergence of voice and data and all other content, being transmitted on the network.

The Federal Government recently announced an expansion of broadband services to rural areas as part of the National Broadband Strategy. The Higher Bandwidth Incentive Scheme (HiBIS) will allow prices to be reduced. It is anticipated that service delivery will initially be via ADSL services to small towns and by satellite and ISDN line to more remote areas.

In new major residential developments, telecommunication carriers are providing optic fibre trunk services with fibre connections to the home. In some brownfield developments, retrofitting with optic fibre connections to business premises is also occurring. Some existing areas are also being retrofitted with a hybrid system utilising the existing copper infrastructure and new optic fibre.

The Queensland Government and Brisbane City Council consider that only fibre optic cables should be installed in any new rollout work. Countries such as Korea and Hong Kong are now installing fibre to their access network at a greater rate than in Australia. As a result, Australia is falling behind the rest of the world in this area and that this may deter some international companies from investing or establishing their head offices here.

The Australian Telecommunications Users Group (ATUG) and the Queensland Telecommunications Industry Group (QTIG) consider that further competition is required within the telecommunications industry in Queensland. Representatives of both State and local government support this view and suggest that further competition based on innovation, price and quality of service should be in place. It is considered that competition will drive Telstra and other carriers to accelerate the implementation of new technology and infrastructure, improve services and lower costs.

To facilitate such competition overseas examples have been cited where a single infrastructure owned by a single entity is established and other parties purchase wholesale access on equal terms. This could be either government or private enterprise, or a combination of both. Content providers would pay a fee to use the infrastructure to deliver content to the home or business. This service delivery model is similar to the way people pay registration fees to drive their vehicles on a public road.

One CBD building in Brisbane currently has six telecommunication service providers supplying services on separate sets of infrastructure, which is an inefficient model for the use of these resources.

## 10.5 Report Card Rating

The provision of telephony services in Queensland has active competition in the wholesale and retail markets. Some reports noting difficulties in maintaining and repairing services to some customers occur from time to time. However it is considered that the network delivering the telephony services is robust and well developed in Queensland.

**Telephony services** have been given a rating of **B+**.

Mobile telephone services are also offered in Queensland in a competitive retail and wholesale environment. Infrastructure construction has been widespread throughout Queensland in recent years. Infrastructure continues to be constructed in areas that are commercially non viable for the carriers, but are supported by Government subsidies.

Coverage is extensive and continues to grow. With the introduction of 3G services in South-East Queensland, current technology has been introduced. Regional and rural areas of Queensland do not enjoy the same level of service and competition as South-East Queensland.

**Mobile telecommunication services** have been given a rating of **B+**.

The rating for data services was derived by considering several factors relating to the current levels of infrastructure and service. The existing infrastructure for transmitting data is considered to be in good condition. For the infrastructure that is currently in place, it is considered that it is fit for its intended purpose. The existing infrastructure used to transmit data appears to be used efficiently however significant investment is required to increase capacity.

The implementation of infrastructure to carry data rates highly when considering the impact on the environment and public safety aspects. A high rating is also achieved when considering the positive social and community aspect this technology delivers.

Significant improvement is required in order to enhance the economic effects potentially available through this technology. A low score is allocated to current funding for infrastructure associated with data transmission. It is considered that significantly more funding is required to realise the economic benefits that are available though this technology.

Improvements are required in the security of the data network and robustness of services.

**Data networks** have been given a rating of **B-**.

The overall Queensland Report Card rating for telecommunications infrastructure is a **B**.

***Case Study***

In recent years, market demand for broadband internet access has risen markedly. In particular, there has been strong growth for demand for broadband access from small business and domestic consumers. Price competition between Internet Service Providers has also been intense with prices falling significantly in the past 12 months.

However access to either ADSL services via an existing telephone line or to the Telstra and Optus coaxial cable network remains limited.

Infrastructure facilitating access to these services in regional and rural Queensland has not been upgraded to the extent required to satisfy demand.

About 10 percent of residents in the Brisbane Metropolitan area also do not have access to broadband internet through either of the above services.

For example, at the time of writing this report, parts of Carindale, which is located about 10 kilometres from Brisbane's CBD, do not have access to OPTUS or Telstra cable services nor access to ADSL services.

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# Appendix B
# Rating Methodology

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

The overall grades are based on the consolidation of the Asset Condition, Asset Availability and Reliability, Asset Management, Sustainability including Economics, Environmental, and Social and Community issues.

The overall grades are:

| 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 to enable infrastructure |
| 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. |
| E | Inadequate | Totally inadequate for current and future needs |

The overall grading is developed based on a review of the following components of the infrastructure. The following key areas have been given equal emphasis.

**Asset Condition**

This section is based on the view that the infrastructure is considered to be fit for the purpose that it is currently being used and for its anticipated future use. An important component of this section is the trends in the general condition of the infrastructure in terms of the infrastructure condition relative to the purpose for which it is intended to be used.

**Asset Availability and Reliability**

The key elements of this sector of the assessment has included the expectation and where available the current known customer satisfaction levels with the infrastructure service delivery.

**Asset Management**

This section of the review included an assessment of 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. This section also includes an overview of the impact and nature of regulation and legislative oversight on the efficient management of the infrastructure.

**Sustainability**

This section of the grading covers the issues associated with long-term sustainability of the infrastructure and considers the following issues.

*Economics*

Economics of the infrastructure management including an overview of the total expenditure on the infrastructure compared with the expected levels based on the current degradation rates of the infrastructure. An opinion on whether sufficient funds are available to provide the infrastructure to an appropriate level for today and the future.

*Environmental*

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

*Social and community*

Social and community impact issues such as distribution of infrastructure, equitable provision of infrastructure, the levels of support to customer service obligations, employment opportunities and issues including staff and customer safety.

**Security**

After the terrorist attacks of 11 September 2001(USA), October 2002 (Bali) and March 2004 (Madrid), governments have responded by enacting legislation and by establishing specific agencies to assess and manage this new risk to infrastructure. While security management is highly confidential, some infrastructure is more vulnerable to attack, and more critical to social and economic welfare than others. This assessment has considered that vulnerability, criticality and the owners perceived awareness and response to the risk.

# Appendix C
# Abbreviations

| | |
|---|---|
| AA | Airservices Australia |
| ABC | Airport Building Controllers |
| ABS | Australian Bureau of Statistics |
| ACA | Australian Communications Authority |
| ACCC | Australian Competition and Consumer Commission |
| ADWG | Australian Drinking Water Guidelines |
| AEO | Airport Environmental Officers |
| AES | Airport Environment Strategy |
| AIRE | Australian Inland Rail Expressway |
| AMSA | Australian Maritime Safety Authority |
| AQIS | Australian Quarantine and Inspection Service |
| ARA | Australasian Railway Association |
| ARMIS | A Road Management Information System |
| ARTC | Australian Rail Track Corporation |
| ATC | Australian Transport Council |
| ATEC | Australian Transport and Energy Corridor |
| ATSB | Australian Transport Safety Bureau |
| ATUG | Australian Telecommunications Users Group |
| BAMS | Bridge Asset Management System |
| BOOT | Build Own Operate and Transfer |
| BTRE | Bureau of Transport and Regional Economics |
| CASA | Aviation Safety Authority |
| CTCU | Counter Terrorism Coordination Unit |
| DDSO | Digital Data Service Obligation |
| DFRS | Diesel Fuel Rebate Scheme |
| DMR | Department of Main Roads |
| DOTARS | Department of Transport and Regional Services |
| DSDI | Department of State Development and Innovation |
| dwt | dead weight tonnes |
| EA | Engineers Australia |
| EMS | Environmental Management System |
| EPA | Environmental Protection Agency |
| GATR | Great Australian Trunk Railway |
| GCAL | Gold Coast Airport Limited |
| grt | gross register tones |
| GSP | Gross State Product |
| HiBIS | Higher Bandwidth Incentive Scheme |
| IPWEA | Institute of Public Works Engineering Australia |
| IRTP | Integrated Regional Transport Plans |
| KSI | Killed and Serious Injury |
| LAT | Lowest Astronomical Tide |

| | |
|---|---|
| LGAQ | Local Government Association of Queensland |
| LRRS | Local Roads of Regional Significance |
| MDP | Major Development Plan |
| MOU | Memorandum of Understanding |
| MPF | Major Project Facilitation |
| NCP | National Competition Policy |
| NR&M | Department of Natural Resources and Mines |
| NRF | Network Reliability Framework |
| NTC | National Transport Commission |
| NTSS | National Transport Security Strategy |
| PBC | Port of Brisbane Corporation |
| PPP | Public-Private Partnership |
| QCA | Queensland Competition Authority |
| QGS | Queensland Greenhouse Strategy 2004 |
| QRNAG | QR Network Access Group |
| QT | Queensland Transport |
| QTIG | Queensland Telecommunications Industry Group |
| R2R | Roads to Recovery |
| RFDS | Royal Flying Doctor Service |
| ROCs | Regional Organisations of Councils |
| RoNI | Roads of National Importance |
| RRADP | Rural and Remote Airport Development Program |
| RRGs | Regional Road Groups |
| RTSA | Rail Technical Society of Australasia |
| SEQ | South-East Queensland |
| SIP | State Infrastructure Plan |
| SPC | Security Planning and Coordination |
| SSBF | Smart State Building Fund |
| TEU | Twenty-foot equivalent units |
| TRSI | Targeted Road Safety Initiative |
| UITP | International Association of Public Transport |
| ULSD | Ultra-Low Sulphur Diesel Fuel |
| USI | User Satisfaction Index |
| USO | Universal Services Obligation |
| WSUD | Water Sensitive Urban Design |

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