SUBMISSION TO IPART ON BULK WATER PRICING 2001/02 - 2003/04

Department of Land and Water Conservation

April 2001

Executive Summary

This submission covers the costs of providing bulk water and related regulatory services. Bulk water provision, regulation and resource management are the responsibility of the Department of Land and Water Conservation (DLWC).

DLWC's Pricing Rationale

A maximum price increase of 20 per cent per year for the three years from 1 July 2001 to 30 June 2004 is proposed. The case for this proposal rests on three principles:

1. Prices should yield full cost recovery. Under the Council of Australian Governments (COAG) framework, to which NSW is a party, pricing regimes should be based on full cost recovery and, ideally, the removal of cross subsidies that are not consistent with efficient and effective service use and provision.

2. The costs of service provision should be borne by those benefiting from the services. This is based on an equity principle that says those who receive the benefits of consumption should pay for them. The corollary of this is that those causing additional costs to be borne by others should pay for these consequences.

3. Changes should be spread over time to minimise dislocation.

Principle (1) Cost Recovery
Current prices recover 54 per cent of the costs attributable to consumers. The proposed price increases would result in an 82 per cent of costs attributable to users 2004. The cost attributable to users is $69 million of the total cost of $104 million.

Current prices recover a portion of the following costs:

- DLWC's total operating costs;
- a renewals annuity representing consumption of assets; and

  (DLWC has been undertaking a total asset management planning process over the past two years which has resulted in an accurate assessment of asset management requirements for the next 30 years. This is the basis for the projected State Water operating and asset costs.)

- DLWC bulk water service resource management costs

IPART established an efficient level of bulk water service operating cost in 1998 that represented a 20 per cent reduction in 1996-97 costs. This submission is premised on overall operating costs being efficient

The submission argues that a portion of the following key costs should also be recovered in order to progress to recovering all categories of costs incurred in bulk water provision:

- a return on new capital investment;

  (Incorporating into full cost recovery a positive real return on new investments is a National Competition third tranche requirement. In this submission, an industry average rate of return

of seven per cent real is applied to the written down value of replacement and refurbishment capital expenditure to 2004.)

- an annuity for environmental and safety compliance costs;
- water use compliance costs;
- a share of water management planning and annual implementation programs and reporting;
- metering and monitoring costs for unregulated rivers; and
- capital costs associated with unregulated and groundwater services.

These costs are not currently recovered through prices. In each case they arise from the provision of bulk water operations and regulatory services which benefit consumers and the general community, and so ought to be included in cost recovery. In each case IPART has previously determined that these costs should be incorporated into full cost recovery.

DLWC has identified a substantial capital works program for regulated rivers over the next thirty years. Attached is a summary of this program.

Principle (2) Beneficiary Pays

The submission applies cost sharing ratios to all bulk water service costs. In some cases, such as water information products, 100 per cent of costs are attributed to Government. In the three sets of cases listed below, benefits accrue to the general community and consumers. Accordingly, cost-sharing ratios are proposed between Government, on behalf of the general community, and consumers. These ratios are a result of extensive public review since 1996 through the IPART price setting process.

Cost sharing is proposed for the following costs:

- Safety and environmental compliance costs. A 50 per cent user cost share of projected safety and environmental compliance costs is proposed. The proposed share is consistent with the cost sharing determined by IPART for flood mitigation operations and environmental impacts.

- Water management planning and implementation program costs. A 50 to 70 per cent user share of these costs is proposed. Water management planning and implementation programs are established by the Water Management Act as the activities that must be performed for strategic management of the rivers and groundwater systems. Strategic management is vital for long term sustainable rivers and hence benefit water users, the environment and general community. Consistent with the 1998 IPART determination, a 50 per cent user share for strategic river management and a 70 per cent user share for strategic groundwater management are proposed.

- Unregulated river metering and monitoring costs and minor asset related costs, including monitoring bores and water use compliance costs. A 90 per cent user share of unregulated river metering and monitoring costs is proposed, consistent with the established share of metering costs on regulated rivers. A 90 per cent share of the minor asset related costs is proposed given that these services are an integral part of bulk water provision.

Principle (3) Minimise Dislocation

Historically, prices have been set at significantly less than full cost recovery. It is recognised that increases in prices to increase cost recovery will impact on customers. The dislocation of these impacts should be minimised. The most appropriate way of doing this is to provide as much certainty as possible about future prices and to spread their implementation over time.

The proposal to spread price increases over three years derives from this principle. DLWC's Customer Service Committees were recently briefed on the key aspects of this submission and provided some feedback. Initially, DLWC had proposed full cost recovery by 2004, but in response to feedback by Customer Service Committees, this submission seeks cost recovery to a level of 82 per cent by 2004.

The Pricing Proposal

To illustrate the impact of the prices proposed in the submission, the following table shows the level of prices that would be charged in the Murrumbidgee valley, which has the lowest prices, and the Namoi valley, which has the highest prices.

Regulated River	**Current Prices**		**Proposed 2001/2002**		**Proposed 2002/2003**		**Proposed 2003/2004**	
	Fixed Price $/ML	Usage Charge $/ML	Fixed Price $/ML	Usage Charge $/ML	Fixed Price $/ML	Usage Charge $/ML	Fixed Price $/ML	Usage Charge $/ML
Murrumbidgee	3.22	0.84	3.42	0.88	3.62	0.91	3.81	0.95
Namoi	5.02	6.01	6.02	7.21	7.23	8.65	8.67	10.39

An annual increase of seven per cent is required for the Murrumbidgee to reach the cost recovery target, whereas a 20 per cent annual increase is required in the Namoi.

Implementation of the proposed price increases would yield revenue of $56.7 million, compared with full cost recovery of $69.0 million, as shown in the following table.

	Regulated Rivers $000	**Unregulated Rivers** $000	**Groundwater** $000	**All Services** $000
Total Costs 2003/04	77,604	17,673	9,144	104,421
Full Cost Recovery	53,083	9,300	6,637	69,020
Current Revenue	32,020	3,100	1,930	37,050
Projected Revenue after proposed price increases	49,118	4,696	2,934	56,748

If the proposed price increases were implemented, the Government would bear a cost of $45.1m ($47.7 m less income from other sources of $2.5 m). This represents a Government contribution for its share of the costs of bulk water supply services, and a subsidy to bulk water consumers of $9.1M.

DLWC Works Program

The table below summarises the regulated river capital works program in five-year lots for the next thirty years. The summary is of the renewal and compliance works program only. Excluded is any enhancement work.

Regulated River	**Renewal and Compliance Capital Works Program 2000/01 to 2029/30**						
	2000/01 to 2004/05 $000	**2005/06 to 2009/10** $000	**2010/11 to 2014/15** $000	**2015/16 to 2019/20** $000	**2020/21 to 2024/25** $000	**2025/26 to 2029/30** $000	**Total** $000
Border	1,366	4,599	627	2,292	626	1,674	11,184
Gwydir	22,350	33,305	1,954	2,266	2,106	1,748	63,729
Namoi	39,049	10,361	1,861	2,207	936	1,843	56,257
Peel	11,965	1,485	454	365	348	224	14,841
Lachlan	16,347	17,515	2,245	2,690	3,154	3,488	45,439
Macquarie	22,146	13,581	1,930	1,703	1,411	2,105	42,876
Far West	528	217	70	229	44	240	1,327
Murray	35,107	25,702	18,450	27,835	36,633	43,325	187,051
Murrumbidgee	27,494	11,227	4,590	5,284	28,155	10,976	87,725
North Coast	1,136	2,741	571	398	586	391	5,822
Hunter	4,654	9,616	10,339	1,672	1,016	1,528	28,826
South Coast	811	352	354	363	202	476	2,558
TOTAL	**182,952**	**130,699**	**43,444**	**47,305**	**75,217**	**68,018**	**547,636**

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1. PRICING FRAMEWORK

1.1 Overview

Pricing reform in the bulk water industry is a long-term process. In NSW, like other Australian jurisdictions, bulk water pricing in the past was not based on recovery of cost for provision of services. Rather, many services were provided free of charge and some resource management activities were never undertaken at all. A high level of government support existed and still exists at current levels for licence fees and water charges. The Council of Australian Government (COAG) agreement and National Competition Council (NCC) requirements regarding bulk water pricing have brought about a need for significant pricing reform. Whilst a great deal of pricing reform has already occurred in NSW, the process is not yet complete.

The Independent Pricing and Regulatory Tribunal (IPART) has determined bulk water pricing since 1995. The review process has set the parameters for pricing policy. The Department of Land and Water Conservation's (DLWC's) April 2000 bulk water pricing submission to IPART outlined the need to increase prices in the medium term to accommodate costs not yet recovered in the pricing process. IPART's subsequent (September 2000) determination sought additional information on bulk water services in order that a longer term pricing regime supporting an appropriate revenue base could be determined.

This submission makes proposals for bulk water pricing within the current policy framework and includes a price path covering a three-year period, from July 2001 to June 2004. A longer-term price period is more suited to the bulk water industry and provides for greater certainty and stability for water users in their forward planning. Significant improvements in the accounting for and reporting of bulk water service costs have now been made and the resultant information incorporated in the submission.

The key points of the submission are outlined below.

Section 1 - provides an overview of the pricing framework for bulk water services, the functions and services associated with bulk water provision, the directions in which DLWC is heading and pricing proposals over the medium term.

Section 2 - outlines the operating environment for State Water, the commercial bulk water business within DLWC, its functions and customer profile, business and asset management planning and performance measurement. While there are a range of stakeholders concerned with the management of water resources in NSW, the primary focus in this submission is on the services provided to State Water customers and the expectations of customers.

Section 3 – gives an overview of the resource management activities necessary to the support and address the impact of water regulation and extraction.

Section 4 - provides information on the bulk water cost recovery methodology, details of historical and projected costs and revenues and revenue targets over the medium term. Total costs for 2003/04 are projected to be $104 million with an attributable full cost recovery level of $68 million.

Section 5 - details proposed prices for regulated rivers, unregulated rivers, groundwater and metropolitan authorities over the medium term, including tariff structure issues.

Section 6 - provides impact analysis information.

Appendices - provide detailed information supporting the main sections of this submission.

1.2 Functions and Services

This submission covers the bulk water functions and related services involving operations, resource management and licensing. For bulk water management in NSW, DLWC is regulator and resource manager, while State Water is bulk water operator. No changes to licence fees are proposed in this submission. There will be significant change to licensing as a result of the requirements of the Water Management Act 2000. Therefore, licence fee scales and structures will be addressed in a separate submission after implementation.

State Water is responsible for the management of water infrastructure and the delivery of water for regulated systems, and billing for all services. State Water, established in late 1997, operates within DLWC under the formal instruments of an operating authority and a resource access authority. The ring fencing of State Water has enabled the production of explicit operating protocols and annual operating plans consistent with DLWC's resource management plans.

For each service, State Water is responsible for water delivery and DLWC has responsibility for resource management and regulation. Efficient and sustainable water delivery can only be achieved if the impacts of river regulation and bulk extraction from all water sources are adequately managed so as to sustain the long-term integrity of the resource itself. This outcome is one being increasingly sought by the community and will also directly benefit water users.

1.3 Compliance with COAG's Strategic Water Reform Framework

This submission demonstrates DLWC's commitment to COAG's February 1994 Strategic Water Reform Framework and the NSW water reforms, announced in September 1995 and August 1997. The COAG framework aims to achieve an efficient and sustainable water industry. It covers the five broad areas of cost recovery and pricing, institutional reform, allocation and trading of water entitlements, environment and water quality and public consultation and education.

A key driver of the Water Reform Framework is the need to stem the widespread natural resource degradation caused by inappropriate pricing practices of bulk water. The two-part tariff introduced by IPART addresses price structure. Price structure reform needs to occur for unregulated services. Full cost recovery is the other key aspect that needs to be addressed if NSW is to comply with COAG obligations.

The economic efficiency argument for ensuring that bulk water prices reflect full costs is equally compelling on environmental grounds. The underpricing of bulk water services will perpetuate ecological degradation because water services are not allocated to those users who value them most. As a result water is used in an inefficient manner. In NSW, regulation is the key instrument of water is managed. Pricing signals, through implementation of full cost recovery, will contribute to the achievement of ecological sustainable outcomes.

Under the COAG framework, pricing regimes should be based on the principles of consumption-based pricing, full cost recovery and ideally, the removal of cross subsidies that are not consistent with efficient and effective service, use and provision. Where subsidies and cross subsidies continue to exist, they should be transparent. Positive real rates of return on the written down replacement costs of assets should also be achieved where practicable. In NSW the established principle is that a rate of return be applied only to new investment, but this is yet to be reflected in bulk water prices.

Another element of the COAG framework has been the institutional separation of the operational functions of water agencies from the resource stewardship, standard setting and regulatory functions. The COAG Framework indicates such institutional separation is necessary to ensure that conflicts of interest are minimised, as well as allowing increased efficiency and greater accountability in the service delivery functions of water agencies. The establishment of State Water, a separate commercial business unit of DLWC achieves this.

The third tranche payment from the Commonwealth to the States/Territories under the National Competition Policy is partially dependent on the implementation of the COAG framework. Implementation of prices contained in this submission, which have been developed in accordance with recommendations in previous IPART determinations, should result in NSW meeting NCC requirements in relation to the third tranche payment. Whilst full cost recovery will not be reached in 2004, the prices setting process does clarify the level of government support. Cross subsidisation between regulated, unregulated and groundwater services will have been removed.

The Water Management Act builds on initiatives of the New South Wales Water Reforms and provides a legislative backing for a robust functioning environment into the future. It clarifies and strengthens water rights and sets a strategic planning process for the long-term sustainable use of the resource.

1.4 Medium Term Pricing Proposal

A 20 per cent per year price increase for the three years from July 2001 to June 2004 is proposed. The case for this proposal rests on three principles:

1. Prices should yield full cost recovery. Under the COAG framework, to which NSW is a party, pricing regimes should be based on full cost recovery and, ideally, the removal of cross subsidies that are not consistent with efficient and effective service use and provision.

2. The costs of service provision should be borne by those benefiting from the services. This is based on an equity principle which says that those who receive the benefits of consumption should pay for the benefits accrued.

3. Changes should be spread over time to minimise dislocation.

Current prices recover 54 per cent of the costs attributable to consumers. The proposed price increases would result in an 86 per cent level of cost recovery by 2004.

Previous IPART reports and determinations have provided guidance on bulk water pricing principles. The 'beneficiary pays' principle for determining cost sharing arrangements and the 'line in sand' approach for establishing the asset base for return on capital calculations are examples of enunciated pricing principles. The July 1998 and September 2000 determinations defined full cost recovery, deferred incorporating all cost items into prices and foreshadowed inclusion of all cost items in future determinations.

(1) Cost Recovery

Current prices recover a portion of the following costs:

- State Water total operating costs;
- a renewals annuity representing consumption of assets; and

- DLWC bulk water service resource management costs.

The efficient level of State Water operating costs and the resource manager operating costs were defined by IPART in 1998.

The submission argues that a portion of the following costs should also be recovered in order to progress to recovering all categories of costs incurred in bulk water provision:

- a return on new capital investment. Incorporating into full cost recovery a positive real return on new investments is National Competition third tranche requirement. In this submission, an industry average rate of return of seven per cent is applied to the written down value of replacement and refurbishment capital expenditure to 2004;
- an annuity for environmental and safety compliance costs;
- water use compliance costs;
- a share of water management planning and annual implementation programs and reporting;
- metering and monitoring costs for unregulated rivers;
- capital costs associated with unregulated and groundwater services; and
- other minor direct water delivery costs not yet incorporated into full cost recovery

These costs are not currently recovered through prices. In each case they arise from the provision of bulk water operations and regulatory services which benefit consumers and the general community, and so ought to be included in cost recovery. In each case, IPART has accepted that these costs should incorporated into full cost recovery.

State Water has been undertaking a total asset management planning process over the past two years that has resulted in a more accurate assessment of asset management requirements for the next 30 years. This is the basis for the projected State Water operating and asset costs.

The renewals annuities for the Murray-Darling Basin Commission (MDBC) and Dumaresq-Barwon Border Rivers Commission (DBBRC), depreciation charges for groundwater and other minor assets are other cost elements.

(2) Beneficiary Pays

The submission applies cost sharing ratios to all bulk water service costs. In some cases, such as water information products, 100 per cent of costs are attributed to Government. In the three sets of cases listed below, benefits accrue to the general community and consumers. Accordingly, cost-sharing ratios are proposed between Government, on behalf of the general community, and consumers. These ratios are a result of extensive public review since 1996 through the IPART price setting process.

Cost sharing is proposed for following costs:

- Safety and environmental compliance costs. A 50 per cent user cost share of projected safety and environmental compliance costs is proposed. The proposed share is consistent with the cost sharing determined by IPART for flood mitigation operations and environmental impacts.

- Water management planning and implementation program costs. A 50– 70 per cent user share of these costs is proposed. Water management planning and implementation programs are established by the Water Management Act as the activities that must be performed for strategic management of the rivers and groundwater systems. Strategic

management is vital for long term sustainable rivers and hence benefit water users, as well as the environment and general community. Consistent with the 1998 IPART determination, a 50 per cent user share for strategic river management and a 70 per cent user share for strategic groundwater management are proposed.

- Unregulated river metering and monitoring costs and minor asset related costs, including monitoring bores and water use compliance costs. A 90 per cent user share of unregulated river metering and monitoring costs is proposed, consistent with the established share of metering costs on regulated rivers. A 90 per cent share of the minor asset related costs is proposed given that these services are an integral part of bulk water provision.

(3) Minimise Dislocation

Historically, prices have been set at significantly less than full cost recovery. It is recognised that increases in prices will impact on customers. The dislocation of these impacts should be minimised. The most appropriate way of doing this is to provide as much certainty as possible about future prices and to spread their implementation over time.

The proposal to spread price increases over three years derives from this principle. State Water Customer Service Committees were recently briefed on the key aspects in this submission and provided some feedback. Initially, DLWC had proposed full cost recovery by 2004, but in response to feedback by Customer Service Committees this submission seeks cost recovery of 86 per cent by 2004, limiting the proposed increase to a maximum of 20 per cent per year

This submission also addresses the information requirements of IPART. It proposes some of the necessary price structural changes such as conversion of unregulated area charge to volumetric charge and the tariff structures for regulated rivers.

Finally, this submission does not address the achievement of ecological sustainable development through pricing. Significantly higher price levels than those proposed would be required for this purpose. However, the implementation of prices which recover direct bulk water service operating and capital costs is the minimum necessary to the achievement of ecological sustainable development.

2. BULK WATER OPERATIONS

2.1 Introduction

In NSW, the separation of bulk water delivery services into a discrete commercial entity, State Water, within the Regional and Commercial Services Division of DLWC has been a key response to the delivery of the NSW water reforms and competition policy NSW. More detailed information about State Water is contained in Appendix 2.

State Water has accountability within DLWC for delivering rural bulk water to customers from all water sources, including regulated streams, unregulated streams and groundwater. This includes infrastructure operations (eg dams and weirs), river operations, metering and billing. State Water has a work force of some 229 EFT (March 2001) and is responsible for over $2 billion in infrastructure assets, with an annual expenditure of around $50 million. The business is responsible for the management of 18 major dams and storages, over 300 weirs and regulators and some 400 other buildings associated with the delivery of rural bulk water.

State Water operating and asset costs represent approximately 90 per cent of the full cost recovery for regulated services.

2.2 Operating Environment

State Water is responsible for the management of water infrastructure and the delivery of water for regulated systems, and billing for all services. State Water, established in late 1997, commenced operations in July 1998 within DLWC under the formal instruments of an Operating Authority and an Access Authority. The ring fencing of State Water has enabled the production of explicit operating protocols and annual operating plans consistent with DLWC's resource management plans.

2.3 State Water Organisation

State Water has been designed to operate as a decentralised business with a small central core of expertise and operations, and offices located in four Customer Service Areas of the State.

State Water achieves its business goals through the development and delivery of its programs, products and business activities in cooperation with DLWC Regions. State Water recognises that it has a range of customers, directly represented through the access to water and indirectly through community service obligations and activities undertaken on behalf of stakeholders involved with the bulk delivery of water.

State Water's Programs comprise water delivery operations, asset management, customer service and commercial services. State Water is continuously improving the efficient and effective delivery of its programs, products and business activities so that they represent quality and value for money to customers and other stakeholders. Accordingly, State Water has an active business development program.

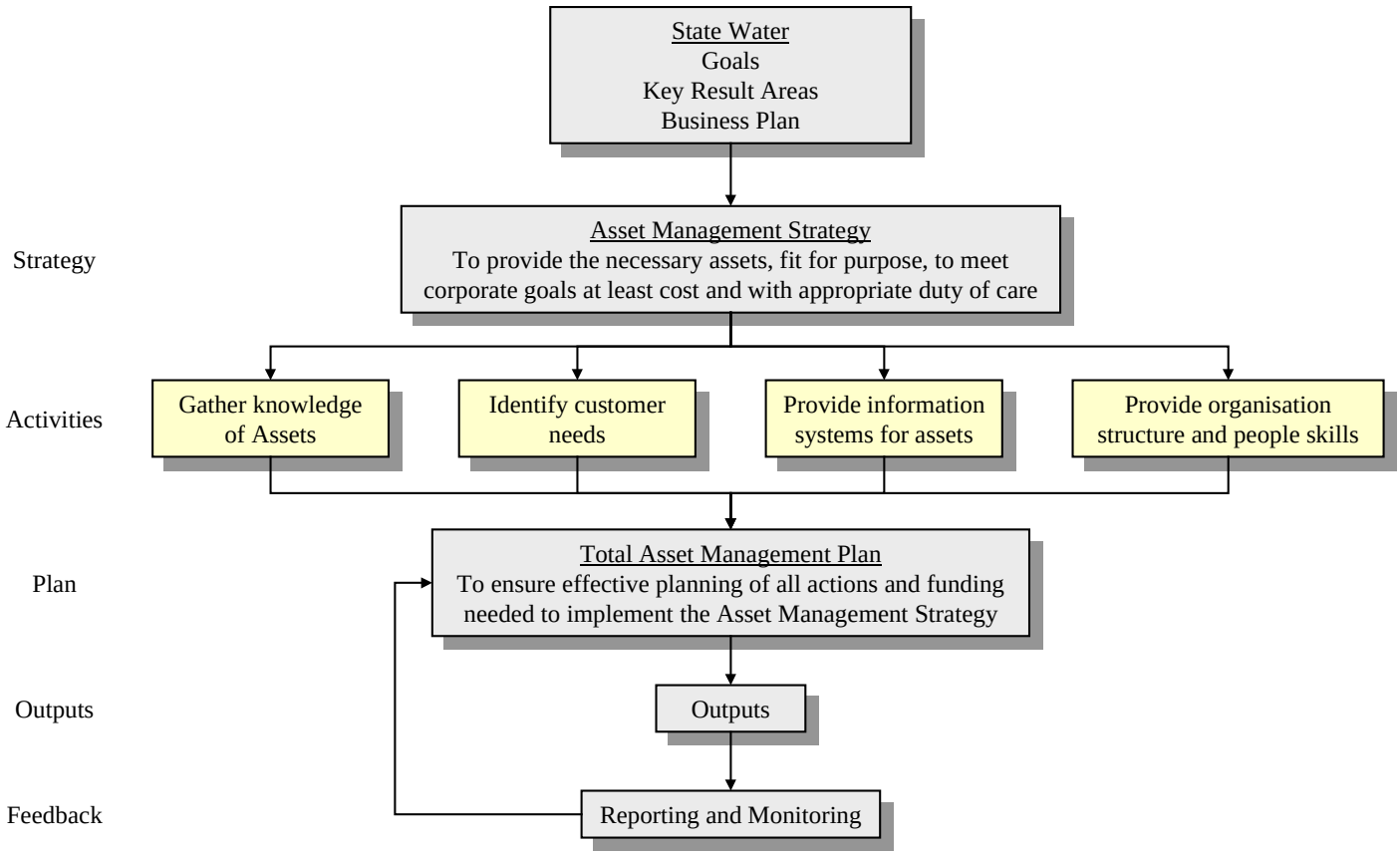
2.4 Total Asset Management Plan

Cost estimates submitted by DLWC to IPART in 1995 were independently reviewed with a consequent recommendation by IPART that State Water develop a Total Asset Management Plan (TAMP) which would facilitate deeper understanding and better management of the assets involved.

The framework for the TAMP is outlined in Figure 2.1 which indicates how the TAMP delivers State Water's goals. Appendix 2 indicates the linkages between organisational work flow at various levels in the business, the TAMP and the Life Cycle Management Programs being prepared for

assets. It should be noted that the individual asset Life Cycle Management Programs roll-up to form the TAMP for each river valley, then each Customer Service Area and the State.

Figure 2.1: Framework for the Total Asset Management Plan



The TAMP represents a continuing cycle of review and refinement as new data and knowledge about structures and works become available.

2.5 Customer Profile

State Water provides bulk water to irrigation customers, riparian users, local government, the environment and industrial customers throughout NSW. These customers extract water from the regulated river systems (volumes and flow rates influenced by releases from storages and weirs), unregulated rivers systems (no infrastructure influencing the river behaviour) and groundwater (extracted from bores).

At the end of the 1999/2000 water year DLWC had issued 5,988 regulated system licences represented by 4,913 customers (the mismatch is caused by some customers having multiple licences). The number of unregulated system licences was 10,373, represented by 9,097 customers and there were 5,983 groundwater licences held by 5,452 customers

2.6 Business Development and Service Standards

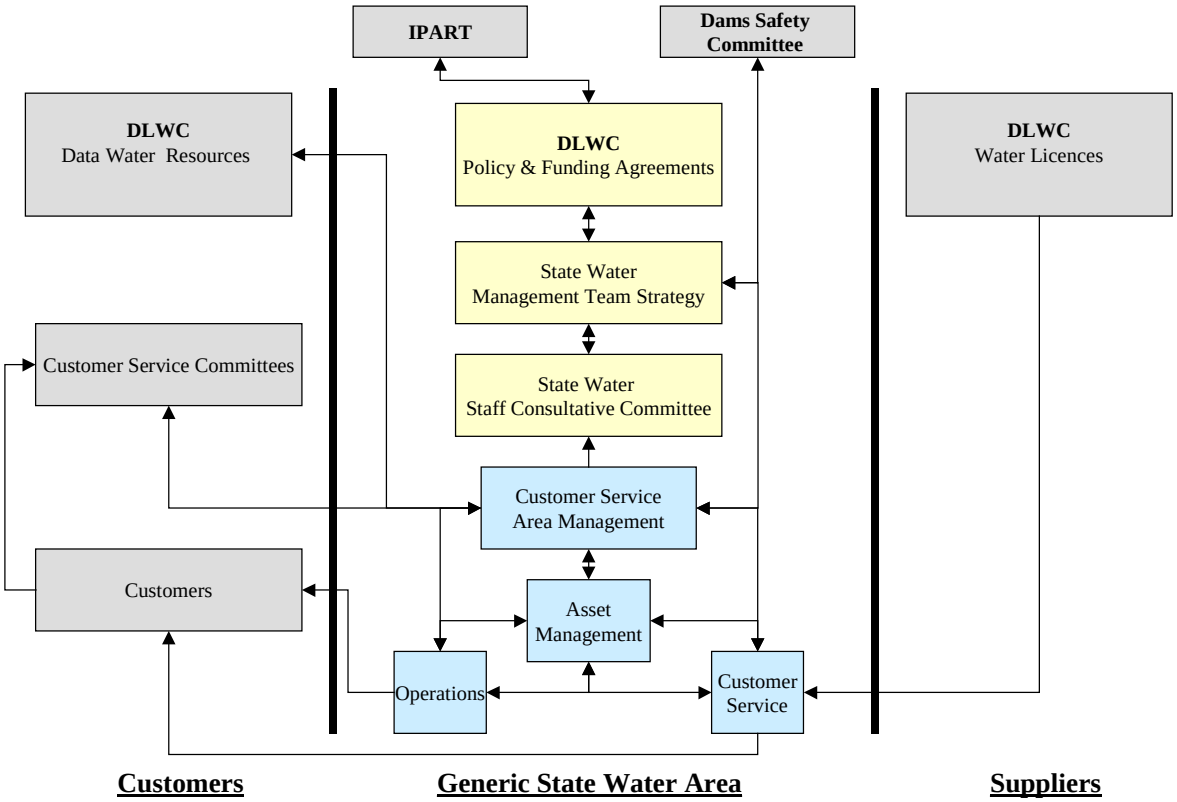
i Best Practice and Culture Change

As part of DLWC, State Water is seeking to emulate world's best business practice. Accordingly, State Water is developing its Customer Service Areas as self-managed teams that act in a cohesive

way within the context of DLWC policy and business strategies. This structure has been developed by State Water's management in concert with its staff Consultative Committee. State Water has developed a business plan for organisational development.

Figure 2.2 illustrates the hierarchical and cross functional relationships in the business and the challenges evident in achieving cohesion (vertically) with DLWC policy and (horizontally) across all areas of business activity. Activities at one level have to be explicitly related to activities at other levels, so that the business can function as intended and become *Best Practice* in Water Delivery.

Figure 2.2: State Water's Supply Chain



Best practice is being pursued through a range of inter-related culture change strategies. These feature:

5 The development and/or finalisation of Customer Service Area and Valley Plans that incorporate local Key Result Areas and associated Key Performance Indicators linked to State Water's Business Plan. The Area and Valley KRAs and KPIs will be designed as practical management tools for use at the local level.

6 The development and/or finalisation of staff position profiles and work plans with personal KRAs and KPIs that are linked to Area and Valley KRAs and KPIs, with associated review and assessment procedures to provide regular feedback on performance.

7 The transfer of Best Practice across Areas, Valleys and functions.

8 Management and supervisory training at all levels of the business in concert with the development of continuous improvement and problem solving skills by Area and valley-based employees.

State Water considers that culture change occurs through employees. Strategies 1, 2 and 3 provide the underpinning and explicit documentation of what is to be achieved by the business and the contribution expected of each stakeholder. State Water is focusing on the *development of people* because this is fundamental to realising the fourth Strategy.

The four State Water Areas are the focal points of service delivery to customers. Customer Service Managers of each Area act in a dynamic relationship with:

- the General Manager,
- other members of the State Water and DLWC Executive,
- Customer Service Committees, and
- area based functional units covering Asset Management, Operations and Customer Service.

ii Continuous Improvement Problem Solving Teams

State Water is developing continuous improvement problem solving teams in each Customer Service Area. The teams feature a mixture of employees from various functional areas and structure, river, operations and customer service employees. The teams established to date include peer groups, Staff Consultative Committees, OH & S Committees, Storage Review Committee plus Operations and Asset Officers Review Committees.

In the longer term, State Water is looking at on-going team based continuous improvement activity in each Area to be facilitated by its own staff so as to promote an ongoing continuous improvement culture.

iii Employee Development Activities

Activities identified in the State Water Business Plan to promote continuous improvement and culture change, in priority order:

5 Implement a facilitated Action Learning Program to develop and implement Continuous Improvement Problem Solving Teams across Areas, Valleys and Functions. This process is to be integrated with management and supervisory training at all levels of the business.

6 Develop and/or finalise position profiles incorporating continuous improvement accountabilities, with personal KRAs and KPIs linked to Area / Valley KRAs and KPIs, with associated assessment procedures to provide regular feedback on performance.

Activities have commenced in both the above points and significant progress has been achieved.

Candidate activities for funding to support Program Areas generally, in priority order:

5 Undertake a skills audit of core competencies of all employees. Develop transition plans, provide training and target recruitment as required to meet succession planning and skills requirements.

6 Develop and conduct a Customer Service Training Program tailored to the respective needs of Operations, Assets and Customer Service employees.

7 Establish performance systems that recognise individual and team contributions to the business.

8 Consider the case for having a single pay structure for all employees.

9 Clarify delegations and responsibilities of various State Water positions.

10 Complete the preparation of the employee induction manual.

Actions have been commenced on 1, 3, 4, 5, and 6 with 5 and 6 being completed.

iv. Further information on service standards and performance

A report on financial year 1999-2000 against the KRAs is contained in Appendix 3, the State Water activities report. Service to customers has improved since the establishment of State Water with greater focus on the business and meeting customer needs. Detailed measures of service standards for each of the KRA's have been established. For example, below is an extract from the service standards measures covering customers services:

	1995-1996	1999-2000
Billing	Inconsistent and irregular billing. Water Revenue approximately $28 million/year.	Centralised Billing Function, with internal control and quality assurance processes in place. 25000 invoices each year, with income of $34 million/year. 2 External Audits conducted.
Information Provision	Varied across the State, with excellent financial information to none.	Consistent standard information provided on all State Water operations, assets and costs. Customer Billing Enquiry Hotline established.
Debt Management	Basic, considerable under recovery.	Clear process for debt management being developed. Aged Debtor Analysis carried out each period. Considerable reduction in debt achieved through temporary suspension of licences.

3. RESOURCE MANAGEMENT

Environmental problems exist in NSW rivers and groundwater systems due to water regulation and extraction. Full cost recovery is an incentive to reduce water extraction. Full cost recovery does not include the total cost in arresting the widespread natural resource degradation. Excluding catchment management costs and the river management costs of other agencies is consistent with the pricing regimes of other Australian jurisdictions. Pricing of bulk water services thus deals with resource management activities where water users are the beneficiary or a have a shared benefit from the activities concerned. Full cost recovery based on the established cost sharing principles is seen as a minimum requirement if bulk water pricing is to assist in arresting continued environmental degradation.

3.1 Recoverable Resource Management Functions

The current level of full cost recovery includes some DLWC resource management activities that identify and manage the availability of water for water users in a way that minimises the impact on the ecology of rivers and groundwater systems. Also recoverable is a portion of in river salinity management and blue-green algae monitoring activities. For groundwater 70 per cent of strategic management costs are also recoverable although full cost recovery level was set on a 20 per cent reduction to pre-water reform costs. Currently no share of river strategic management is recoverable because this work has been paid for over the past four years by the NSW Government through the Water Reform package.

Current recoverable activities include gathering and analysing information, developing management plans and implementing actions that address the need for a sustainable resource into the future. The total cost of resource management and environmental management of rivers and groundwater systems is far greater than that reported in this submission. In accordance with the established cost sharing principles, full cost recovery and valley financial reports exclude catchment management costs. Also excluded are the associated costs of other agencies in river and groundwater management activities.

This submission proposes that the ongoing strategic management costs for rivers and groundwater be included in full cost recovery and that an appropriate share based on the established IPART cost sharing principles and ratios be applied to water management planning and annual implementation programs and reporting. Water use compliance is also a key activity in the provision of bulk water services where recovery is sought. This aspects affects regulated, unregulated and groundwater services.

The current recovery levels for unregulated river and groundwater do not represent an adequate price for providing bulk water services. In the past many systems received little or no management of the resource. This has changed in the past few years and services on unregulated and groundwater systems have expanded under the water reform package. The costs of the required level of resource management and ongoing cost for metering and monitoring for unregulated rivers are proposed to be included.

Water management planning and annual implementation programs

The Water Management Act provides a process for ensuring a robust functioning environment, that is to benefit of the general community and to water users. It makes some significant changes to the status and process of water management planning in NSW. The planning and implementation process is designed to ensure the long-term sustainability of this environmental resource. This provides greater security for the community and water users. Implementation programs must set out the means for achieving the objectives of water management plans. Monitoring, reporting and

reviewing these programs is required annually. This is not only to ensure objectives set out in the water management plan are being achieved but also to build an information base for use in the development of future water management plans.

Unregulated metering and monitoring

The cost of unregulated metering and monitoring was not included in full cost recovery in the 1998 IPART determination. This submission proposes that the ongoing metering and monitoring costs now be incorporated into full cost recovery for unregulated services. The purpose of collecting data on how much and when water is extracted from rivers and groundwater is threefold:

- planning: development of Bulk Access Regimes and water management plans; development of water implementation plans; announcements of allocations, commence to pump rules and so on. The more accurate information on water extractions available for the planning process means the less precaution has to be built into the flow shares made available for extraction;

- water availability management: developing information on water usage patterns on unregulated rivers enabling appropriate flow management and sharing of water; and

- billing: determining annual water bills in accordance with IPART determinations. Accurate information on water extractions for billing means that everyone meets their fair share of management costs.

Water use compliance

Compliance plans and compliance activities are needed to ensure that statutory water management plans and provisions are adhered to. This requires an appropriate mix of enforcement, prosecution and education strategies.

Water Compliance Implementation aims to ensure compliance by all water users with their general statutory obligations and with specific conditions of consents in order to:

- protect environmental values through water use and ecosystems approvals;
- ensure water is being shared between the environment and water users according to agreed arrangements between the Government and the community;
- safeguard water users' rights by ensuring that water is being shared between water users in accordance with the licensing system and legislation;
- generally ensure water is managed sustainability; and
- improve natural resource management by providing information on water use and compliance across the State.

3.2 Cost sharing

Under the proposed cost recovery, the New South Wales Government contribution to these services is still the main funding source of river and groundwater program management activities. Recoverable resource management costs include a portion of river and groundwater program costs. The shares of efficient service levels were determined by IPART in 1998 based on a 20 per cent reduction of operating costs by June 2001. The prices proposed in this submission are based on the efficient level determined. A full listing of products and the cost sharing information is contained in Appendix 6. A summary of the key additional costs are;

- *A 50 to 70 per cent share of water management planning and implementation program costs.* Water management planning and implementation programs are established by the Water

Management Act as the activities that must be performed for strategic management of rivers and groundwater systems. Strategic management is vital for long term sustainable rivers and hence benefit water users as well as the environment and general community. Consistent with the 1998 determination, a 50 per cent cost share for river strategic management and a 70 per cent cost share for groundwater strategic management are proposed for full cost recovery. Other agency costs associated with water management planning are excluded. Catchment management planning costs are also excluded in accordance with the 1998 IPART determination.

- *Other items including a 90 per cent share of unregulated river metering and monitoring costs.* Consistent with the established share of metering costs on regulated rivers, a 90 per cent share of minor asset related costs including monitoring bores and water use compliance is proposed.

3.4 Licensing administration

In 1998, IPART established an efficient level of cost for licensing administration based on a 30 per cent reduction in operating costs. Licensing administration costs are 100 per cent recoverable through licence charges. Current licence fees recover only half of the efficient level of costs. This submission does not propose any changes to licence fees because significant changes in licensing administration activities will result from the implementation of approvals and access licences as required under the Water Management Act. It is not proposed to recover conversion or implementation costs through licence fees, and therefore licence administration fees will be the subject of a separate submission when implementation is substantially complete.

4. COSTS AND REVENUES

4.1 Overview

This submission on bulk water prices is based on a business strategy which meets DLWC's objectives and statutory obligations. Bulk water cost information is presented in four parts:

- actual bulk water operating costs for 1999/00;
- bulk water cost reductions arising from implementation of the efficiency improvements in IPART's July 1998 determination and DLWC initiatives to reduce the cost of bulk water services;
- key bulk water resource management costs not previously incorporated but proposed to be incorporated into full cost recovery, as detailed in section 3; and
- bulk water asset costs, covering annuities based on planned works for the next 30 years, return on capital and depreciation charges on minor assets.

Section 4.2 describes the bulk water cost identification, cost allocation and cost sharing processes. Bulk water costs for 1999/00 are detailed in Section 4.3. Information on future bulk water asset costs are covered in Section 4.4. The impact of the New Tax System on bulk water charges over the price path is discussed in Section 4.5. In Section 4.6, information on medium term bulk water costs and revenue requirements is provided. Appendix 4 provides more detailed information on bulk water costs and revenues. Unless otherwise stated, all financial information has been expressed in 2001/02 values.

4.2 Cost Allocation Process

5.4.1 Cost Identification

Bulk water costs are disaggregated by water source (regulated rivers, unregulated rivers, and groundwater), by regional location (river valley and groundwater area) and by function (regulator, operator, resource manager). This is necessary to achieve transparency and minimisation of cross subsidies.

Separate financial reporting for State Water is now available, enabling the provision of costing information on a valley basis. The financial reports relate specifically to bulk water services and include State Water costs that are clearly delineated from other financial information for DLWC. In DLWC's program structure, the Rivers and Groundwater program products are bulk water-related. These products form the framework for reporting on bulk water costs by type of service. The program structure aligns programs closely with DLWC corporate goals, further facilitating the separation of bulk water activities, and hence their cost identification, from other activities.

DLWC’s financial system enables identification of the funding source of costs at a job level. As bulk water cost recovery is only associated with NSW Government funded activities, those activities funded directly by the Commonwealth and others funded externally have been separated within valley special purpose financial reports from bulk water costs.

5.4.1 Cost Sharing

All bulk rural water costs have to be shared between chargeable water users and the Government. The Government pays all costs where the benefit or impact relates to either a broad community good or falls to a specific group for which there is no current charging mechanism. The

Government may also choose to subsidise a particular group at its discretion, but such a subsidy must be strongly justifiable and clearly transparent to meet COAG requirements.

In its July 1998 Determination, IPART indicated a preference for the beneficiaries-pay principle for pricing of bulk water services. Given IPART's position, DLWC proposes to continue to base cost sharing on the beneficiaries pay principle for the medium term. No changes to the cost sharing ratios are proposed in this submission. The cost sharing principles will be applied to additional costs not yet incorporated into the full cost recovery level.

4.3 Base Year Costs

5.4.1 Introduction

DLWC's bulk water costs in the base year, 1999/2000, represent key information for determining the overall funding requirement for provision of bulk water services. The process of establishing the levels of cost recovery necessary to fund bulk water services over the medium term, building on base year costs, is discussed in Section 4.6.

5.4.2 Costs

The total cost of bulk water services in 1999/00 was $89.8M. These services were funded from water charges of $33.7M, other income of $2.5M, the Government's contribution based on cost shares reported in IPART's July 1998 determination and a Government transitional subsidy because revenue from prices did not meet full cost recovery.

Bulk water operating costs for 1999/00 fell by nearly seven per cent from the levels recorded for the two previous years. This follows DLWC's efforts to contain costs in all its business activities together with the imposition of efficiency gains by IPART on the level of cost recovery allowable for bulk water services. More information on cost savings is provided in Section 4.6. Table 4.1 shows bulk water costs, dissected into net operating and asset cost components, for all services in 1999/00.

Table 4.1: Bulk Water Costs (All Services) 1999/00 ($2001/02)

Valley/Area	**Bulk Water Costs 1999/00 All Services**		
	Operating Costs	**Asset Costs**	**Total Costs**
	$000	$000	$000
Border	2,548	614	3,162
Gwydir	3,704	981	4,685
Namoi	5,521	943	6,465
Peel	1,162	204	1,366
Lachlan	7,075	1,144	8,218
Macquarie	6,354	1,764	8,118
Far West	2,902	372	3,274
Murray	14,217	7,473	21,690
Murrumbidgee	11,332	3,417	14,750
North Coast	4,509	224	4,733
Hunter	5,451	131	5,582

South Coast	7,650	112	7,761
Total	**72,425**	**17,380**	**89,805**

4.4 Asset Costs

4.4.1 Introduction

A major element of bulk water service cost is associated with assets. Asset costs are mainly concerned with maintaining the service capacity of bulk water infrastructure at agreed standards. DLWC's asset costs are primarily represented by way of an annuity, which determines funding requirements to ensure the asset's service capacity is maintained over its life cycle. The approach taken is consistent with the directions set by IPART in previous determinations.

The categorisation and reporting on assets reflects the bulk water cost structure. In addition to a renewals annuity for State Water infrastructure assets, the costing profile includes a compliance annuity for other components of the infrastructure reflecting costs associated with raised standards and environmental requirements; a renewal annuity for River Murray Water (a business unit of MDBC) and DBBRC assets; depreciation charges for other DLWC bulk water and State Water assets; and a return on capital for State Water assets acquired since 1 July 1997. The profile is tailored to the bulk water services operating environment and the approach adopted is consistent with the Standing Committee of the Agricultural and Resource Management Council of Australia and New Zealand Water Industry Asset Valuation Study Guidelines for Determining Full Cost Recovery, August 1997. Details of current asset costs are covered below.

5.4.1 State Water Asset Costs

.1 4.4.2.1 Total Asset Management Plan

State Water's TAMP provides significantly higher levels of confidence than available under previous asset management programs. The TAMP is linked to the corporate goals and strategies of State Water, including customer and stakeholder service strategies.

The TAMP has regard to the operational requirements of State Water in response to the needs of customers and stakeholders, dictating what is required of the asset infrastructure in terms of service strategies. As life cycle management plans develop, the TAMP must include mandatory expenditures and satisfy the requirements of various external regulators such as the Dam Safety Committee and the Environment Protection Authority. In conjunction with State Water management, the CSCs are given the opportunity to review the TAMP.

With respect to capital compliance works, the portfolio risk assessment under the TAMP has now developed sufficiently to provide a robust assessment of compliance costs. Given the significant cost of compliance works, DLWC believes finalisation of the risk assessment process should not delay recovery of costs through the proposed compliance annuity. Any such deferral will only result in a position in the next pricing round (from 2004/05) where very substantial price increases will need to be proposed without the lead time to cushion the impact on water users.

There have, up till now, been no significant capital development or compliance works, primarily because the justification for such major developments is dependant on the recommendations of TAMP itself. Hence major development and compliance expenditures have been scheduled over the next 30 years on the basis of the lead time required to complete the risk assessments under TAMP, completion of detailed studies, extensive consultation with stakeholders and the need to secure adequate financial support.

In this submission, asset related expenditure under the TAMP has been grouped into four expenditure categories for the purpose of bulk water costing, as follows and discussed below:

Category 1: routine maintenance - included in recurrent operating costs
Category 2: major periodic maintenance, refurbishment, replacement and TAMP
Category 3: regulatory compliance and environmental standards, and
Category 4: service capacity enhancements

4.4.2.2 Cost of Capital

In determining State Water's asset costs, it has been necessary to establish an appropriate interest rate for use in the calculation of its asset annuities and return on capital. A real discount rate of 7 per cent is considered a reasonable approximation of State Water's cost of capital for a medium term price path.

5.4.1.1 **State Water Renewals Annuity - Category 2**

Costs associated with Category 2 assets have been translated into an annuity with the following characteristics:

- it relates to the cost of asset consumption for depreciable infrastructure assets used in bulk water supply, comprising those assets which form an integral component of the renewable bulk water infrastructure
- it is dissected by river valley into dams and river structures each covering the cost of major periodic maintenance, refurbishment and replacement and also covering the cost of project planning and implementation associated with the TAMP
- excluded from the expenditure base are routine maintenance (included in recurrent costs), compliance associated works and large capital development undertakings
- it draws on projected expenditure under the TAMP, based on a 30 year timeframe
- it is calculated by reference to a real discount rate of 7 per cent per annum
- it is predicated on maintaining a sustainable business structure through maintaining the performance capacity of water infrastructure

The TAMP and asset annuity profile will generally result in expenditure occurring in advance of funds being received from customers. In circumstances where funds are collected in advance of expenditure, a 'sinking fund' could be created. However, NSW Treasury considers it more efficient to manage cash reserves centrally and hence a separate sinking fund has not been established.

4.4.2.4 State Water Compliance Annuity - Category 3

Capital expenditures designed to meet regulatory compliance and raised standards are recovered through a compliance annuity. Regulatory compliance primarily covers compliance with safety of the public in and around the infrastructure, and reduction of risk associated with floods and seismic activity. Raised standards primarily cover environmental protection works (some of which are also of a regulatory nature), such as variable level offtake towers to meet the requirements for improved water quality and installation of fish ladders.

Of critical concern are the risk factors associated with water infrastructure. Many dams are deficient to some degree in meeting updated dam safety requirements for flood or earthquake security. Major capital expenditure will be required to at least minimise the risks due to flood and

earthquake. A community consultation process will be used to determine the minimum level of capital required to mitigate such risks rather than eliminate them.

In most cases, there are a number of options that could be adopted to achieve the required standards. These options can vary materially in cost. The programs for expenditure on both regulatory compliance and raised standards have been predicated on the basis that risk will be minimised or reduced to acceptable levels.

It should be noted that while such compliance works may result in qualitative changes to a structure to meet service levels required by contemporary operational standards, as with asset renewals they are not designed to increase the water supply delivery capacity of the structures concerned. This category of expenditure is similar nature to renewals in that it is obligatory if the structures are to continue to deliver the same level of service. In addition, due to the range of works necessary to be undertaken over an extended period, the pattern of expenditure largely reflects an ongoing commitment. Accordingly, it is necessary to raise periodical charges based on projected expenditures in order to fund these works on an ongoing basis. Therefore, in calculating the annuity for compliance works, the same methodology is utilised as for renewals, and the costs associated with Category 3 assets are translated into an annuity.

4.4.2.5 State Water Capital Annuities - Category 4

The costs of future capital development works, designed to meet upgrading and growth initiatives in bulk water structures, are recovered through discreet capital annuities commencing when the expenditures occur. Capital annuities relate to specific capital items, and only apply once capital items are completed and operational and the expenditures incurred. Accordingly, the annuities are negotiated in respect of each specific asset development expenditure and apply only for the contractual periods over which cost recovery is agreed with customers. These annuities should normally be fully recovered from users, following consultation with affected user groups.

As capital annuity charges are recovered directly from users and are subject to negotiation at the time a development proposal emerges, they are not included in asset costs for recovery in bulk water charges under the IPART determined pricing regime, in contrast to charges under the renewals and compliance annuities. Accordingly, projected bulk water capital development expenditure, rather than details of individual capital annuity charges, are reported in the submission for information only.

4.4.2.6 State Water Infrastructure Support Costs

As part of the TAMP, State Water has established the recurrent staffing levels required for infrastructure support. These costs consist of staff, contract costs including service agreements with DLWC and the Department of Public Works and Services and other cash costs.

The major component of these costs is incurred on a valley basis and has been allocated accordingly. Some costs cannot be attributed directly to the bulk water business in a specific valley and, in the absence of a sophisticated activity-based costing system, these costs have been allocated to valleys based on the respective valley asset values. Capitalised costs of $1.0M per annum for infrastructure support have been allocated over regulated rivers for the medium term based upon historical information and planned capital works.

4.4.3 Other Asset Costs

4.4.3.1 MDBC Renewals Annuity

RMW recently introduced an asset renewals annuity. Significantly for NSW as a shareholder Government, the annuity has the effect of smoothing annual funding requirements, while for RMW

it will facilitate a more predictable pricing regime in place of the longstanding annual cost recovery requirement. The annuity provides a more comprehensive estimate of renewals based on a breakdown of assets to major component level.

The annuity has been calculated by reference to an asset base for RMW with a replacement cost of $1.7B. The computed annuity is $14.8M per annum. Under the MDBC Agreement, NSW share of the annuity amounts to $5.9M annually. All the renewals are associated with the regulated Murray river valley

In the February 1998 bulk water pricing submission to IPART, an annuity of $5M ($1996/97), based on MDBC estimates, was sought for inclusion in bulk water costs. In the determination that followed, IPART capped the annuity at $2M ($1996/97) on the broad assumption that future asset refurbishment requirements for the Murray valley should be comparable to those for the Murrumbidgee valley. This decision has resulted in significant under recovery of bulk water costs for DLWC in the Murray valley.

4.4.3.2 DBBRC Renewals Annuity

The Queensland State Water Projects Division of the Department of Natural Resources has developed an asset renewals annuity for DBBRC's water supply infrastructure. The annuity covers renewals (major periodic maintenance, refurbishment and replacement expenditure) for the major DBBRC assets associated with the Border Regulated River. The NSW share of the annuity (50 per cent, amounting to $0.085M per annum) is included in bulk water costs.

5.4.1.1 DLWC and State Water Depreciable Assets

Costs associated with a range of assets utilised for bulk water delivery services which fall outside the TAMP process have been included as part of the asset cost regime for pricing purposes as practicable. These assets are not included in the TAMP primarily because they do not form part of the renewable bulk water infrastructure, and also because of their relatively short lives, wide dispersion or current classification under DLWC resource management activities. In these instances, it has been necessary to utilise depreciation charges where available to measure asset costs, as an annuity approach would be impractical. Nevertheless, it is considered the resulting costs should be included for pricing purposes alongside those in the annuities since the assets concerned form a requisite component of the bulk water supply function.

Groundwater Monitoring Bores

Monitoring bores for groundwater assessment purposes have been included in bulk water costs ($0.9M per annum) since they are an essential part of water supply operations and are critical in maintaining the integrity of the resource.

State Water Non Infrastructure Assets

State Water maintains a range of mobile plant and equipment to support its bulk water infrastructure assets. The great majority of these assets are utilised on regulated rivers and bulk water costs ($0.084M) are attributed accordingly.

4.4.3.4 State Water Return on Capital

Return on capital information was included for information in the 1998 submission to IPART, although it was not incorporated in the proposed bulk water pricing structure. In the determination that followed, IPART endorsed the return on capital concept for new assets, although the prices established did not include this element of cost. The COAG Water Reform Framework states that there is a requirement to achieve positive real rates of return on the written down replacement costs of assets in rural water supply, where practicable.

A return on capital, calculated by reference to State Water's depreciable bulk water infrastructure assets, has been incorporated in the pricing structure as part of asset costs in this submission. This is consistent with the rationale noted in IPART's determination. A 'catch up' provision is not being sought for return on capital omitted from the last submission.

Under the approach adopted, a return on capital (assets) is sought along with the recovery of the decrement in value of the assets, through the asset annuities, reflecting the current period's consumption of their service capacity. Development of the methodology for the return on capital has been undertaken in consultation with the NSW Treasury and IPART.

The return on capital has been calculated on the basis of actual investments made since 1 July 1997 plus the proposed capital investment over the forthcoming price path. As new investments are made, they are to be added to the (new) asset base, from which the return is calculated after providing for associated depreciation charges. Existing infrastructure (prior to 1 July 1997) is treated for the purpose of pricing calculations as a sunk investment with no opportunity cost and, given current levels of cost recovery, valued at $Nil, with associated charges limited to the cost of maintaining service capacity. This conforms with the 'line in the sand' (LIS) approach, which sets a benchmark date to provide for intergenerational equity considerations in the pricing regime, on the basis that a return should not be expected to be realised as a result of past (investment) decisions made for a variety of non-commercial reasons.

To give the correct signals for efficient investment, new investments, including those of a renewals nature, should earn a commercial, risk adjusted rate of return. The LIS valuation establishes an opening asset valuation for pricing purposes and ensures that new investments earn a real rate of return. Thus in this submission, a positive real interest rate (7 per cent per annum) has been utilised to calculate the return on capital.

The return on capital has been applied to those categories of expenditures for which capitalisation is appropriate. These include major refurbishment and replacement expenditure, but not routine maintenance expenditure nor major periodic maintenance. Clearly, State Water cannot be expected to provide funding to refurbish or replace assets into the future without consideration being given to the opportunity cost of additional capital expenditure. This approach is also consistent with IPART's 1998 determination.

It should be noted that the proposed application of a return on capital to State Water assets is restricted. While use of a positive real return on capital meets COAG requirements, the latter extends its application to both new and existing assets in rural water supply. Further, such assets are not confined to dams and river structures, but include all assets utilised for supply of water. For example, channels, pipes, and gauging stations have a direct relationship to supply activities. Non infrastructure/supply assets (eg land, buildings, plant, equipment and motor vehicles) have an indirect relationship to service delivery, but nevertheless can be essential to maintain supply.

In this submission, a return on capital has been confined to the major infrastructure assets included in the TAMP for which reliable expenditure projections are available. In addition, the NSW Government, along with other jurisdictions, has a 'shareholder' relationship with the MDBC and DBBRC, and under the respective agreements could expect a return on funds provided for capital works undertaken by these organisations. Nevertheless, a return on capital has not been sought in this submission for funds provided to the MDBC or DBBRC.

4.4.4 Summary of Asset Costs

Table 4.2 shows DLWC's bulk water annualised asset costs by service from 2001/02 to 2003/04. These costs are adjusted for inflation and efficiency gains as appropriate when aggregated with other operating costs.

Table 4.2: Bulk Water Annual Asset Costs 2001/02 to 2003/04 ($2001/02)

Asset Type	Regulated Rivers $000	Unregulated Rivers $000	Groundwater Areas $000	Total $000
State Water Renewals Annuity	6,568	135	0	6,703
State Water Compliance Annuity	10,871	12	0	10,883
MDBC Renewals Annuity	5,944	0	0	5,944
DBBRC Renewals Annuity	85	0	0	85
DLWC & State Water Depreciation Charges	84	0	909	993
State Water Return on Capital	3,740	66	0	3,806
Total Asset Costs	**27,292**	**213**	**909**	**28,414**

4.5 New Tax System Savings

Under the Federal Government's New Tax System (ANTS), the Goods and Services Tax (GST) came into affect on 1 July 2000, replacing the Wholesale Sales Tax (WST) and some other indirect taxes. The provision of bulk water services is GST-free under the legislation, meaning that DLWC:

- is not required to pay GST on its bulk water revenue and is not required to increase bulk water prices by the GST 10 per cent tax rate,
- can claim back GST credits on its bulk water purchases, and
- realises reductions in bulk water input costs where Wholesale Sales Tax (WST) equivalents are paid, and indirectly as supplier's costs decrease.

Table 4.3 shows estimated bulk water ANTS cost savings by service, resulting from the removal of indirect taxes, over the four years 2000/01 to 2003/04.

Table 4.3: Bulk Water ANTS Cost Savings

Period	Bulk Water ANTS Cost Savings		
	Regulated Rivers %	Unregulated Rivers %	Groundwater %
Short Term (2000/01)	0.5	0.6	0.6
Long Term (2001/02 - 2003/04)	2.4	1.7	1.6

Bulk water prices proposed for the period 2001/02 - 2003/04 incorporate the long term savings shown in the table. DLWC will absorb additional (compliance) costs to administer the GST, as well as the GST on input taxed supplies, through efficiency improvements.

The GST will impact general price movements, particularly in the first year of its introduction. As the supply of bulk water is GST-free, the GST price component has been removed from the inflator for purposes of adjusting projected bulk water costs for price changes.

4.6 Medium Term Costs and Revenue

4.6.1 Introduction

DLWC's bulk water costs for the four years 1996/97 to 1999/00 form the basis of assessing historical cost trends. Bulk water costs for 1999/00 also provide the base for projecting costs over the price path. In projecting costs, gross operating costs are adjusted for cost savings in various operating items, as well as for additional operating and asset related costs, in order to derive total bulk water costs. Projections of total costs establish the cost recovery requirement, after applying user/government cost sharing ratios to bulk water costs for each water product. This requirement represents the minimum level of revenue necessary for DLWC to provide bulk water services which meet customer, community and Government expectations.

4.6.2 Cost Savings

Bulk water gross operating costs have been adjusted as appropriate for improvements in efficiency. In IPART's July 1998 Determination, prices were set on the assumption that DLWC could achieve efficiency gains for bulk water services of 20 per cent over the three years 1998/99 to 2000/01 inclusive. This was made up of 10 per cent in 1998/99 and then 5 per cent for the two subsequent years, yielding savings of $7.1M in total for the three years.

The reductions imposed on the core funding of bulk water services are scheduled to be achieved and future cost projections are predicated on this basis. To a large extent, the associated savings have been realised through the Head Office and regional office reductions with DLWC still being required to meet its service standards. This program has dovetailed with the corporate services review, which has led to the centralisation of a range of transaction processing functions, with the freed up resources in regional offices being utilised to maintain service delivery levels on an ongoing basis. Rationalisation of office accommodation, following organisational restructure and staffing reductions - particularly in the Parramatta and regional offices - has also contributed to cost savings.

DLWC's forward estimates for 2002/03 and 2003/04 continue to be subject to budgetary constraints, and consequently, the efficiency gains have been built into the bulk water cost estimates for the two years concerned. This level of savings is significant insofar as DLWC is expected to maintain and in many cases enhance service provision with substantially lower levels of funding. Bulk water service provision cannot be expected to be maintained at an acceptable standard if further cost reductions were to be imposed.

4.6.3 Cost not yet incorporated into full cost recovery

There are several factors giving rise to higher bulk water full cost recovery. These relate to costs not yet incorporated into full cost recovery. These costs include both capital and operating costs. This section reports on the operating cost to be included in full cost recovery. The costs are of a recurrent ongoing nature over the medium to long term, rather than short term or once off aberrations in the cost profile. Details of additional costs are noted below.

No adjustments have been made to cost estimates for increases in salaries. Adjustments to compensate for increases in the general cost of input prices are provided for through movements in the CPI. Where salary increases exceed price movements, it is necessary for DLWC to achieve savings - whether through efficiencies, rationalisation, or other means - while as far as possible not impacting the level of service.

Implementation of the GST will result in higher costs being incurred by DLWC through additional administrative complexity, while tax credits will not be available for certain input taxed supplies. For the most part, it will be necessary for DLWC to absorb these GST associated costs, and consequently, they have not been included in bulk water cost estimates.

Unregulated River Metering and Monitoring Costs

Progress on the volumetric conversion program for unregulated rivers and estimates of associated implementation costs, together with ongoing metering and monitoring costs, are discussed in Section 3. Total costs for metering and monitoring over the period 2001/02 to 2003/04 have been assessed at $1.9M per annum.

Regulated and Unregulated River and Groundwater Compliance Costs

The Water Management Act strengthens water users' property rights and supports this with reaffirming the need for compliance activities. DLWC carries out periodic audits of meter accuracy and readings in river valleys and groundwater areas to ensure compliance with licence conditions. This is essential for effective control of water allocations and usage. Therefore, the costs of this activity clearly form part of the bulk water cost structure. Compliance costs were not considered in determining prices in 1998. Total compliance costs over the period 2001/02 to 2003/04 are estimated to be $1.2M per annum for regulated rivers and for unregulated rivers and $0.2M for groundwater areas.

Water Management Planning and Implementation Program Costs

Water management planning and annual implementation program costs are outlined in section 3. The total additional annual cost is $5.8M for regulated rivers and $5.4 M for unregulated rivers and groundwater.

Other Costs Changes

State Water's total asset management plan is discussed in Section 4.4. The planning process has enabled more accurate forecasting of asset related costs. State Water operating costs aligned to the total asset management plan results in an overall shift from forecast renewals expenditure to operating asset maintenance. The result is a 4.5 per cent ($1.5M) increase in State Water costs.

4.6.4 Asset Costs

Asset infrastructure and associated items of plant and equipment are a major component of bulk water service provision, with asset costs representing 27 per cent of bulk water total costs. Asset costs are discussed in Section 4.4.

4.6.5 Total Costs

As indicated above, bulk water total costs are derived by adding together net operating and asset costs. Total costs reflect the overall funding requirement - cost recovery from water users and Government contributions - for bulk water service provision.

Table 4.4 shows estimated total bulk water costs by service in 2003/04.

Table 4.4: Bulk Water Total Costs 2003/04 ($2001/02)

Valley/Area	Total Bulk Water Costs 2003/04			
	Regulated River	Unregulated River	Groundwater Area	Total
	$000	$000	$000	$000
Border	3,067	248	154	3,470
Gwydir	7,276	176	266	7,719
Namoi	7,635	788	1,123	9,546
Peel	1,993	29	314	2,337
Lachlan	8,452	590	657	9,699
Macquarie	8,327	760	794	9,881
Far West	0	2,066	1,533	3,599
Murray	20,178	348	893	21,418
Murrumbidgee	13,455	669	1,473	15,598
North Coast	795	4,314	525	5,635
Hunter	5,752	1,482	577	7,811
South Coast	674	6,200	835	7,709
Total	**77,604**	**17,673**	**9,144**	**104,421**

4.6.6 Cost Recovery Revenue

Minimum revenue requirements for bulk water service provision are based on full cost recovery of the water users' share of costs over the price path. Having regard to the stability of costs over the medium term, a single reference period for establishing cost recovery levels for each river valley and groundwater area has been utilised. To reflect longer term cost trends in bulk water costs, the most appropriate period is the final year of the price path, 2003/04. Cost recovery revenues for each service are derived from application of proposed user cost shares to the relative product costs. Table 4.5 shows full cost recovery revenue (excluding miscellaneous income) by service for 2003/04.

Table 4.5: Bulk Water Full Cost Recovery Revenue 2003/04 ($2001/02)

Valley/Area	Bulk Water Full Cost Recovery Revenue 2003/04			
	Regulated River	Unregulated River	Groundwater Area	Total
	$000	$000	$000	$000
Border	2,155	143	114	2,412
Gwydir	4,634	105	194	4,933
Namoi	4,965	423	803	6,191
Peel	1,349	20	227	1,596
Lachlan	5,593	297	484	6,374
Macquarie	5,925	439	560	6,924
Far West	-	1,239	1,149	2,389
Murray	14,365	194	677	15,236
Murrumbidgee	8,876	342	1,087	10,304
North Coast	582	2,276	352	3,210
Hunter	4,102	934	394	5,430

South Coast	537	2,889	595	4,022
Total	**53,083**	**9,300**	**6,637**	**69,020**

Table 4.6 shows total bulk water costs, full cost recovery revenue and cost recovery revenue based on the maximum prices proposed in this submission phased in progressively over the medium term from 2000/01, for all services over the eight years 1996/97 to 2003/04.

Table 4.6: Bulk Water Costs and Revenue (All Services) 2003/04 ($2001/02)

All Services	**Total Costs**(a) $000	**Full Cost Recovery Revenue**(b) $000	**Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
Barwon Region	23,072	15,131	13,201	1,930
Lachlan/Macquarie	19,580	13,298	12,319	979
Far West	3,599	2389	859	1,530
Murray	21,418	15236	14876	360
Murrumbidgee	15,598	10304	9622	682
North Coast	5,635	3210	730	2,480
Hunter	7,811	5430	2946	2,484
South Coast	7,709	4022	854	3,168
TOTAL	**104,421**	**69,020**	**55,408**	**13,612**

(a) Bulk water total costs are estimates.
(b) Revenue levels based on application of user cost shares proposed for the price path and exclude miscellaneous income; excludes Sydney Water and Hunter Water Corporations revenues.
(c) Revenue levels based on cost recovery levels adjusted for proposed prices; excludes Sydney Water and Hunter Water Corporations revenues.

5. PROPOSED BULK WATER PRICES

5.1 Introduction

Higher prices will be progressively phased in over the three-year period. Consequently, there will be an overall shortfall in cost recovery, particularly in some locations. This shortfall effectively absorbs the cost savings accruing under the ANTS package (refer Section 4.5).

This section covers the proposed prices for the medium term and reports on price structures. Bulk water prices need to rise substantially in order to recover the full costs of bulk water service provision. To minimise the impact on customers, DLWC proposes the maximum increase in prices will not exceed 20 per cent annually for any category of bulk water service in any regional location.

Proposed prices incorporate ANTS savings. Necessary structural changes are proposed for the medium term. Unregulated prices are proposed to be restructured to account for volumetric conversion of entitlement that has occurred and the implementation of metering and monitoring during the price term.

As bulk water costs are expressed in $2001/02, proposed tariffs will not require adjustment for the effects of inflation in the first year of the price path, 2001/02. Adjustments to tariffs for inflation in 2002/03 and 2003/04 will still be required. Price adjustments in those years should ideally be based on the annual movement in the CPI for the March quarter of the immediately preceding year, being the most recent period for which actual price data is available.

5.2 Regulated River Prices

5.4.1 Introduction

Regulated river costs, revenues and price structures have been managed for a considerably longer time than unregulated or groundwater. For regulated rivers, previous determinations have set the two-part tariff on a valley basis

5.4.2 High Security / Low Security Ratios

In the February 1998 submission DLWC sought an increase in the differential between high and low security but the changes were not adopted by IPART. More information was required before considering any changes to tariff differentials based on cost reflectivity.

Various methods can be used to determine appropriate high and low prices. One method of determining high security tariffs is on cost reflectivity. This encompasses identifying the additional costs attributable to high security customers. High security users benefit from greater use of operation services, particularly from the use of which they benefit is the infrastructure. Storage capacity is a measure of the cost relativity of high and low security given that dam and weir infrastructure costs are a primary cost driver in regulated bulk water services.

Another approach is price relativity to water access. Based on the current tariffs in some valleys, the long-term high security effective price of water is lower than that for low security users. This is because high security users have access to 100 per cent of entitlements in nearly all years. The remaining low security entitlement holders can only access a portion of their entitlements over the same period.

State Water customer service committees requested different approaches to the high and low security ratio issue. The coastal committee requested that it be noted in this submission as an issue and left for IPART to address, as the committee was contemplating making a submission covering

this issue. Peel irrigator representatives have sought an increase to the high security tariff that would provide a more equitable sharing of the fixed costs in the Peel. Other committees have not addressed the issue or requested that no change be proposed by this submission.

In the Peel and Coastal regulated rivers, revenue from charges is well below full cost recovery and this will still be the case over the price path. High security prices would need to rise at a much faster rate than 20 per cent for any equity to be derived from adjusting the ratios.[1] As this submission is based on capping price increases each year, no change to the IPART ratios is proposed.

5.4.3 Fixed and Variable Costs

The two-part tariff should align fixed and variable costs to the fixed and usage charge. However, a higher usage charge sends stronger water conservation signals and also benefits consumers in having greater control over their business costs. The effect on State Water is to place it at some financial risk because of the lack of revenue security in a business where nearly all costs are fixed. The mix of fixed and variable costs does not vary considerably from valley to valley. For a number of valleys the usage charge rather than the fixed charge alone is recovering fixed asset related costs.

Therefore competing principles exist in determining the right mix of fixed and variable components of the tariff. In July 1998 IPART set tariff structures based on a range of factors including the expectations of customers for each valley. Some minor adjustments occurred in 2000. This submission has not priced in the financial risk associated with the high level of usage charges compared to the level of fixed costs. A new set of fixed and variable prices could be proposed based on the fixed and variable costs. Such a proposal would see a significant shift away from usage charges to fixed charges. Given the competing principles and the need to account for customer interests, there is little value in making such a proposal. Therefore, the current IPART fixed and variable ratios are proposed for 2001-2004. The coastal State Water customer committee may make a submission to IPART concerning the ratios in the Hunter.

5.4.4 Wholesaler Discounts

In the last submission DLWC proposed that these discounts be discontinued. IPART disagreed and maintained the discounts tat the established levels. Prices in this submission are based on the maintenance of current wholesale discounts.

Based on DLWC regulated bulk water operation costs alone, wholesalers do not deserve such significant discounts to wholesalers on operational costs are difficult to justify. The water storage and other infrastructure costs alone do not warrant any discount to wholesalers. Other operation costs are impacted by the efficiency of wholesalers and also the level of service they may demand. If a wholesaler is inefficient in operations this requires greater operational management and imposes higher costs on Sate Water.

Wholesalers assist in providing information which helps State Water in managing operations of a valley. Wholesalers also participate in providing resource management information. Therefore, the maintenance of wholesaler discounts is based on the full cost recovery levels set out in this submission. Therefore no changes to wholesaler discounts is proposed at this time.

5.2.5 Transitional and Long Term Subsidies

Long term government subsidies have been declared by IPART for the Toonumbar, Brogo and Hunter valleys. To allow full cost recovery, based on current entitlements and usage, prices would need to rise by 700 per cent in the South Coast and 2000 per cent in the North Coast.

Over the medium term Government transitional subsidies are also proposed that enable price increases to be capped at 20 per cent per annum. This means that all valleys will be receiving a transitional Government subsidy during the price period and the Toonumbar, Brogo and Hunter will still be receiving an ongoing subsidy at the end of the medium term price period.

5.2.6 Prices 2000-2004

To allow customers time to adjust, it is proposed that prices increase by a maximum of 20 per cent per year or until full cost recovery prices are reached. The rise in the Murrumbidgee is an average 7 per cent annually and the Macquarie is 14.5 per cent per year. The table below contains the current and proposed regulated river prices.

Table 5.1 Actual and Proposed Regulated River Prices ($2001/02)

River Valley	2000/01 Prices			Proposed Prices 2001/02			Proposed Prices 2002/03			Proposed Prices 2003/04		
	Fixed Charge $/ML of entitlement		Usage Charge $/ML	Fixed Charge $/ML of entitlement		Usage Charge $/ML	Fixed Charge $/ML of entitlement		Usage Charge $/ML	Fixed Charge $/ML of entitlement		Usage Charge $/ML
	High Security	Low security		High Security	Low security		High Security	Low Security		High security	Low security	
Border	4.53	303	3.53	4.84	3.32	4.25	5.16	3.62	4.97	5.47	3.91	5.69
Gwydir	4.26	2.83	3.30	5.11	3.40	3.96	6.13	4.08	4.75	7.36	4.89	5.70
Namoi	7.53	5.02	6.01	9.04	6.02	7.21	10.84	7.23	8.65	13.01	8.67	10.39
Peel	7.53	5.02	6.01	9.04	6.02	7.21	10.84	7.23	8.65	13.01	8.67	10.39
Lachlan	5.20	3.46	3.97	6.24	4.15	4.76	7.49	4.98	5.72	8.99	5.98	6.02
Macquarie	4.37	3.36	4.54	5.02	3.86	5.15	5.67	4.36	5.75	6.32	4.86	6.36
Murray	4.18	3.79	1.02	5.02	4.55	1.22	6.02	5.46	1.47	7.09	6.45	1.69
Murrumbidgee	3.39	3.22	0.84	3.66	3.42	0.88	3.93	3.62	0.91	4.20	3.81	0.95
North Coast	6.85	5.27	3.51	8.22	6.32	4.21	9.86	7.59	5.05	11.84	9.11	6.07
Hunter	5.36	3.83	3.81	6.43	4.60	4.57	7.72	5.52	5.49	9.26	6.62	6.58
South Coast	6.85	5.27	3.51	8.22	6.32	4.21	9.86	7.59	5.05	11.84	9.11	6.07

5.3 Unregulated River Prices

5.4.1 A higher level of management

The management of water allocations from unregulated rivers in the past was based on land area rather than volume. In practice, the most commonly employed pricing policy for irrigation water is a flat rate charge with authorised irrigated area as the basis for the tariff. This method is relatively easy to implement and administer and does not require expensive water conveyance metering and monitoring facilities.

Due to the full development of unregulated river valleys in NSW, area based allocations have become increasingly ineffective in servicing the needs of water users and addressing declining river health issues. DLWC has implemented a volumetric conversion to achieve a better balance between competing water uses, ensuring improved environmental protection, increased investment confidence and providing a basis for the development of an effective water market.

Volumetric management requires information on the volume of water used by each user: that is, metering and monitoring is required. This is programmed to occur during the price term. The projected cost of managing unregulated rivers in a similar manner to regulated systems is higher than that allowed for in the area-based management system.

5.4.1 Volumetric Conversion

Licences that were previously based on area or pump capacity limits will now be based on volume, thus relating resource management activities to the amount of water used. The volumetric conversion process is occurring in two stages.

Stage one has been nearly completed and gives water users a volume of water that can be used annually. This amount is termed the annual volumetric entitlement. This entitlement was calculated by multiplying the authorised irrigation area by a crop conversion rate. For non-irrigation licences it will be based on water needs for the enterprise. The crop conversion rate, developed by the DLWC and NSW Agriculture, takes into account climatic conditions, irrigation practices and crop type. A water user survey to all unregulated licensees was used to ensure licences are allocated a fair entitlement based on their needs.

Stage two will define how much water can be taken daily from different flow events. With a large number of water users taking water from a particular river, there is a limit to how much water can be used without affecting river health or the amount of water available to other river users. Rules for determining the sharing of water are to be developed by River Management Committees.

5.4.1 Metering and Monitoring

DLWC is to implement metering and monitoring on unregulated rivers progressively over the next few years. DLWC reported in its 1998 submission on the cost of implementing metering and monitoring and on the costs of ongoing metering and monitoring. Section 4 of this submission provides information on the ongoing costs forming part of full cost recovery levels for each valley.

In some circumstances, unregulated users will be required to install meters. This will need to occur at the expense of the individual user. It is proposed to set standards for meter installation rather than DLWC installing meters. Should a mechanism be made available that offered users a service for meter installation or funding of installation, recovery of such costs will occur on an individual cost recovery basis separate from the unregulated tariffs proposed in this section. Acceptance of such a facility by a user is regarded as a voluntary charge.

5.4.1 Pricing 2001-2004

The current price fails to recover the chargeable user share of costs. This submission does not propose cost recovery by the end of the 3-year term. Price increases are limited to 20 per cent per year. Unregulated prices are much lower than regulated river prices. Many unregulated uses will need to install meters and the impact of this has been taken into account in limiting proposed price increases.

A structural change to unregulated prices is a significant aspect of this submission. Unregulated river prices are based on irrigation area for nearly all users. Volumetric conversion of irrigation licences is nearly complete and this submission proposes that the entitlement charge be converted from an area price to volumetric entitlement price. The conversion of area prices to volumetric prices is based on the average conversion rate for each valley.

The prices proposed for 2001-2004 for unregulated river users with a volumetric entitlement but that are not metered or monitored are shown in the table 5.2.

Table 5.2 Unregulated River Entitlement Prices ($2001/02)

Proposed Unregulated River Volumetric Tariffs Entitlement Charges – no metering and monitoring (a)			
River Valley	**Entitlement Charge ($/ML)**		
	2001/02	**2002/03**	**2003/04**
Border	2.23	2.68	3.21
Gwydir	2.17	2.60	2.99
Namoi/Peel	2.23	2.68	3.21
Lachlan	1.79	2.15	2.58
Macquarie	2.60	3.13	3.75
Far West	1.32	1.58	1.90
Murray	1.80	2.16	2.59
Murrumbidgee	3.15	3.77	4.53
North Coast	2.59	3.11	3.73
Hunter	1.71	2.05	2.46
South Coast	1.97	2.37	2.84

(a) Prices based on maintaining the current $50 minimum bill.

It is also proposed that as metering and monitoring is progressively implemented, each volumetric entitlement price be replaced with a two-part tariff. This would occur only when metering and monitoring is fully implemented in each valley. It would be inappropriate not to incorporate a usage charge into prices for customers with a volumetric entitlement who have metering and monitoring implemented. The two-part tariff for each valley would be a combination of a discounted entitlement charge and the valley usage charge.

Table 5.3 Unregulated Two-part tariff in valleys with metering and monitoring ($2001/02)

Unregulated River Two Part Tariff Entitlement Price per Megalitre plus a Usage Price per Megalitre (a)						
River Valley	**Entitlement Charge ($/ML) 2001/02**	**Usage Charge ($/ML) 2001/02**	**Entitlement Charge ($/ML) 2002/03**	**Usage Charge ($/ML) 2002/03**	**Entitlement Charge ($/ML) 2003/04**	**Usage Charge ($/ML) 2003/04**
Border	1.23	1.00	1.47	1.20	1.77	1.43
Gwydir	1.17	1.00	1.41	1.20	1.56	1.43
Namoi /Peel	1.23	1.00	1.47	1.20	1.77	1.43
Lachlan	0.70	1.09	0.84	1.31	1.01	1.57
Macquarie	1.51	1.09	1.82	1.31	2.18	1.57
Far West	0.22	1.09	0.27	1.31	0.32	1.57
Murray	1.23	0.56	1.48	0.68	1.78	0.81
Murrumbidgee	2.05	1.09	2.46	1.31	2.96	1.57
North Coast	1.50	1.09	1.80	1.31	2.16	1.57
Hunter	0.75	0.95	0.90	1.14	1.08	1.37
South Coast	0.87	1.09	1.04	1.31	1.25	1.57

(a) Prices based on maintaining the current $50 minimum bill.

For town and industrial where usage information is collected but are yet to have a defined volumetric entitlement it is proposed to continue the established price structure of a $100 based charge and a volumetric charge. As entitlements are introduced, prices will be based on the two-part tariff and replacement of the $100 base charge with a minimum bill of $50.

5.4.1 Pricing for Metropolitan Water Utilities

The nominal charges from Metropolitan water utilities have not changed since 1995 and this represents a real price decline of 15 per cent. Over the same period there has been a need to implement increases in charges to bulk water rural customers to move towards full cost recovery. Revenue from unregulated services is well below full cost recovery. The bulk water management prices levied on metropolitan water utilities meets part of this under recovery[2].

The Sydney catchment is projecting the need to increase water extractions dramatically in 5-10 years from now. The Sydney Catchment Authority is responsible for limiting increases in demand. The DLWC water management charge is necessary to undertake resource management activities because of the large extraction from the catchment. The extent of resource management activities is limited because of the level of resources. An increase in water extraction will result in a greater level of resource management.

The water management price set by IPART for metropolitan utilities has not been linked to CPI changes. For the medium term it is proposed that the metropolitan water charge be raised from $1.80 /ML to $2.15 /ML to redress the decline in real annual revenue since 1995 and that the new base revenue be increased at 20 per cent per year in line with other unregulated users. It is proposed that the annual charge be linked to changes in CPI.

It is also proposed to levy an additional $1.49 million per year for the next three years on the Sydney Catchment Authority to fund a joint Aquatic Weeds task force. There is an urgent need for funding to reduce the threat posed by aquatic weed infestations in the Hawkesbury-Nepean, particularly alligator weed. This will be achieved through a comprehensive, integrated strategy developed by the Hawkesbury-Nepean Aquatic Weeds task force. The task force reports that the potential socioeconomic impact of alligator weed is alarming. Alligator weed has spread along 72km of the Hawkesbury-Nepean river system below Warragamba Dam. It threatens agriculture, mining, fisheries and tourism.

5.4 Groundwater Prices

5.4.1 Pricing 2001 -2004

The current prices fail to achieve full cost recovery of ongoing costs. There is now greater emphasis on sustainable management of ground water resources as outlined in section 3 of this submission. This emphasis will need to continue into the future. Management costs for areas that have serious sustainability problems require much higher levels of information collection and analysis, monitoring and management. For example, prices have been capped for areas in the Barwon region at 1997/98 levels. However, the Namoi has serious sustainability problems and the annual costs incurred for Namoi groundwater is five times higher than in 1997/98. Current prices do not recovery costs and play no role in assisting in the sustainability of the resource. If entitlements are reduced this will impact on the level of recovery from prices. The prices proposed do not account for any reductions to entitlement in any groundwater area.

[2] IPART 1998 determination for bulk water prices page 36

Other developments are being progressed by DLWC, including the further implementation of metering and monitoring for groundwater in managed areas. In some areas, bore owners have not installed meters, despite a licence condition requiring this to be done. At present, these licensees do not incur a usage charge, although they are in a managed area requiring metering. It is proposed these licensees pay a usage charge on the basis of assessed usage.

In the Great Artesian Basin, there are still many unrestricted artesian bore flows. Approximately 90 per cent of this water is lost to evaporation. Over the next 15 years, the 'cap and pipe' program will reduce losses and improve pressure in the aquifer. The program is voluntary with to date, very little participation in the Far West region. In addition, graziers in this group are exempt from groundwater charges. It is proposed that groundwater charges be phased in for all licensees who choose not to enter into the cap and pipe program. The phase in period is to be agreed with the GAB advisory committee.

For 2000/01 to 2003/04 it is proposed to maintain the current structure of prices. It is also proposed the based charge of $75 per property be maintained at the existing level. It is proposed to increase the base charge for managed areas by the maximum 20 per cent per year for 2001-2004. It is proposed to increase the entitlement charge and usage charge by the maximum 20 per cent per year towards full costs recovery.

Table 5.4 Groundwater Prices ($2001/02)

Groundwater Two Part Tariff **Entitlement Price per Megalitre plus a Usage Price per Megalitre** (a)						
River Valley	**Entitlement Charge ($/ML) 2001/02**	**Usage Charge ($/ML) 2001/02**	**Entitlement Charge ($/ML) 2002/03**	**Usage Charge ($/ML) 2002/03**	**Entitlement Charge ($/ML) 2003/04**	**Usage Charge ($/ML) 2003/04**
Border	0.50	0.25	0.60	0.30	0.73	0.36
Gwydir	0.50	0.25	0.60	0.30	0.73	0.36
Namoi /Peel	0.50	0.25	0.60	0.30	0.73	0.36
Lachlan	0.80	0.41	0.96	0.49	1.16	0.59
Macquarie	0.80	0.41	0.96	0.49	1.16	0.59
Far West	0.88	0.44	1.05	0.53	1.26	0.64
Murray	0.79	0.40	0.95	0.48	1.14	0.57
Murrumbidgee	0.49	0.24	0.59	0.29	0.71	0.35
North Coast	0.88	0.44	1.05	0.53	1.26	0.64
Hunter	0.88	0.44	1.05	0.53	1.26	0.64
South Coast	0.88	0.44	1.05	0.53	1.26	0.64

6: Impact Assessment

The Department has prepared impact assessment in the form of a gross margin (GM) impact study of major irrigated crops in different regions. The Department also commissioned the Economic Services Unit at NSW Agriculture to prepare a detailed impact assessment on a representative farm basis in the Peel and Lachlan Valleys, the results of which are now available. The results of these farm level impact assessments are consistent with the results of this assessment on enterprise GM.

The GM impact assessment is restricted to analyses of the regulated system. It is expected that the impacts for unregulated and groundwater systems would not be any greater than those for regulated system, as usage charges are even smaller in relation total variable costs in those systems.

6.1 Gross Margin Impacts

The following is a study that provides an assessment of impacts based on the estimated changes in tariffs at the GM level. The study only looks at the contribution of bulk water charges to changes in GM, other costs and revenues are assumed to remain constant at 1999/2000 levels. The gross margins were sourced from the NSW Agriculture Farm Enterprise Budgets (various issues) and the Bega Dairy Farm Benchmarking Report 1996/97.

A GM is the gross income from an enterprise less the variable costs in achieving it. Variable costs are defined as costs directly attributable to an enterprise that vary in proportion to the volume of output. The variable costs do not include fixed or overhead costs such as depreciation, interest payments, rates or permanent labour that have to be met regardless of the volume of output. Therefore, the impacts of the proposed increases in entitlement charges for high and low security bulk water are not included in this analysis, as irrespective of the level of crop production, the irrigators have to pay the entitlement charges based on the entitlement volume.

Gross margin budgets are intended as a guide to the relative profitability of different cropping enterprises. The budgets are calculated using crop yields for the region that are consistent with the operations given, forecast product prices, current costs of production, and technical information supplied by District Agronomists.

Factors such as commodity prices, seasonal conditions, and individual farm characteristics such as soil type, crop rotation and management will influence the degree to which the budgets reflect actual crop returns.

6.1.2 Results

Tables in Appendix 7 present the detailed results of this analysis and these results are summarised in terms of ranges in water charges as a percentageof total variable costs (TVC) in Table 6.1. The impact of water price increases on GM depends on the proportion of water charges that constitutes enterprise TVC. For the proposed price path (20% annual increase in usage charge in most cases) during the 2000/01 – 2003/2004 period, water usage charges would constitute up to 15% of TVC. The resulting impact on GM is only very marginal (the largest annual decline in GM is under 2% in the case of wheat and sunflowers in the Macquarie, Lachlan, Namoi/Peel regions). It is interesting to note that soybeans account for the highest percentage of water charge in TVC in most of the regions, while the most affected crop in most of the region is sunflower (though only marginally). The most affected enterprise in a region is the enterprise with either the lowest or the second lowest GM.

Table 6.1 Ranges in Water Charge as % of TVC and GM Decline per Annum due to Increased Water Charge, 2000/01 – 2003/04

Region	**Range in Water Charge as % of TVC**	**Enterprise with Highest % of Water Charge**	**Range in GM Decline per Annum**	**Most Affected Enterprise**
Murray	0.80% - 3.16%	Millet	0.16% - 1.22%	Millet
Murrumbidgee	0.58% - 1.46%	Soybeans	0.02% - 0.12%	Sorghum
Lachlan	4.52% - 14.12	Soybeans	0.19% - 1.57%	Sunflowers
Macquarie	5.25% - 7.82%	Wheat	0.92% - 1.38%	Wheat
Namoi	1.43% - 15.25%	Soybeans	0.24% - 1.73%	Sunflowers
Peel	1.43% - 15.25%	Soybeans	0.24% - 1.73%	Sunflowers
Gwydir	0.78% - 8.53%	Soybeans	0.03% - 0.95%	Sunflowers
Border Rivers	0.84 % - 8.53%	Soybeans	0.03% - 0.72%	Sunflowers
Hunter	0.16% – 2.05%	Potatoes (Spring/Summer)	0.02% – 0.86	Potatoes (Autumn/Winter)
South Coast	0.75% - 1.29%	Dairy	0.16% - 0.26%	Dairy

The results indicate that for the Murrumbidgee Region the proposed cost recovery charges would result in the least decline in GM. On the other hand, Namoi/Peel would be the most affected regions, follow by the Lachlan and the Macquarie regions. In these regions water charges constitute relatively higher proportions of TVC (in the range of 6 per cent to 15 per cent in the case of most enterprises). Thus the analysis shows that the magnitude of water usage charge increases are only likely to have some impact on GM when water charges are a relatively high proportion of TVC. Possible responses could include a change in the enterprise mix to enterprises that had a lower proportion of water costs to TVC. Where the proposed price increases result in only a very marginal decline in GM this may not be sufficient to change management practices and the decline would be borne by the farming business.

The gross margin for dairying in the South Coast has been developed from the Bega Dairy Farm Benchmarking Report of 1996/97, therefore the analysis is representative of that area only. Due to data and resource constraints no attempt has been made to analyse price impacts in other areas in the South Coast. Over the determination period water charges represent around 1 per cent of TVC in the case of dairying. The proposed increase in water charges would translate only to a marginal decline of dairy GM in the Bega valley.

The results indicate that total water costs would continue to account for only a small proportion of variable costs and the irrigated enterprises in most regions and the viability of farming systems would not be jeopardised by the proposed price increases.

6.2 Impacts on farm enterprise

DLWC commissioned two studies to be conducted, one each in the Peel and Lachlan valleys, on the impact of proposed price increases. Department of Agriculture have produce reports on the impacts. The studies used representative farm models of irrigation agriculture in those valleys to assess the importance of the bulk water to farm costs and the implications of proposed increases estimated by DLWC in late 1999. Both studies conclude that farms are capable of absorbing the impacts of the full cost recovery prices but the change will add to the difficulties of some farms and add to the picture of declining terms of trade. Both reports demonstrate that time is needed for irrigators to adjust to the price changes. DLWC believes that the proposed cap of 20% per annum meets this requirement.

A copy of the Department of Agriculture reports will be provided separately.

APPENDIX 1

Reporting on IPART Information Requirements

Appendix 5 of IPART's September 2000 Determination on Bulk Water Prices detailed the information required from DLWC for a medium term price path. These requirements are listed below, with DLWC's response shown in italics.

General Information

- Description of the scope of activities for State Water and each DLWC water related program.

  Refer Section 2 of the submission.

- Description of how ringfencing of costs and activities works within DLWC.

  Ringfencing of State Water's business within DLWC is achieved through the following methods. Resource management costs are extracted manually from DLWC's financial system and added to the ringfenced State Water costs to produce the valley financial information. State Water's organisational structure includes all staff involved in bulk water delivery, including:

  - *water infrastructure operations, maintenance, renewals and development,*
  - *water operations,*
  - *safety and audit,*
  - *metering and customer service,*
  - *operational systems management,*
  - *financial management, billing and receivables management, and*
  - *management, administration and business planning.*

  Where costs are shared with resource management or regulatory activities of DLWC, the service is charged to State Water via a Service Agreement as detailed under the 'Actual Costs' heading of the Transfer Pricing section below. State Water's organisational structure comprises four Customer Service Areas (North, Central, South, Coast), an Asset Services Branch and a Head Office providing general and commercial management, and water operations services. DLWC's payroll system costs employees to their work location so individual cost elements can be aggregated for common functions. Non valley specific personnel are costed to their Area, Asset Services or Head Office prior to costing to jobs (ie charging out time worked to each job at the hourly rates). The majority of jobs are valley specific so most work is costed direct to valleys. A small amount of non valley specific costs are allocated to valleys.

  State Water is a separate financial entity in DLWC's financial information system (FIS) with its own general ledger for balance sheet and income and expenditure reporting. State Water employs two professional accountants to manage the Financial Information System, (FIS), for the appropriate functions. Valley accounting is achieved through the costing system with income and expenditure for each valley or groundwater area aligned to Profit Centres. State Water revenue or funding allocations is deposited into the DLWC consolidated revenue bank account and State Water's intercompany loan account is credited accordingly. Daily cash flow for State Water is achieved through intercompany funding transactions. Costs shown in the State Water accounts currently reflect:

- *The cost of water infrastructure and water delivery activities undertaken by the State Water business, and*
- *Service agreements exchanged with Regions or other Divisions of DLWC.*

Two cost components accounted for separately from the State Water accounts are:

- *DLWC water resource management costs, and*
- *MDBC and DBBRC transactions for the purchase of water delivery services.*

DLWC's FIS identifies water resource management activity costs for bulk water products and these costs are reported on accordingly. A resource management overhead allocation is added to produce total resource management costs. Payments to MDBC (for RMW services) and payments to DBBRC are identified and allocated to water products according to expenditure profiles provided by these entities. This allows RMW and DBBRC water delivery activities to be correctly costed to products for valley reporting. Resource management and RMW/DBBRC costs are then added to State Water costs to produce valley reports.

The valley reports, which provide a full costing of water, are prepared externally to the financial system. The costing system provides full costing for all program activities in State Water. DLWC overheads are charged to State Water via Service Agreements and are included in State Water's administrative overheads used by the costing system.

The costing system allows costs to be recorded and reported by profit centre which is defined within the valley (or groundwater area) and water source. Discrete activities and water infrastructure depreciation which are not included in the water price are costed to profit centres termed 'other services' for each valley. This allows appropriate water costs to be reported against revenue for each valley clearly separated from non water activity expenditure. Costs of any shared program activity (ie not directly attributable to a valley) in Head Office, Asset Services or Customer Service Area management is apportioned according to a defined protocol. These protocols for cost apportionment across valleys use asset values, water volume delivered, or number of effective full time employees as appropriate.

- Current organisational chart.

  The State Water organisation charts have been provided separately to IPART

- Description of how services are charged between related business units, ie transfer prices to and from State Water, where relevant.

  Transfer pricing between DLWC and State Water occurs in the three categories described below.

  (1) Direct Charge of Consolidated External Purchases. State Water utilises DLWC's centralised purchasing to optimise price and purchasing and payment process efficiency. Whole of agency invoices are received for telecommunications, insurance, airline, fleet and other services. State Water charges can be directly identified from supplier invoices for many of these services eg telephone numbers can identify State Water telecommunication services and the identifiable charges are charged directly to State Water. Cost allocations of purchased services are made on an agreed basis eg a single invoice for vehicle insurance premium is split according to the number and class of vehicles owned or operated by State Water; workers compensation insurance is split according to the number and type of persons employed by State Water with adjustments for the claims history for the business. Administration cost of central purchasing services is covered under the Fixed Fee Charges, described below.

(2) Actual job costs. Where State Water purchases discrete services from other divisions in DLWC the process for determining the charge is as follows:

- *determine the required output specification,*
- *negotiate service agreement for services to be provided within output specification,*
- *DLWC Division supplying the service charges costs incurred to specific jobs for the service agreement,*
- *State Water monitors outputs supplied against Service Agreement and the cost of those services.*
- *the supplying division and State Water review the service delivered and cost against budget, and*
- *the cost is charged to State Water on a periodic basis.*

Examples of this kind of transfer pricing are river gauging, surveillance surveys and hydrological investigations.

(3) Fixed Fee Charges. Where a DLWC division supplies a service that is not readily separable, the resource use and outputs required are analysed to determine the State Water cost share. The required service is specified and a fixed service fee is agreed. The fee is then charged to State Water on a periodic basis.

Examples of this method of transfer pricing are:

- shared facilities and office services
- corporate financial services
-
- human resource management and payroll processing services
- information technology services
- media relations
- internal and corporate communications
- internal audit.
- water quality

- DLWC's Corporate Plan and any documentation explaining its resource management role.

  This information has been provided separately to IPART.

- Description of asset valuation methodology used for financial reporting and regulatory purposes, where different.

In line with Treasury guidelines, State Water is currently undertaking five yearly asset valuations effective from 1 July 2001. This follows the 1996 methodology which valued assets on Modern Engineering Equivalent Replacement Asset (MEERA) valuation. MEERA valuations are based on current methods of the most appropriate asset construction and costs. This approach can lead to the valuation being less than the original construction cost of a current asset. For example, an Earth Core Rockfill dam may now be valued on the construction costs of a concrete faced Rockfill dam, which is cheaper to construct. The updated MEERA valuation will be derived from the sum of the following:

A base MEERA value for the specific site, less the net value of features included the base MEERA value but not in the current asset, plus the Net value of site specific features not in the

MEERA valuation included in the current asset. This is an attempt to cost on the optimised replacement asset value.

The valuation process currently in progress for the eighteen major storages and the weirs, regulators and associated structures through the state under State Water's control. Asset lives are being reassessed at a component level to ensure correct depreciation levels are calculated.

MEERA values will be brought to account at gross depreciated value, that is, gross MEERA value and accumulated depreciation to reflect expired useful life at time of revaluation.

The asset valuation process currently under way will be complete by 30 June 2001. The MEERA asset values in the Financial Asset Register were determined five years ago and will be replaced by the reassessed values determined through the valuation process being undertaken at present.

The asset values in the Financial Asset Register are used for both financial and regulatory purposes.

- A description of cost allocation methodology.

  Refer Section 4 of the submission

- A review of progress in implementing the NSW Government's water reform agenda and its implications for operating and capital costs of water related activities.

  Refer Section 1 of the submission

- A review of implications of NCC review of NSW compliance with COAG water reforms.

  Refer Section 1 of the submission

Separation of State Water

- Copies of State Water's Operating Authority, Water Access Authority and Statement of Corporate Intent.

  This information has been provided separately to IPART.

- Clear accounting of the resource management activities covered in the bill sent by the resource manager to State Water.

  Refer Appendix 2 of the submission.

- Clear separation in the operating licence of State Water's function from the resource management function.

  Refer to the Operating Authority.

- Description of Service Agreements between DLWC and State Water.

  Service Agreements between DLWC and State Water fall into two categories:

  1. Program activities

2. Corporate support and shared facilities and services.

Service Agreements for program activities are entered into on a valley or site specific basis. These activities are charged direct to a valley job attached to the appropriate Profit Centre. Examples of direct program activities charged in this way are river gauging, surveillance surveys and software application development. Corporate support and shared services include activities such as centralised fleet purchasing and management, human resource management and payroll services, and legal services. These costs are charged to overhead cost centres, and spread as part of the standard overhead cost rates charged on salary and wage cost time-written to jobs for program activities.

- Review of degree to which Service Agreements are contestable.

Service Agreements are used to obtain or provide services which are transferred internally within DLWC. They are used for the provision of such items as Corporate Services, (Finance, Human Resources, Information Management and Technology), river gauging, Water Quality Testing etc.

As State Water is a commercial business within DLWC, it relies on these service to comply with departmental protocols, and policies. Consequently, none of the services provided under service agreements can be substituted by those of commercial service provider. The costs and the service delivery specification are negotiated bt State Water managers who have to cost these services into their budget. The manger's performance is subsequently assessed, in part on compliance with budgets and service delivery to customers.

Customer Service

Detailed information is contained in Section 2.

- Description of recent improvements in customer service.

At Customer Service Committee level:

On two occasions in 2000 the Deputy-Director General of DLWC met with Customer Service Committee Chairs to discuss issues concerning them. The second of these meetings was a two-day CSC Chairs Workshop in Sydney. The Director-General was also involved in this workshop.

Procedures were established in 2000 for reporting to Customer Service Committees. These procedures ensure committee members have input into the development of the CSC agenda which is circulated in draft a month before the meeting. Written reports are provided to CSCs two weeks before their meetings and minutes are circulated within two weeks of all meetings. A one-page summary of the minutes is also provided to make the communication between CSC members and their nominating organisations an easier. Management and/or accounting staff have been attending the CSC meetings since mid 2000 to provide advice and feedback.

The CSC Communication Strategy was reviewed in late 2000, with input from all CSCs at the end of 2000 or the first meetings of 2001.

A TAMP information sheet was produced to help CSC members and their nominating organisations understand the concepts of asset management planning, as it relates to State

Water. Each CSC has either formed TAMP sub-committees or held workshops to review structures on a valley basis.

For Customers in General:

In early 2001 State Water will introduce BPay by phone and Internet. This was in response to suggestions raised in the 1998 and 1999 customer surveys and through CSCs. Bpay will provide increased opportunities for the payment of accounts. In the past the only payment options were by mail, using cheque or money order. As well as these options, customers can now pay by phone or the Internet, using their cheque, savings or credit card accounts. Feedback has been sought from the CSCs on other payment options that may be worth consideration by State Water.

State Water continues to provide responses to letters written by customers. The Customer Service Managers at each of State Water's four area offices also respond to phone and personal enquiries on a regular basis. In 2000 a Program Support Officer was appointed in each of those offices. As well as providing support to the Customer Service Manager, those staff provide administrative support to the CSCs.

With the establishment of Head Office in Dubbo, there is now one central inquiry number for any range of requests or queries. When inquiring about their accounts, customers can phone State Water on its freecall 1800 phone number or send an email to swace@dlwc.nsw.gov.au. In the first half of 1999-2000 alone, State Water's billing staff responded to an estimated 2,300 customer inquiries using these services.

An Internet Project Team has also been established, with a target of April 2001 for the launch of the first stage of a State Water presence on the World Wide Web. While this presence will provide a range of information on State Water's operations, it will also provide links to the water information site and other useful information, as well as a feedback page where customers can make comments or suggestions on any aspect of State Water's operations.

State Water has employed Customer Service Officers, (CSOs), who are the frontline staff. They respond to customers requests for water, transfers and information. They also carry out State Water's responsibility for monitoring and metering use, maintaining water use data bases, ensuring meter compliance assist in accurate and timely billing and debt management. These a staff endeavour to make sure all customers are on a level playing field by not allowing any customer to gain an advantage through penalising another customer.

Thirty CSOs are employed across NSW servicing 21,000 customers with pumps and other works. These staff provide a consistent personal point of contact for the customers.

The water ordering process has been partly automated through the use of an Interactive Voice Unit (IVR) and the Internet. Lead times have been reduced by 50% through the use of technology and process improvement of processes.

State Water is also in the process of developing a presence on the World Wide Web. This should be achieved by mid-2001. One element of that presence will be a section allowing customers to provide feedback, make comments and suggestions for improvements to service by return e-mail.

Further details of the customer service improvements are given in the Functions and Levels of Service which has been supplied separately to IPART.

- Copy of a Customer Service Charter negotiated with a customer service committee

  State Water's Customer Service Charter is in developmental stages. The State Water Staff Consultative Committee considered the second draft in February 2001. After comments from the staff are incorporated, a report will be presented to all eight Customer Service Committees for their comments and input in mid-2001.

  In developing its charter, State Water has considered similar documents prepared by Sydney Water, Hunter Water and the Goulburn-Murray Rural Water Authority, as well as the Murrumbidgee and Coleambally irrigation schemes. The draft charter is based on State Water's five key result areas and looks at the legal, financial and voluntary standards State Water should be meeting in its operations.

  The charter has also been developed with a view that the organisation and its customers have mutual obligations. It is not only State Water that has conditions to meet – customers must also meet obligations such as the conditions of their licence, payment terms on accounts, etc. Members of State Water Customer Service Committees are also obliged to meet the terms of reference for their committees, including the expectation that they will keep their nominating organisation(s) informed of State Water issues and seek their feedback wherever appropriate.

  A copy of the Customer Service Charter will be provided separately to IPART

- Review of the billing system and any steps taken to improve it.

  The billing section has been centralised in Dubbo, (previously it was distributed and carried out in the separate regions), to increase productivity and accountability. The software has been updated to allow better control of the process.

  An 1800 number and an email address have been introduced for low cost, quick direct contact with the State Water billing section. Both these services are heavily used.

  Additional payment options have been introduced through BPay for water accounts. Customers will be able to pay accounts by telephone or using the Internet at times convenient to them.

  A credit policy is being developed to cover the terms of payment and the processes to be followed for water users that do not pay accounts in a timely manner.

  A review of the billing system was carried out by State Water management and the billing staff following the end of the1999/00 water year billing. A number of procedural problems were identified and these have been referred to specific people for rectification.

  In November 2000 the billing process was audited in accordance with the DLWC 1999/00 Audit Plan. The audit was commissioned by the NSW Auditor General.

  The audit objectives were:
  - *"Assess whether the internal control; surrounding the accounting and administration were operating effectively.*
  - *Determine, where applicable, whether the accounting transactions, management and administrative data were processed in accordance with the established departmental policies."*

A number of procedural aspects were identified for auditor's comment, none of which were of great significance. State Water's Commercial Accountant has implemented a process to manage these issues.

The overall evaluation stated, "The internal controls and management practices surrounding the water billing process are in the main operating effectively and efficiently."

An operational billing debt management and billing protocol has been established.

- Copy of State Water's complaints protocol (and any similar documentation for DLWC).

DLWC's Customer Complaint Handling System procedures will be supplied separately to IPART. The department is also developing a customer inquiry system that would link a number of databases to that in one call customers can access a range of information.

State Water has a form for logging complaints to the billing unit in Dubbo. The form used to register those complaints is attached. It categorises complaints by valley and customer source, as well as the nature of the complaint. Localised complaints are handled at local offices or directed there by the billing unit.

State Water's complaints procedure is currently under review. The intention is to register complaints electronically. However, it is important that the system be an efficient tool for staff to use as most complaints are made during their busiest time of processing accounts.

- Copy of current customer satisfaction surveys.

A Customer Satisfaction survey was conducted in 1999. A copy of this survey will be provided to IPART separately. The next survey is proposed to be conducted in October 2001.

- Description of processes for consultation with user groups and other stakeholders on regional/valley accounting, and negotiation of service levels, where appropriate.

State Water consults with its user groups via the eight valley based Customer Service Committees, which were established in 1999. Those committees meet quarterly and are regularly presented with an aged debtors analysis, as well as annual financial reports. With a review of the financial accounting procedures underway , it is envisaged that financial reports will be presented to CSCs on a more regular basis.

In the last quarter of 2000, the Commercial Accountant or Manager Commercial Services has attended each CSC meeting to seek feedback on the type and format of financial information CSCs would like to receive. Those suggestions are being considered as part of the review.

Service levels are negotiated with CSCs in the development of the annual operating plan and the TAMP review process. Each Area Senior Asset Engineer is based in the local area and are readily available to customers. They have a prime role in educating and informing customers about the TAMP.

Planning forums have been held in the South Area involving all stakeholders to consider the future of a number of structures in the Murray and Murrumbidgee valleys. This process will be adopted around the state to involve a range of stakeholders and customers and will be an introduction to the process of reviewing structures and service levels.

Each of the CSCs have received a copy of the TAMP and discussion about the role of the document during 2000. Some CSCs have received more detailed presentations by the Senior Asset Engineers.

Financial Information & Financial Systems

General

Note: *The State Water accounts are included in the annual DLWC audit but are not separately audited.*

- Financial statements for State Water including:

  - profit and loss account - audited previous year, current and 3 year forecast

  Refer Section 4 in the submission.

  - balance sheet - audited previous year, current and 3 year forecast

  This information has been provided separately to IPART.

  - cash flow - audited previous year, current and 5 year forecast

  This information has been provided separately to IPART.

  - capital expenditure forecasts - 30 years

  Refer Section 4 in submission

  - debt and interest profiles - plus 10 year forecasts

  This information has been provided separately to IPART.

- Explanation of any material differences between revised costs and the cost provided to the Tribunal for the 1998/99 determination.

  Refer Section 4 in submission

Capital Costs

- Copy of current Total Asset Management Plan

  Refer Section 4 of the submission.

- Description of how future capital works are affected by dam risk assessments and current potential environmental flow rules.

  Refer Section 4 of the submission.

- Description of asset value for the current review, tracing additions to initial capital base since the last review.

  Refer Section 4 of the submission.

- The requested rate of return and calculations which support this request.

  Refer Section 4 of the submission.

- Depreciation expense by major asset class for those capital items excluded from the asset annuity, indicating the method of depreciation, average asset life, and a comparison of depreciation expense for tax or tax equivalent purposes.

  Refer Section 4 of the submission.

Operating Costs

- Audited special purpose valley financial statements for years 1999/00 and 2000/01

  Refer Appendix 2 of the submission.

- Staff numbers by valley/region by year.

  This information has been provided separately to IPART.

- Wages and salaries by valley/region by year.

  This information has been provided separately to IPART.

- Total overhead costs prepared on an accrual basis

  This information has been provided separately to IPART.

- Assigned corporate overheads, indicating the total amount of the corporate overhead, the amount assigned to each valley/region, and the basis and calculation of that allocation.

  This information has been provided separately to IPART.

- Separation identification of costs charged by the Murray Darling Basin Commission (MDBC) and any associated MDBC water business, and description of associated works.

  Refer Appendix 5 of the submission.

- Description and measurement of efficiency improvements since the last review, and targets for the proposed price path period.

  Refer Section 2 for of the submission.

The efficiency improvements and the targets for the term of the submission will be provided to IPART separately.

- Results of any internal benchmarking between regions/valleys and externally with other utilities.

  Refer Section 2 of the submission.

Performance Measures and Operating Statistics

Information for performance measures and operating statistics is contained in Sections 2 and 3 or will be provided to IPART separately.

Proposed Prices and Tariff Reform

- Requested revenue as developed from these inputs.

  Refer Section 4 of the submission.

- Proposed prices, describing the current prices, and proposed changes over the requested price path.

  Refer Section 4 of the submission.

- Revenue analysis, indicating the amounts of revenue derived from each valley/region by year, by water source.

  Refer Section 4 of the submission.

- Description of the method used to derive proposed prices and major drivers in the application of that method.

  Refer Section 5 of the submission.

- Pricing models, updated for changes to licence system and water usage data.

  Refer Section 5 of the submission.

- Description of actions taken to rationalise existing tariffs and licensing system to overcome charging anomalies (eg Macquarie Generation, industrial water use, town water supply, recreational, high flow).

  These matters were reported on in the April 2000 submission or are discussed in section 5.

- Description and review of the method used to determine premiums for high security water use.

  Refer Section 5 in the submission.

- Review of the existing proportions of fixed and usage charges.

  Refer Section 5 in the submission.

- Review of the cost-reflectivity of high security premiums.

  Refer Section 5 in the submission.

- Review of the existing discounts on wholesale access fees and the commercial viability of charging arrangements with these wholesale customers, including legislative obstacles to charging for system losses.

  Refer Section 5 in the submission.

- Comparison of existing and proposed prices with bulk water prices in Queensland, Victoria and any other relevant jurisdictions

  Information on this to be provided to IPART separately.

Impact Analysis

- Description of the impact of proposed prices on typical bills for water user by water source.

  Refer Section 6 in the submission.

- Assessment of the financial impact of proposed prices on typical water users by region/valley.

  Refer Section 6 in the submission.

- Assessment of the socio-economic impact of proposed prices by region/valley.

  Refer Section 6 in the submission.

Licence Fees and Other Miscellaneous Charges

- A schedule of licence fees and identification of any changes over the past three years

  This information has been provided separately to IPART.

- Review of licensing administration processes and efficiency levels.

  This information does not form part of this submission. A submission concerning future licence fees will be produced at a later date.

- Description of any changes proposed to licensing administration and fees and the time frame for this.

  No changes are proposed in this submission.

- A schedule listing other miscellaneous charges levied by the DLWC or State Water.

  This information has been provided separately to IPART.

- Revenues raised from each of those miscellaneous charges, by year.

  This information has been provided separately to IPART.

- Separate identification of resource management actions and costs attributed to metropolitan water authorities and any other "large" customers.

  Refer to section 5.

APPENDIX 2

VALLEY AND GROUNDWATER PROFILE

1. BULK WATER RIVER VALLEYS AND GROUNDWATER AREAS

Valley/Area	Description	DLWC Region
Regulated Rivers		
Border	Border Rivers including the Severn River down to Mungindi	Barwon
Gwydir	Gwydir River and Gwydir Wetlands to the junction with the Barwon River	Barwon
Namoi	Namoi River to Peel River and Pian Creek to Barwon River	Barwon
Peel	Peel River to junction with Namoi River	Barwon
Lachlan	Lachlan River to the Murrumbidgee River junction	Central West
Macquarie	Macquarie River to junction with Darling River	Central West
Murray	Murray River including the Darling River below Menindee	Murray
Murrumbidgee	Murrumbidgee River to junction with Murray River, including Yanco Creek to Algudery	Murrumbidgee
North Coast	Regulated flows for Iron Pot and Eden Creeks	North Coast
Hunter	Hunter River, including Patterson River and Glennies Creek	Hunter
South Coast	Brogo River Catchment	Sydney/South Coast
Unregulated Rivers		
Border	Unregulated rivers in the Border Rivers Catchment	Barwon
Gwydir	Unregulated rivers in the Gwydir River Catchment	Barwon
Namoi	Unregulated rivers in the Namoi River Catchment	Barwon
Peel	Unregulated rivers in the Peel River Catchment	Barwon
Lachlan	Unregulated rivers in the Lachlan River Catchment	Central West
Macquarie	Unregulated rivers in the Macquarie, Castlereagh and Bogan River Catchments	Central West
Far West	From Mungindi to Menindee including Bogan River below Murrawombie Road, and those rivers west of Darling-Barwon Rivers which originate in Queensland and minor unregulated rivers in the Western Division not in other valleys	Far West
Murray	Unregulated rivers in the Murray River Catchment, including Billabong Creek	Murray
Murrumbidgee	Unregulated rivers in the Murrumbidgee River Catchment	Murrumbidgee
North Coast	Unregulated rivers east of the Great Dividing Range from Queensland to the Hastings River Catchment	North Coast
Hunter	Unregulated rivers in the Hunter Region, including the Manning, Karuah and Williams Rivers	Hunter
South Coast	Shoalhaven, Woronora, Warragamba and Hawkesbury/Nepean River Catchments, River Lake Illawarra, Sydney City including Georges River and Port Jackson, Clyde, Moruya, Tuross, Towamba and Bega River Catchments, NSW portions of Genoa and	Sydney/South Coast

	Snowy River Catchments	

Valley/Area	Description	DLWC Region
Groundwater		
Border	Largely riverine aquifers in the Border Rivers Catchments	Barwon
Gwydir	Largely riverine aquifers in the Gwydir River Catchment	Barwon
Namoi	Largely riverine aquifers in the Namoi River Catchment	Barwon
Peel	Largely riverine aquifers in the Peel River Catchment	Barwon
Lachlan	Largely riverine aquifers in the Lachlan River Catchment	Central West
Macquarie	Largely riverine aquifers in the Macquarie, Castlereagh and Bogan River Catchments	Central West
Far West	The Great Artesian Basin Aquifer and minor aquifers in the Western Division	Central West
Murray	Aquifers in the Murray River Catchment	Murray
Murrumbidgee	Aquifers in the Murrumbidgee River Catchment	Murrumbidgee
North Coast	Aquifers east of the Great Dividing Range from Queensland to the Hastings River Catchment	North Coast
Hunter	Aquifers in the Hunter Region, including the Manning and Karuah River Catchments and 'Special Areas' of the Tomago Groundwater Aquifer	Hunter
South Coast	Aquifers east of the Great Dividing Range from the NSW central coast to Victoria	Sydney/south Coast

2. BORDER, GWYDIR, NAMOI AND PEEL RIVER VALLEYS *(Barwon Region)*

These four valleys are located in north western NSW and cover an area of 94,000 square kilometres. They encompass the Namoi (including Peel), Gwydir and Border Rivers systems. The Border Rivers catchment is shared with Queensland. The rivers are major tributaries of the Barwon-Darling River and are part of the Murray-Darling Basin. River flows vary greatly from year to year and major storages have been built in all of the valleys to store water and to provide more reliable supplies for water users.

In the Namoi Valley, three main storages have been constructed. Chaffey Dam (62,000 ML capacity) provides regulated flow along the Peel River, Split Rock Dam (397,000 ML) on the Manilla River, and Keepit Dam (425,000 ML) on the Namoi River, both provide regulated flow downstream along 560 kilometres of the Namoi and several effluent streams and anabranches, including the Gunidgera and Pian Creeks. The combined storage capacity of these dams is 884,000 ML, the majority of which is used for irrigation. The water regulated by these dams has been fully allocated for a number of years through volumetric allocation schemes that share the resource.

Many irrigators in the valley also have controlled access to off-allocation water to supplement regulated flows. Whilst the majority of irrigation development occurs along the Namoi River, irrigation is also undertaken from unregulated streams in the valley, particularly along the Mooki River and Coxs Creek which flow through the fertile Liverpool Plains area.

In the Gwydir Valley, there is only one major storage, Copeton Dam, which has a storage capacity of 1,364,000 ML. It supplies regulated flows for irrigation, stock and domestic and environmental uses along the Gwydir River and a number of effluent streams across the north western plains, including the Mehi River, Moomin Creek and the Carole/Gil Gil Creek system.

In the Border Rivers, under agreement between the States, Glenlyon Dam in Queensland (capacity 253,000 ML) provides regulated supplies to users in both states on the Dumaresq and lower Macintyre Rivers downstream as far as Mungindi. Pindari Dam (312,000 ML) on the Severn River supplies additional water to users on the NSW side of the Macintyre River. Regulated flows provide only the minor portion of average flows in the Border Rivers, and irrigators have relied heavily on off-allocation flows to supplement water supplies. Small areas of irrigation have been developed on some of the unregulated streams in the upper catchment, the most important being the Macintyre above the Severn River junction.

Groundwater is a major resource for irrigators, landholders and town water supplies in the region. The Namoi and Gwydir Valleys have significant areas of irrigation development dependent on groundwater. In the Border Rivers, groundwater usage is concentrated in the alluvial sediments associated with the Dumaresq River upstream of Keetah Bridge. The Great Artesian Basin is also an important regional.groundwater resource.

BORDER VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$464,437	$128,116	$ -	$332,776	$925,329
PA2	Groundwater Database	-	-	31,687	66,631	98,319
PA3	River Health Database & Water GIS system	28,875	2,424	-	22,686	53,985
PA4	Water Information Products	14,607	1,660	3,513	12,392	32,172
PB1	Surface Water Allocation Strategies	160,789	7,159	-	76,372	244,320
PB2	Surface Water Licences	6,927	-	-	149,195	156,122
PB3	Groundwater Allocation Strategies	-	-	7,686	16,554	24,240
PB4	Groundwater Licences	-	-	5,752	26,726	32,478
PC1	Rural Water Supply Strategies	43,857	26	417	523	44,823
PC2	Rural Water Operations	355,249	12,907	7,720	29,646	405,522
PC3	Flood Operations	133	-	-	-	133
PC4	Rural Water Infrastructure	701,124	-	-	571,960	1,273,083
PD1	River Quality/Flow reforms	283,626	41,262	-	32,867	357,755
PD2	Blue-Green Algae Strategies	2,710	90	-	-	2,801
PD3	River Salinity Strategies	4,942	481	-	47,959	53,382
PD4	Bacterial, chemical & other strategies	67	2	-	1,020	1,089
PD5	Groundwater Management Strategies	-	-	49,870	68,099	117,969
PD6	Wetland Strategies	9,734	324	-	3,359	13,417
PD7	Water Industry Strategies	14,353	-	990	4	15,346
PE1	Provision for doubtful debts	6,775	-	467	100,000	107,242
Other	Asset levy repayments	-	-	-	-	-
						-
TOTAL OPERATING EXPENDITURE		**2,098,205**	**194,452**	**108,102**	**1,558,768**	**3,959,526**
INCOME						
Business Income		2,275	-	-	14,738	17,013
Cost Recoveries		-	-	-	94,640	94,640
Hydropower Income		25,691	-	-	-	25,691
Licensing		-	-	-	61,578	61,578
Other Income		4,843	155	(21)	(742,615)	(737,638)
Water Charges		1,384,997	44,338	(6,041)	-	1,423,294
						-
TOTAL INCOME		**1,417,806**	**44,493**	**(6,062)**	**(571,659)**	**884,578**
NET COST OF SERVICES		**680,399**	**149,959**	**114,164**	**2,130,427**	**3,074,948**
Government Operating Contribution		777,790	114,890	32,089	2,130,427	3,055,196
OPERATING SURPLUS/(DEFICIT)		**97,392**	**(35,070)**	**(82,074)**	**-**	**(19,753)**
CAPITAL						
Total Capital Expenditure		366,325	-	-	-	366,325
Government Contribution		134,507	-	-	-	134,507
CAPITAL SURPLUS / (DEFICIT)		(231,818)	-	-	-	(231,818)
TOTAL						
Operating Surplus / (Deficit)		97,392	(35,070)	(82,074)	-	(19,753)
Capital Surplus / (Deficit)		(231,818)	-	-	-	(231,818)
TOTAL SURPLUS / (DEFICIT)		(134,427)	(35,070)	(82,074)	-	(251,571)

GWYDIR VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		Regulated	Unregulated	Groundwater	Other Services	Total
OPERATING EXPENDITURE						
PA1	Surface Water Database	$514,911	$36,698	$ -	$3,177	$554,786
PA2	Groundwater Database	-	-	72,117	486	72,603
PA3	River Health Database & Water GIS system	40,446	6,582	-	95,348	142,376
PA4	Water Information Products	18,198	2,528	3,542	12,392	36,660
PB1	Surface Water Allocation Strategies	107,447	11,220	-	25,917	144,584
PB2	Surface Water Licences	-	-	-	197,598	197,598
PB3	Groundwater Allocation Strategies	-	-	2,253	-	2,253
PB4	Groundwater Licences	-	-	2,260	32,034	34,294
PC1	Rural Water Supply Strategies	61,044	495	625	-	62,164
PC2	Rural Water Operations	492,481	3,840	31,777	-	528,098
PC3	Flood Operations	268	-	-	-	268
PC4	Rural Water Infrastructure	1,420,018	-	-	1,871,966	3,291,984
PD1	River Quality/Flow reforms	413,118	46,728	-	42,342	502,189
PD2	Blue-Green Algae Strategies	4,246	271	-	-	4,517
PD3	River Salinity Strategies	5,894	1,113	-	78,690	85,697
PD4	Bacterial, chemical & other strategies	106	7	-	1,020	1,132
PD5	Groundwater Management Strategies	-	-	105,520	67,725	173,244
PD6	Wetland Strategies	43,681	4,117	-	3,359	51,158
PD7	Water Industry Strategies	21,776	990	1,485	4	24,255
PE1	Provision for doubtful debts	10,279	467	701	-	11,447
Other	Asset levy repayments	-	-	-	-	-
						-
TOTAL OPERATING EXPENDITURE		**3,153,915**	**115,056**	**220,281**	**2,432,056**	**5,921,307**
INCOME						
Business Income		6,194	-	-	108,266	114,460
Cost Recoveries		-	-	-	69,537	69,537
Hydropower Income		159,968	-	-	-	159,968
Licensing		-	-	-	100,512	100,512
Other Income		9,838	216	141	28,071	38,266
Water Charges		2,813,367	61,838	40,362	-	2,915,567
						-
TOTAL INCOME		**2,989,367**	**62,054**	**40,503**	**306,386**	**3,398,310**
NET COST OF SERVICES		**164,548**	**53,002**	**179,778**	**2,125,670**	**2,522,997**
Government Operating Contribution		1,051,063	86,036	62,234	2,125,670	3,325,003
OPERATING SURPLUS/(DEFICIT)		**886,515**	**33,035**	**(117,543)**	**-**	**802,007**
CAPITAL						
Total Capital Expenditure		1,458,837	-	-	-	1,458,837
Government Contribution		926,155	-	-	-	926,155
CAPITAL SURPLUS / (DEFICIT)		(532,682)	-	-	-	(532,682)
TOTAL						
Operating Surplus / (Deficit)		886,515	33,035	(117,543)	-	802,007
Capital Surplus / (Deficit)		(532,682)	-	-	-	(532,682)
TOTAL SURPLUS / (DEFICIT)		353,833	33,035	(117,543)	-	269,324

NAMOI VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		Regulated	Unregulated	Groundwater	Other Services	Total
OPERATING EXPENDITURE						
PA1	Surface Water Database	$488,774	$108,041	$ -	$3,087	$599,901
PA2	Groundwater Database	-	-	423,514	7,942	431,456
PA3	River Health Database & Water GIS system	43,654	14,988	-	5,152	63,794
PA4	Water Information Products	17,478	4,683	6,624	15,490	44,274
PB1	Surface Water Allocation Strategies	110,827	25,819	-	33,068	169,713
PB2	Surface Water Licences	-	-	-	285,332	285,332
PB3	Groundwater Allocation Strategies	-	-	3,460	-	3,460
PB4	Groundwater Licences	-	-	31,409	77,279	108,688
PC1	Rural Water Supply Strategies	68,711	1,406	1,042	-	71,160
PC2	Rural Water Operations	590,308	11,080	47,913	-	649,301
PC3	Flood Operations	239	-	-	-	239
PC4	Rural Water Infrastructure	1,540,241	-	-	1,637,085	3,177,327
PD1	River Quality/Flow reforms	575,671	543,806	-	35,346	1,154,823
PD2	Blue-Green Algae Strategies	4,988	542	-	-	5,530
PD3	River Salinity Strategies	4,942	1,754	-	124,917	131,613
PD4	Bacterial, chemical & other strategies	121	13	-	1,275	1,409
PD5	Groundwater Management Strategies	-	-	465,115	164,810	629,925
PD6	Wetland Strategies	17,521	1,916	-	4,199	23,636
PD7	Water Industry Strategies	25,241	2,969	2,475	5	30,690
PE1	Provision for doubtful debts	11,915	1,402	1,168	-	14,485
Other	Asset levy repayments	-	-	-	-	-
						-
TOTAL OPERATING EXPENDITURE		**3,500,630**	**718,420**	**982,720**	**2,394,985**	**7,596,755**
INCOME						
Business Income		7,619	-	-	363,029	370,648
Cost Recoveries		-	-	-	67,220	67,220
Hydropower Income		56,407	-	-	-	56,407
Licensing		-	-	-	128,082	128,082
Other Income		19,655	545	803	26,738	47,741
Water Charges		2,403,943	155,904	229,626	-	2,789,473
TOTAL INCOME		**2,487,624**	**156,449**	**230,429**	**585,069**	**3,459,571**
NET COST OF SERVICES		**1,013,006**	**561,971**	**752,291**	**1,809,916**	**4,137,184**
Government Operating Contribution		1,204,497	637,702	281,620	1,809,916	3,933,736
OPERATING SURPLUS/(DEFICIT)		**191,490**	**75,732**	**(470,670)**	**-**	**(203,449)**
CAPITAL						
Total Capital Expenditure		1,321,160	-	-	-	1,321,160
Government Contribution		848,819	-	-	-	848,819
CAPITAL SURPLUS / (DEFICIT)		(472,341)	-	-	-	(472,341)
TOTAL						
Operating Surplus / (Deficit)		191,490	75,732	(470,670)	-	(203,449)
Capital Surplus / (Deficit)		(472,341)	-	-	-	(472,341)
TOTAL SURPLUS / (DEFICIT)		(280,850)	75,732	(470,670)	-	(675,789)

PEEL VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$123,975	$8,558	$ -	$631	$133,164
PA2	Groundwater Database	-	-	214,847	486	215,332
PA3	River Health Database & Water GIS system	8,584	588	- -	1	9,171
PA4	Water Information Products	3,147	675	2,188	3,098	9,108
PB1	Surface Water Allocation Strategies	20,481	821	-	6,207	27,510
PB2	Surface Water Licences	20	-	-	89,766	89,786
PB3	Groundwater Allocation Strategies	-	-	563	-	563
PB4	Groundwater Licences	-	-	22,452	94,670	117,122
PC1	Rural Water Supply Strategies	11,588	-	208	-	11,797
PC2	Rural Water Operations	153,609	2,369	14,248	-	170,226
PC3	Flood Operations	48	-	-	-	48
PC4	Rural Water Infrastructure	439,266	-	-	585,990	1,025,255
PD1	River Quality/Flow reforms	16,805	7,627	-	5,836	30,268
PD2	Blue-Green Algae Strategies	994	-	-	-	994
PD3	River Salinity Strategies	1,113	160	-	6,889	8,162
PD4	Bacterial, chemical & other strategies	25	-	-	255	280
PD5	Groundwater Management Strategies	-	-	28,248	13,719	41,967
PD6	Wetland Strategies	3,569	-	-	840	4,409
PD7	Water Industry Strategies	4,949	-	495	1	5,445
PE1	Provision for doubtful debts	2,336	-	234	-	2,570
Other	Asset levy repayments	-	-	-	-	-
						-
TOTAL OPERATING EXPENDITURE		**790,508**	**20,800**	**283,483**	**808,384**	**1,903,175**
INCOME						
Business Income		-	-	-	34,510	34,510
Cost Recoveries		-	-	-	12,798	12,798
Hydropower Income		-	-	-	-	-
Licensing		-	-	-	39,529	39,529
Other Income		1,554	62	202	1,964	3,782
Water Charges		280,544	17,810	57,794	-	356,148
						-
TOTAL INCOME		**282,098**	**17,872**	**57,996**	**88,801**	**446,767**
NET COST OF SERVICES		**508,410**	**2,928**	**225,487**	**719,583**	**1,456,408**
Government Operating Contribution		170,830	13,898	77,226	719,583	981,537
OPERATING SURPLUS/(DEFICIT)		**(337,580)**	**10,970**	**(148,261)**	**-**	**(474,871)**
CAPITAL						
Total Capital Expenditure		600,620	-	-	-	600,620
Government Contribution		486,076	-	-	-	486,076
CAPITAL SURPLUS / (DEFICIT)		(114,544)	-	-	-	(114,544)
TOTAL						
Operating Surplus / (Deficit)		(337,580)	10,970	(148,261)	-	(474,871)
Capital Surplus / (Deficit)		(114,544)	-	-	-	(114,544)
TOTAL SURPLUS / (DEFICIT)		(452,124)	10,970	(148,261)	-	(589,415)

3. LACHLAN AND MACQUARIE RIVER VALLEYS *(Central West Region)*

The Lachlan and Macquarie River Valleys and surrounding districts, including the Castlereagh and Bogan River systems, are located in mid-western NSW and cover an area of 175,000 square kilometres. The region forms part of the Murray-Darling Basin.

Flows vary greatly from year to year and major storages have been built to store water and to provide more regular supplies for water users. In the Macquarie Valley, Burrendong Dam and the smaller Windamere Dam provide a combined storage capacity of 1,557,000 ML. In the Lachlan Valley, there are two storages - Wyangala and Carcoar Dams - with a combined capacity of 1,253,000 ML as well as two reregulating storages - Lakes Cargelligo and Brewster. While the largest quantities of water are extracted from the regulated rivers, water is also extracted from the unregulated rivers throughout the region by a range of water users.

Groundwater is an important regional resource, with 13 Groundwater Management Areas. The alluvial sediments can provide good quantities of groundwater supplies, particularly in the mid to lower reaches of the valleys. Usage is high in the area around Narromine in the Macquarie Valley and Cowra in the Lachlan Valley.

State Water's major customers in terms of water volume are irrigators. Cotton and cereals are the major irrigated crop in the Macquarie. In the Lachlan Valley the main irrigated crops are wheat, pastures, lucerne and corn, with increasing cotton development. A number of towns within the region also rely on groundwater for their supplies. The level of demand for groundwater has increased substantially, increasing the need for management of the resource.

LACHLAN VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		Regulated	Unregulated	Groundwater	Other Services	Total
OPERATING EXPENDITURE						
PA1	Surface Water Database	$277,194	$319,620	$ -	$1,637	$598,451
PA2	Groundwater Database	-	-	115,402	-	115,402
PA3	River Health Database & Water GIS system	73,693	9,735	-	72,224	155,651
PA4	Water Information Products	24,039	1,933	3,786	21,686	51,444
PB1	Surface Water Allocation Strategies	154,635	22,016	-	44,852	221,503
PB2	Surface Water Licences	38,428	24,651	-	361,570	424,648
PB3	Groundwater Allocation Strategies	-	-	2,414	-	2,414
PB4	Groundwater Licences	-	-	24,313	206,489	230,802
PC1	Rural Water Supply Strategies	393,569	213	-	-	393,783
PC2	Rural Water Operations	1,129,106	9,488	60,606	7,861	1,207,062
PC3	Flood Operations	3,208	-	-	-	3,208
PC4	Rural Water Infrastructure	2,044,374	1	-	1,550,581	3,594,955
PD1	River Quality/Flow reforms	1,201,449	160,195	-	43,335	1,404,979
PD2	Blue-Green Algae Strategies	61,641	5,453	-	- 1,669	65,425
PD3	River Salinity Strategies	4,238	471	-	-	4,709
PD4	Bacterial, chemical & other strategies	164	13	-	1,785	1,962
PD5	Groundwater Management Strategies	-	-	337,634	107,214	444,848
PD6	Wetland Strategies	102,342	3,203	-	17,269	122,813
PD7	Water Industry Strategies	34,149	2,475	1,485	7	38,115
PE1	Provision for doubtful debts	16,120	1,168	701	-	17,989
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**5,558,350**	**560,634**	**546,341**	**2,434,840**	**9,100,164**
INCOME						
Business Income		4,012	-	-	42,979	46,991
Cost Recoveries		330,945	-	-	-	330,945
Hydropower Income		189,916	-	-	-	189,916
Licensing		-	-	-	257,778	257,778
Other Income		19,121	112	497	92,621	112,351
Water Charges		3,225,874	32,053	157,670	-	3,415,597
						-
TOTAL INCOME		**3,769,868**	**32,165**	**158,167**	**393,378**	**4,353,578**
NET COST OF SERVICES		**1,788,482**	**528,469**	**388,174**	**2,041,462**	**4,746,586**
Government Operating Contribution		2,042,999	352,303	147,966	2,041,462	4,584,730
OPERATING SURPLUS/(DEFICIT)		**254,517**	**(176,166)**	**(240,208)**	**-**	**(161,856)**
CAPITAL						
Total Capital Expenditure		681,642	-	-	-	681,642
Government Contribution		381,884	-	-	-	381,884
CAPITAL SURPLUS / (DEFICIT)		(299,759)	-	-	-	(299,759)
TOTAL						
Operating Surplus / (Deficit)		254,517	(176,166)	(240,208)	-	(161,856)
Capital Surplus / (Deficit)		(299,759)	-	-	-	(299,759)
TOTAL SURPLUS / (DEFICIT)		(45,241)	(176,166)	(240,208)	-	(461,614)

MACQUARIE VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$352,275	$339,313	$ -	$1,637	$693,225
PA2	Groundwater Database	-	-	247,784	-	247,784
PA3	River Health Database & Water GIS system	85,621	6,442	-	- 8	92,056
PA4	Water Information Products	24,042	2,599	5,664	21,686	53,991
PB1	Surface Water Allocation Strategies	196,560	17,174	-	44,462	258,196
PB2	Surface Water Licences	10,611	14,121	-	470,290	495,022
PB3	Groundwater Allocation Strategies	-	-	3,098	-	3,098
PB4	Groundwater Licences	-	-	5,738	340,661	346,398
PC1	Rural Water Supply Strategies	436,705	112	81	-	436,898
PC2	Rural Water Operations	840,712	16,570	11,521	7,861	876,664
PC3	Flood Operations	1,664	-	-	-	1,664
PC4	Rural Water Infrastructure	1,792,436	4,402	-	2,341,699	4,138,537
PD1	River Quality/Flow reforms	757,252	240,090	-	18,286	1,015,628
PD2	Blue-Green Algae Strategies	54,401	8,627	-	-	63,028
PD3	River Salinity Strategies	4,238	471	-	-	4,709
PD4	Bacterial, chemical & other strategies	173	7	-	1,785	1,964
PD5	Groundwater Management Strategies	-	-	403,683	57,260	460,942
PD6	Wetland Strategies	42,485	1,768	-	62,760	107,012
PD7	Water Industry Strategies	36,129	1,485	1,980	7	39,600
PE1	Provision for doubtful debts	17,054	701	934	-	18,690
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**4,652,358**	**653,882**	**680,483**	**3,368,384**	**9,355,106**
INCOME						
Business Income		5,756	-	-	35,567	41,323
Cost Recoveries		84,000	-	-	-	84,000
Hydropower Income		162,970	-	-	-	162,970
Licensing		-	-	-	175,003	175,003
Other Income		11,782	486	518	13,362	26,148
Water Charges		3,369,462	138,870	148,190	50	3,656,572
TOTAL INCOME		**3,633,970**	**139,356**	**148,708**	**223,982**	**4,146,016**
NET COST OF SERVICES		**1,018,388**	**514,526**	**531,775**	**3,144,402**	**5,209,090**
Government Operating Contribution		1,557,256	437,291	205,173	3,144,402	5,344,122
OPERATING SURPLUS/(DEFICIT)		**538,868**	**(77,234)**	**(326,602)**	**-**	**135,032**
CAPITAL						
Total Capital Expenditure		1,008,121	-	-	388,421	1,396,542
Government Contribution		599,599	-	-	388,421	988,020
CAPITAL SURPLUS / (DEFICIT)		(408,522)	-	-	-	(408,522)
TOTAL						
Operating Surplus / (Deficit)		538,868	(77,234)	(326,602)	-	135,032
Capital Surplus / (Deficit)		(408,522)	-	-	-	(408,522)
TOTAL SURPLUS / (DEFICIT)		130,346	(77,234)	(326,602)	-	(273,489)

4. FAR WEST RIVER VALLEYS, INCLUDING BARWON-DARLING RIVER, GREAT ARTESIAN BASIN AND WESTERN DIVISION AQUIFERS

(Far West Region)

This area encompasses the Western Division of NSW, which has as its eastern boundary parts of the Barwon, Bogan and Lachlan Rivers and a line between Coolabah and Euabalong, and the borders of the State as its northern, southern and western boundaries, an area of 335,000 square kilometres.

The three major river systems are the Barwon-Darling, the Murray, and the Lachlan. The Barwon-Darling River has two distinct sections. The upper reaches of the Barwon-Darling River from Mungindi to Menindee, a stretch of some 1670 kilometres, is unregulated – the largest section of unregulated river in the State. The lower reaches of the Darling River, covering 518 kilometres, are regulated by Menindee Lakes. The lower Murray and Lachlan Rivers are regulated. Operation of the Murray and lower Darling Rivers is carried out by the Murray Region. The Lachlan River is operated by the Central West Region.

Although the Barwon-Darling River above Menindee is not regulated by a major storage on the river itself, flow patterns are affected by the regulation and water extractions in its major upstream tributaries – the Border, Gwydir, Namoi and Macquarie Rivers. Water is also contributed from the Narran, Bokhara, Culgoa, Warrego and Paroo systems (known as the Intersecting Streams because they originate in Queensland). Some 17 weirs on the river have been constructed to provide pools of water. Flows in the river are highly variable and large private off-river storages have also been constructed to store water. The capacity of these off-river storages amounts to some 230,000 ML.

A large source of stock and domestic water in the region comes from ground tanks, with local catchment areas. Groundwater within the unconsolidated sediments of the Great Artesian Basin is a major source of stock and domestic water in the region. The pressure within the confined aquifers, when tapped, causes the groundwater to flow naturally to the surface. There are other regional groundwater resources of variable quantity and quality.

FAR WEST
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$ -	$318,087	$ -	$52,358	$370,445
PA2	Groundwater Database	-	-	471,142	1,335	472,476
PA3	River Health Database & Water GIS system	-	104,336	-	44,857	149,193
PA4	Water Information Products	-	101,389	1,502	92,940	195,830
PB1	Surface Water Allocation Strategies	-	96,556	-	159,767	256,323
PB2	Surface Water Licences	-	40,247	-	365,662	405,909
PB3	Groundwater Allocation Strategies	-	-	56,687	-	56,687
PB4	Groundwater Licences	-	-	892	88,280	89,172
PC1	Rural Water Supply Strategies	-	808	81	-	889
PC2	Rural Water Operations	-	239,607	172,079	12,411	424,097
PC3	Flood Operations	-	-	-	-	-
PC4	Rural Water Infrastructure	-	14,688	-	9,359	24,047
PD1	River Quality/Flow reforms	-	571,104	-	695,279	1,266,382
PD2	Blue-Green Algae Strategies	-	48,922	-	-	48,922
PD3	River Salinity Strategies	-	18,646	-	3,656	22,302
PD4	Bacterial, chemical & other strategies	-	29	-	7,648	7,678
PD5	Groundwater Management Strategies	-	100	446,459	31,112	477,671
PD6	Wetland Strategies	-	17,276	-	59,077	76,353
PD7	Water Industry Strategies	-	5,939	3,464	47,124	56,527
PE1	Provision for doubtful debts	-	2,336	1,635	-	3,972
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**-**	**1,580,070**	**1,153,940**	**1,670,863**	**4,404,873**
INCOME						
Business Income		-	-	-	26,144	26,144
Cost Recoveries		-	-	-	167,183	167,183
Hydropower Income		-	-	-	-	-
Licensing		-	-	-	153,236	153,236
Other Income		-	501	331	58,919	59,751
Water Charges		-	127,569	96,495	-	224,064
						-
TOTAL INCOME		**-**	**128,070**	**96,826**	**405,482**	**630,378**
NET COST OF SERVICES		**-**	**1,452,000**	**1,057,114**	**1,265,381**	**3,774,495**
Government Operating Contribution		-	1,066,718	314,468	1,265,381	2,646,568
OPERATING SURPLUS/(DEFICIT)		**-**	**(385,282)**	**(742,646)**	**-**	**(1,127,927)**
CAPITAL						
Total Capital Expenditure		-	6,090	-	-	6,090
Government Contribution		-	890	-	-	890
CAPITAL SURPLUS / (DEFICIT)		-	(5,200)	-	-	(5,200)
TOTAL						
Operating Surplus / (Deficit)		-	(385,282)	(742,646)	-	(1,127,927)
Capital Surplus / (Deficit)		-	(5,200)	-	-	(5,200)
TOTAL SURPLUS / (DEFICIT)		-	(390,482)	(742,646)	-	(1,133,127)

5. MURRAY RIVER VALLEY, INCLUDING LOWER DARLING RIVER
(Murray Region)

The River Murray system in NSW includes the Murray and the southern portion of the Darling River system. These systems extend through south and south west of NSW and cover an area of 108,000 square kilometres. The area extends from the Snowy Mountains, through the riverine plains, to the South Australian border and includes the lower Darling River valley and Menindee Lakes storages.

The River Murray system is regulated by two large dams, the Menindee Lakes storage scheme, the use of Lake Victoria as an off river storage and a number of diversion weirs. Hume Dam is the main operating storage of the River Murray system. Hume has a storage capacity of over 3,030,000 ML. Dartmouth Dam is upstream of Hume on the Mitta Mitta River (Victoria) and has a storage capacity of over 4,000,000 ML. (Dartmouth can be used to supplement Hume and provides important insurance against water shortages in the Murray Valley). These dams are managed by state operating authorities under the direction of the MDBC which is responsible for the coordination and management of Murray River waters.

The third major regulating storage is the Menindee Lakes storage scheme, which is owned by NSW and operated by DLWC, in accordance with the Murray-Darling Basin Agreement. The scheme includes a series of interconnected natural lakes on the Darling River, contained by artificial embankments and regulated by a weir. These lakes have a combined storage capacity of greater than 2,000,000 ML and cover some 453 square kilometres.

The region has a population of around 175,000 with almost a third living in or around Albury. The other major regional towns are Corowa, Deniliquin, Barham, Euston, Buronga, Wentworth, Menindee and Broken Hill.

Rice is the major irrigated crop, while citrus and vineyards dominate production in the lower Murray. Other major irrigated crops in the region include wheat, oilseeds and vegetables. The major industries are forestry, sheep, wool, beef, dairying, piggeries, tourism, paper production and mining.

The dams and other regulatory structures, besides providing water for consumptive purposes, provide important recreational facilities. Boating, fishing and water skiing are popular on the dams and along the rivers, particularly along the Murray. A considerable numbers of commercial ventures have developed along the Murray, particularly in the tourism industry, that benefit from a regulated river system. With respect to consumptive use, commercial irrigators are the largest bulk water customers.

MURRAY VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$1,577,260	$196,281	$ -	$495,353	$2,268,894
PA2	Groundwater Database	-	-	267,708	-	267,708
PA3	River Health Database & Water GIS system	334,797	3,719	-	101,265	439,781
PA4	Water Information Products	256,651	6,801	2,212	127,667	393,331
PB1	Surface Water Allocation Strategies	592,577	4,634	-	157,610	754,821
PB2	Surface Water Licences	192,958	135,382	-	894,940	1,223,279
PB3	Groundwater Allocation Strategies	-	-	139,588	-	139,588
PB4	Groundwater Licences	-	-	34,937	294,725	329,662
PC1	Rural Water Supply Strategies	332,807	455	2,148	61,369	396,779
PC2	Rural Water Operations	803,049	6,355	102,883	326,551	1,238,838
PC3	Flood Operations	1,230	-	-	-	1,230
PC4	Rural Water Infrastructure	5,216,071	18,006	-	17,556,046	22,790,123
PD1	River Quality/Flow reforms	1,219,530	246,964	-	95,213	1,561,707
PD2	Blue-Green Algae Strategies	88,364	1,815	-	107,254	197,433
PD3	River Salinity Strategies	990,200	471	-	553,979	1,544,650
PD4	Bacterial, chemical & other strategies	635	2	-	3,824	4,462
PD5	Groundwater Management Strategies	-	-	133,977	95,722	229,699
PD6	Wetland Strategies	104,308	319	-	95,488	200,115
PD7	Water Industry Strategies	312,712	495	2,475	14	315,696
PE1	Provision for doubtful debts	62,611	234	1,168	800,000	864,013
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**12,085,758**	**621,935**	**687,095**	**21,767,020**	**35,161,808**
INCOME						
Business Income		37,328	-	-	16,770,398	16,807,726
Cost Recoveries		586,171	-	-	40,000	626,171
Hydropower Income		-	-	-	-	-
Licensing		-	-	-	281,238	281,238
Other Income		386,505	146	521	10,074	397,246
Water Charges		6,347,972	41,630	148,905	-	6,538,507
						-
TOTAL INCOME		**7,357,976**	**41,776**	**149,426**	**17,101,710**	**24,650,888**
NET COST OF SERVICES		**4,727,782**	**580,159**	**537,669**	**4,665,310**	**10,510,920**
Government Operating Contribution		4,488,640	362,382	177,571	4,665,310	9,693,903
OPERATING SURPLUS/(DEFICIT)		**(239,142)**	**(217,777)**	**(360,097)**	**-**	**(817,016)**
CAPITAL						
Total Capital Expenditure		5,108,983	-	-	2,617,203	7,726,186
Government Contribution		555,028	-	-	2,617,203	3,172,231
CAPITAL SURPLUS / (DEFICIT)		(4,553,955)	-	-	-	(4,553,955)
TOTAL						
Operating Surplus / (Deficit)		(239,142)	(217,777)	(360,097)	-	(817,016)
Capital Surplus / (Deficit)		(4,553,955)	-	-	-	(4,553,955)
TOTAL SURPLUS / (DEFICIT)		(4,793,097)	(217,777)	(360,097)	-	(5,370,971)

6. MURRUMBIDGEE RIVER VALLEY *(Murrumbidgee Region)*

The Murrumbidgee River Valley is located in south western NSW. It covers an area of 84,000 square kilometre, encompassing an area stretching from Cooma in the east to Balranald in the west including the Yanco-Colombo-Billabong Creeks system. While river flows vary from year to year, the Murrumbidgee Valley is one of the most secure irrigation areas in the State.

Within the Murrumbidgee catchment there are two major storages operated by State Water. Burrinjuck Dam is on the Murrumbidgee River near Yass and has a storage capacity of 1,026,000 ML. This storage provides supplies for irrigation, town and stock and domestic use. The dam is operated in conjunction with Blowering Dam on the Tumut River near Tumut, which has a storage capacity of 1,628,000 ML. This dam stores the winter outputs of the Snowy Mountains Hydroelectric scheme for irrigation and rural releases during summer. A number of other major storages are operated by the Snowy Mountains Hydroelectric Authority upstream of Blowering.

There are seven major weirs and one reregulating storage on the Murrumbidgee River downstream of Wagga. While the largest quantities of water are extracted from the regulated rivers, water is also extracted from the unregulated rivers throughout the region by a range of water users. Groundwater is also a major regional resource. The alluvial sediments provide large quantities of groundwater with the main area of use being west of Narrandera. A number of towns also rely on groundwater for their supplies.

The region has a population of around 520,000, which includes NSW's largest inland city of Wagga, with other major centres including Queanbeyan, Griffith, Tumut, Leeton, Narrandera and Hay. The Murrumbidgee Valley catchment also includes the ACT and Canberra.

Rice is the major irrigated crop. Other irrigated crops include vines, fruit trees, cereals, pulses and pastures. Besides providing water for consumptive and power generation purposes, the major storages provide important recreational facilities. Boating and fishing are popular on the dams and rivers.

MURRUMBIDGEE VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		Regulated	Unregulated	Groundwater	Other Services	Total
OPERATING EXPENDITURE						
PA1	Surface Water Database	$968,684	$36,507	$ -	$180,207	$1,185,398
PA2	Groundwater Database	-	-	434,894	-	434,894
PA3	River Health Database & Water GIS system	83,649	15,955	-	47,580	147,184
PA4	Water Information Products	207,984	17,306	148	91,060	316,497
PB1	Surface Water Allocation Strategies	239,692	96,683	-	115,432	451,807
PB2	Surface Water Licences	62,601	20,055	-	380,974	463,630
PB3	Groundwater Allocation Strategies	-	-	23,456	2,000	25,456
PB4	Groundwater Licences	-	-	122,909	173,208	296,117
PC1	Rural Water Supply Strategies	263,638	4,099	2,148	-	269,885
PC2	Rural Water Operations	1,053,839	5,467	36,183	108,288	1,203,778
PC3	Flood Operations	593	-	-	-	593
PC4	Rural Water Infrastructure	3,276,783	17	-	3,837,946	7,114,746
PD1	River Quality/Flow reforms	1,633,740	774,231	-	91,061	2,499,031
PD2	Blue-Green Algae Strategies	14,029	1,006	-	-	15,035
PD3	River Salinity Strategies	398,735	1,883	-	-	400,619
PD4	Bacterial, chemical & other strategies	9,196	1,118	-	2,550	12,863
PD5	Groundwater Management Strategies	-	-	634,270	5,067	639,337
PD6	Wetland Strategies	117,773	10,843	-	48,775	177,390
PD7	Water Industry Strategies	65,329	4,454	2,475	20,538	92,795
PE1	Provision for doubtful debts	30,838	2,103	1,168	75,000	109,109
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**8,427,102**	**991,727**	**1,257,650**	**5,179,684**	**15,856,163**
INCOME						
Business Income		93,987	570	(18,069)	69,174	145,662
Cost Recoveries		247,508	-	-	17,236	264,744
Hydropower Income		76,664	-	-	-	76,664
Licensing		-	-	-	145,306	145,306
Other Income		27,715	(57)	2,014	93,886	123,558
Water Charges		7,732,712	(16,315)	317,681	303,316	8,337,394
						-
TOTAL INCOME		**8,178,586**	**(15,802)**	**301,626**	**628,918**	**9,093,328**
NET COST OF SERVICES		**248,516**	**1,007,529**	**956,024**	**4,550,766**	**6,762,835**
Government Operating Contribution		3,387,962	892,905	334,241	4,550,766	9,165,874
OPERATING SURPLUS/(DEFICIT)		**3,139,446**	**(114,624)**	**(621,783)**	**-**	**2,403,039**
CAPITAL						
Total Capital Expenditure		1,006,642	-	-	108,629	1,115,271
Government Contribution		413,438	-	-	108,629	522,067
CAPITAL SURPLUS / (DEFICIT)		(593,204)	-	-	-	(593,204)
TOTAL						
Operating Surplus / (Deficit)		3,139,446	(114,624)	(621,783)	-	2,403,039
Capital Surplus / (Deficit)		(593,204)	-	-	-	(593,204)
TOTAL SURPLUS / (DEFICIT)		2,546,242	(114,624)	(621,783)	-	1,809,835

7. NORTH COAST RIVER VALLEYS *(North Coast Region)*

These valleys cover 50,000 square kilometres and take in all rivers which flow to the Pacific Ocean from Port Macquarie in the south to Tweed Heads and the Queensland Border 400 kilometres to the north. They include catchments back to the crest of the Great Dividing Range as far as 150 kilometres inland from the ocean.

Because of the high rainfall on the North Coast, the proportion of rainfall as runoff is high compared with the rest of the State, producing over 12 million ML a year in river flows. However, there are great variations in river flows between seasons. On average, flows in late summer- early Autumn (January to March) are six times those in late Winter/Spring(August/November). It is in the Spring period when flows are smallest that most irrigation occurs.

Most North Coast rivers are unregulated. The small Toonumbar dam (11,000 ML) on the Richmond is the only regulated irrigation dam on the North Coast. However, many councils have constructed small storages for urban supplies - Clarrie Hall (16,000 ML) on the Tweed for Tweed Council; Rocky Creek Dam (14,000 ML) on the Richmond for Rous County Council; Karangi Dam (8,000 ML) on the Orara River on the Clarence for Coffs Harbour, and Malpas Dam on the upper Macleay for Armidale.

A significant groundwater area for agricultural production is the Alstonville Plateau, in the upper Richmond catchment. While groundwater is used throughout the rest of the region, its most significant use is for town water supply.

The North Coast districts contain many of the fastest growing urban areas in NSW. Its population of over 500,000 people is expected to increase to over 600,000 by 2016. Major population growth centres are around Port Macquarie, Coffs Harbour, Ballina/Lismore and Tweed Heads, with steady to slight growth in the inland towns of Kempsey, Grafton, Casino, Murwillumbah and Armidale.

Of those industries which depend on rivers for either consumption or recreation, tourism is by far the largest. The major industries which depend on irrigation are dairying, horticulture and the nursery industry. The beef industry also uses irrigation on a more irregular basis generally for fodder in drought periods. New industries such as tea tree and coffee plantations in the Richmond and Clarence and wine grapes on the tablelands are developing and will need irrigation water for expansion. The major use of water is from the unregulated rivers for town supplies, followed by irrigation.

NORTH COAST
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		Regulated	Unregulated	Groundwater	Other Services	Total
OPERATING EXPENDITURE						
PA1	Surface Water Database	$33,591	$647,024	$ -	$12,928	$693,543
PA2	Groundwater Database	-	-	78,628	6,049	84,677
PA3	River Health Database & Water GIS system	27,280	418,238	- -	6	445,512
PA4	Water Information Products	9,968	193,263	29,769	23,186	256,186
PB1	Surface Water Allocation Strategies	29,792	315,902	-	64,027	409,721
PB2	Surface Water Licences	-	171,552	-	772,562	944,114
PB3	Groundwater Allocation Strategies	-	-	3,340	-	3,340
PB4	Groundwater Licences	-	-	7,655	132,192	139,847
PC1	Rural Water Supply Strategies	16,165	10,152	-	-	26,316
PC2	Rural Water Operations	28,044	59,735	18,516	-	106,295
PC3	Flood Operations	31	-	-	-	31
PC4	Rural Water Infrastructure	314,595	6,927	-	401,578	723,100
PD1	River Quality/Flow reforms	10,022	1,335,533	-	84,539	1,430,095
PD2	Blue-Green Algae Strategies	632	28,738	-	2,378	31,748
PD3	River Salinity Strategies	-	-	-	-	-
PD4	Bacterial, chemical & other strategies	16	99	-	1,275	1,389
PD5	Groundwater Management Strategies	-	-	339,025	2,213	341,237
PD6	Wetland Strategies	6,629	68,901	-	4,199	79,728
PD7	Water Industry Strategies	3,464	20,291	2,475	5	26,235
PE1	Provision for doubtful debts	1,635	9,602	1,168	402	12,807
Other	Asset levy repayments	-	-	-	-	-
TOTAL		**481,865**	**3,285,956**	**480,575**	**1,507,525**	**5,755,920**
INCOME						
Business Income		2,298	-	-	100,442	102,740
Cost Recoveries		5,000	15,712	-	(11,872)	8,840
Hydropower Income		6,240	-	-	-	6,240
Licensing		-	-	-	113,827	113,827
Other Income		102	791	273	10,603	11,769
Water Charges		29,084	230,977	78,075	-	338,136
						-
TOTAL INCOME		**42,724**	**247,480**	**78,348**	**213,000**	**581,552**
NET COST OF SERVICES		**439,141**	**3,038,476**	**402,227**	**1,294,525**	**5,174,368**
Government Operating Contribution		125,283	2,539,838	160,393	1,294,525	4,120,039
OPERATING SURPLUS/(DEFICIT)		**(313,858)**	**(498,638)**	**(241,834)**	**-**	**(1,054,330)**
CAPITAL						
Total Capital Expenditure		32,774	-	-	-	32,774
Government Contribution		5,383	-	-	-	5,383
CAPITAL SURPLUS / (DEFICIT)		(27,391)	-	-	-	(27,391)
TOTAL						
Operating Surplus / (Deficit)		(313,858)	(498,638)	(241,834)	-	(1,054,330)
Capital Surplus / (Deficit)		(27,391)	-	-	-	(27,391)
TOTAL SURPLUS / (DEFICIT)		(341,248)	(498,638)	(241,834)	-	(1,081,720)

8. HUNTER RIVER VALLEY *(Hunter Region)*

This region is located in the central coastal region of NSW and covers an area of approximately 39,000 square kilometres. It encompasses four major river valleys - the Hunter, Wyong, Karuah and Manning, as well as numerous coastal lake systems.

The region has diverse industrial, agricultural and town water supply activities. There is a high level of riparian usage on the unregulated streams and stock and domestic usage of groundwater. Water quality is a driving factor with many consumers demanding different levels of quality.

Annual flows are extremely variable and major storages have been built for irrigation, industrial and town water supplies. In the Hunter Valley the major Glenbawn (with a capacity of 870,000 MLs) and Glennies Creek Dams (283,000 MLs) and smaller Lostock Dam (20,000 MLs) are owned and operated by the DLWC. There are numerous other dams operated by water supply and electricity utility organisations. The Hunter Water Corporation operates water storages on the Williams River for supply to Newcastle and towns in the lower valley.

Groundwater is a major regional resource. The Hunter Valley alluvial sediments provide the largest quantities of groundwater on the NSW coast. Groundwater is also important in the fractured and porous rock areas away from the main streams. The Tomago and Tomaree sand beds are a significant supply for Newcastle and other towns.

In terms of volumes of water used, irrigators are the DLWC's main customers, the bulk of which are irrigators, followed by industrial purposes and mining. Muswellbrook and Singleton are the major urban users of regulated water. The dams, beside providing water for consumptive purposes, are also important recreational facilities. Boating and fishing are popular on the stored waters.

Macquarie Generation has had a statutory right to extract water for its purposes under separate legislation. However, during 2000/01 that legislation was repealed and Macquarie Generation was brought into the licensing system under a Part 9 licence. Hunter Water Corporation similarly operates under a Part 9 water management licence.

HUNTER VALLEY
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$616,553	$100,434	$ -	$58,421	$775,408
PA2	Groundwater Database	-	-	3,083	-	3,083
PA3	River Health Database & Water GIS system	51,840	54,770	4,548	- 8	111,150
PA4	Water Information Products	17,922	15,866	928	204,495	239,210
PB1	Surface Water Allocation Strategies	322,200	289,982	-	46,730	658,913
PB2	Surface Water Licences	838	388	-	732,241	733,467
PB3	Groundwater Allocation Strategies	-	-	135,195	- 277	134,918
PB4	Groundwater Licences	-	-	-	222,579	222,579
PC1	Rural Water Supply Strategies	86,986	415	-	-	87,401
PC2	Rural Water Operations	422,655	40,931	4,486	-	468,072
PC3	Flood Operations	10,777	-	-	-	10,777
PC4	Rural Water Infrastructure	1,432,115	12,832	-	2,265,163	3,710,111
PD1	River Quality/Flow reforms	577,995	169,600	-	626,831	1,374,427
PD2	Blue-Green Algae Strategies	25,061	27,017	-	-	52,078
PD3	River Salinity Strategies	85,945	77,039	-	-	162,984
PD4	Bacterial, chemical & other strategies	37,844	32,375	-	1,785	72,003
PD5	Groundwater Management Strategies	-	-	384,742	38,942	423,684
PD6	Wetland Strategies	23,141	11,850	-	5,878	40,869
PD7	Water Industry Strategies	28,187	10,504	2,239	7	40,937
PE1	Provision for doubtful debts	12,148	3,504	701	-	16,354
Other	Asset levy repayments	-	-	-	-	-
TOTAL OPERATING EXPENDITURE		**3,752,207**	**847,508**	**535,921**	**4,202,788**	**9,338,424**
INCOME						
Business Income		4,200	-	1,729	553,216	559,145
Cost Recoveries		420,327	-	-	201,724	622,051
Hydropower Income		36,076	-	-	-	36,076
Licensing		-	-	-	149,439	149,439
Other Income		2,788	307	315	11,574	14,984
Water Charges		834,945	128,384	93,450	-	1,056,779 -
TOTAL INCOME		**1,298,336**	**128,691**	**95,494**	**915,953**	**2,438,474**
NET COST OF SERVICES		**2,453,871**	**718,817**	**440,427**	**3,286,835**	**6,899,950**
Government Operating Contribution		1,461,373	547,619	165,069	3,286,835	5,460,896
OPERATING SURPLUS/(DEFICIT)		**(992,498)**	**(171,198)**	**(275,358)**	**-**	**(1,439,054)**
CAPITAL						
Total Capital Expenditure		654,322	-	-	-	654,322
Government Contribution		162,555	-	-	-	162,555
CAPITAL SURPLUS / (DEFICIT)		(491,767)	-	-	-	(491,767)
TOTAL						
Operating Surplus / (Deficit)		(992,498)	(171,198)	(275,358)	-	(1,439,054)
Capital Surplus / (Deficit)		(491,767)	-	-	-	(491,767)
TOTAL SURPLUS / (DEFICIT)		(1,484,266)	(171,198)	(275,358)	-	(1,930,821)

9. SOUTH COAST RIVER VALLEYS *(Sydney/South Coast Region)*

The Sydney/South Coast river valleys stretch from the Hawkesbury-Nepean River system in the north to the Victorian border in the south. The region covers an area of 53,700 square kilometres and comprises the major catchments of the Hawkesbury-Nepean, Shoalhaven, Georges, Hacking, Clyde, Bega and Snowy Rivers. The rivers all flow in an easterly direction to the sea with associated estuarine systems critical to regional water resources.

The provision of water to the Sydney urban area dominates water resource issues in the Hawkesbury-Nepean River Valley, with 88% of all water extracted being for urban supply purposes. Current and possible future extraction from the Shoalhaven River for Sydney supply purposes may have a major impact on flow regimes within the Shoalhaven Valley.

Due to the relatively high rainfall and slopes in the region, the proportion of rainfall appearing as surface runoff water varies from 15% in the Hawkesbury-Nepean River to 41% in the Bega River. A total of 12 million ML annual average river flow discharge is generated from all the rivers. This is approximately 33% of the total discharge from all NSW rivers.

With the exception of the Brogo Dam (9,800 ML), situated on the Brogo River 30 kilometre upstream of Bega, DLWC does not operate any regional storages. Sydney Water impounds 2.7 million ML in eight storages within the Hawkesbury-Nepean system. Pejar and Sooley dams impound 13,500 ML for Goulburn City water supply purposes, whilst Delta Electricity impounds 65,300 ML for electricity generation on the Coxs River arm of the Hawkesbury-Nepean system. Within the Snowy River system, a total of 5.5 million ML is impounded for electricity generation and irrigation in the Murray and Murrumbidgee River systems.

Groundwater has a range of uses including domestic and stock water supplies, process water for commercial/industrial (including water bottling) purposes, irrigated agriculture, mining, and irrigation of recreational open space areas.

SYDNEY SOUTH COAST (Hawkesbury Nepean, Far South Coast and Snowy)
BULK WATER SERVICES FINANCIAL REPORT
For year ended 30 June 2000

OPERATING		**Regulated**	**Unregulated**	**Groundwater**	**Other Services**	**Total**
OPERATING EXPENDITURE						
PA1	Surface Water Database	$47,050	$701,472	$ -	$55,129	$803,651
PA2	Groundwater Database	-	-	52,966	5,231	58,197
PA3	River Health Database & Water GIS system	5,343	544,228	-	19,847	569,419
PA4	Water Information Products	1,262	51,509	1,148	49,826	103,745
PB1	Surface Water Allocation Strategies	10,584	653,137	-	468,924	1,132,646
PB2	Surface Water Licences	2,178	96,986	-	1,011,723	1,110,887
PB3	Groundwater Allocation Strategies	-	-	39,898	-	39,898
PB4	Groundwater Licences	-	-	47,510	323,476	370,987
PC1	Rural Water Supply Strategies	9,548	10,080	-	-	19,628
PC2	Rural Water Operations	77,947	43,970	7,839	-	129,756
PC3	Flood Operations	37	-	-	-	37
PC4	Rural Water Infrastructure	275,326	27,282	-	139,299	441,906
PD1	River Quality/Flow reforms	5,190	2,865,581	-	376,122	3,246,893
PD2	Blue-Green Algae Strategies	813	243,799	-	-	244,612
PD3	River Salinity Strategies	-	-	-	-	-
PD4	Bacterial, chemical & other strategies	20	256	-	1,275	1,551
PD5	Groundwater Management Strategies	-	-	627,189	2,993	630,182
PD6	Wetland Strategies	2,920	90,574	-	4,199	97,693
PD7	Water Industry Strategies	4,368	624,774	5,444	148,268	782,854
PE1	Provision for doubtful debts	1,869	24,764	2,336	-	28,969
						-
TOTAL OPERATING EXPENDITURE		**444,457**	**5,978,413**	**784,330**	**2,606,311**	**9,813,512**
INCOME						
Business Income		-	-	-	162,659	162,659
Cost Recoveries		-	-	-	814,687	814,687
Hydropower Income		-	-	-	-	-
Licensing		-	-	-	134,872	134,872
Other Income		273	176,169	362	20,346	197,150
Water Charges		77,974	1,263,900	103,579	-	1,445,453
						-
TOTAL INCOME		**78,247**	**1,440,069**	**103,941**	**1,132,564**	**2,754,821**
NET COST OF SERVICES		**366,210**	**4,538,344**	**680,389**	**1,473,747**	**7,058,691**
Government Operating Contribution		84,628	4,984,260	223,391	1,473,747	6,766,027
OPERATING SURPLUS/(DEFICIT)		**(281,581)**	**445,916**	**(456,998)**	**-**	**(292,663)**
CAPITAL						
Total Capital Expenditure		24,045	-	-	-	24,045
Government Contribution		3,949	-	-	-	3,949
CAPITAL SURPLUS / (DEFICIT)		(20,096)	-	-	-	(20,096)
TOTAL						
Operating Surplus / (Deficit)		(281,581)	445,916	(456,998)	-	(292,663)
Capital Surplus / (Deficit)		(20,096)	-	-	-	(20,096)
TOTAL SURPLUS / (DEFICIT)		(301,678)	445,916	(456,998)	-	(312,760)

NOTES TO 1999/00 VALLEY SPECIAL PURPOSE FINANCIAL REPORTS

Note 1: Source of Costing Information

The special purpose financial reports have been prepared from financial information contained in DLWC's financial system. Presentation of costing information is for bulk water pricing purposes and reflects the full costs of bulk water service provision. State Water's bulk water costs are ringfenced - under Company 12 - from other bulk water costs in the financial system. Company 12 costs are desegregated to the valley level. DLWC resource management costs - included under Company 10 - are represented by the relative product costs at valley level shown in the reports.

Other Services costs reflect bulk water services that do not form part of the current bulk water cost recovery framework. These services are funded from other sources and/or are not directly related to determination of water charges. For example, depreciation expenses for infrastructure assets under product PC4 are included in Other Services. This is an expense recorded in the financial system but is not included in water pricing in accordance with past IPART determinations on the basis that asset consumption costs are recovered by way of an annuity mechanism. Details of Other Services costs are provided in recognition of the desirability of reporting on all bulk water associated costs for stewardship purposes and to ensure these costs agree with financial data in DLWCs financial system.

The reports also show the user cost shares contained in IPART's 1998 determination.

Note 2: Government Contribution

The government contribution towards regulated river, unregulated river and groundwater services shown in these reports is based on IPART's 1998 determined government cost share for each product.

The government contribution for Other Services represents government funding of the net cost of services. Other Services do not have any user cost share as the associated activities fall outside the cost recovery framework.

Note 3: Surplus or Deficit

The reports enable monitoring from year to year of each valley's bulk water surplus and deficit financial result. A deficit effectively represents a transitional subsidy to cover the shortfall between full cost recovery as defined in IPART's 1998 determination and revenue from water charges receipts plus the government contribution.

Note 4: Exclusion of Return on New Investment

The reports include the applicable valley level return on capital replacement and refurbishment expenditure.

Appendix 3

State Water Activities Report: 1999-2000

Our Vision
Improving life with water.

Summary report on State Water's achievements for the year ended 30 June 2000
In our role as a commercial business within the NSW Department of Land and Water Conservation, State Water has added value to the State of NSW in the delivery of water for a number of economic, environmental and social activities.

Key achievements are presented under State Water's Key Result Areas (KRAs).

Water Delivery
1. Delivered water to customers, the environment and other users as planned (see details in Water Delivery Report).
2. Successfully conducted flood operations in Murray, Macquarie and Lachlan Valleys.

Asset Management
3. Produced the Preliminary Total Asset Management Plan.
4. Five Year Inspections of dams completed as scheduled.
5. Hume Dam Remedial Phase 2 works nearing completion and proceeding as per plan.
6. Hume Dam maintenance works nearing completion as planned.
7. Hume Dam First Fill management proceeding as planned.
8. Glenbawn Dam outlet works refurbishment program completed after four years.
9. Lostock 20-year maintenance program completed.
10. Maintenance works completed at Maude, Euston, Redbank and Stevens Weirs.
11. Menindee Lakes Infrastructure OH&S works nearing completion as planned.

Customer Service
12. Responded to an estimated 4,600 customer inquiries and concerns.
13. Established State Water Head Office in Dubbo.
14. Established eight Customer Service Committees, producing useful outcomes.
15. Met 95% of ministerial response requirements (total number 96).
16. Consolidated a number of State Water's roles and functions.
17. Clarified a number of State Water accountabilities.

Business Development
18. Developed Business Plan 2000 and State Water Road Map to outline processes.
19. Commenced documentation management.
20. Y2K Compliance and Contingency Plans completed in accordance with Government Guidelines.
21. Successfully implemented Sales and Distribution Module of SAP.
22. Annual Billing 95% completed successfully with 60% reduction in customer enquiries.
23. Valley Financial Reports Completed.
24. Consolidated State Water vehicle fleet management.
25. Annual Asset Stocktake completed.

Our People
26. Commenced recruitment of 40 new staff to State Water head office functions and formation of teams.
27. Conducted forums for Water Operations, Asset Management and Storages Management staff.
28. Commenced performance review of managers.
29. Produced a staff induction kit.
30. Staff Consultative Committee elected and quarterly meetings commenced.
31. OH&S Management Plan developed and Committees elected.

Key Result Area	Strategies	Report for 1999-2000
KRA 1: Customer Service *Aim: Our customers are satisfied with the products and services we provide.*	Develop formal mechanisms for consultation with key customer groups	Eight Customer Service Committees established in the Border, Coastal, Gwydir, Lachlan, Macquarie (including Cudgegong), Murray-Lower Darling, Murrumbidgee and the Namoi-Peel (including Manila) valleys
	Survey customers to identify needs and satisfaction with products and services	State Water Customer Satisfaction Survey carried out in 1999 - 34% of respondents agreed State Water had improved its service delivery since 1997 - 42% of respondents agreed that State Water had a positive image with bulk water users - no significant differences in attitudes across different geographical areas, nor between irrigation and other users
	Develop customer and supplier service contracts with negotiated levels of service and standards	Customer service charter scheduled to be developed 2000-2001, with due consultation
	Implement a statewide call centre and formal complaints handling procedure	To be addressed in 2001-2002 60% reduction in customer complaints related to billing between 1998-1999 and 1998-2000
KRA 2: Water Delivery *We will deliver water in a manner which meets timeliness, price, quantity, quality and environmental requirements*	Improve water ordering procedures and systems	A number of SCADA systems and mechanical/electrical components at dams and major weirs have been upgraded A statewide SCADA project has been conceptualised and is under development
	Develop operating procedures to maximise delivery of water to meet stakeholders' requests	Process commenced, with drafts prepared for some valleys
	Improve the analysis of and access to real time and historical water data	Trials carried out on IVR water ordering system in the Murrumbidgee Valley

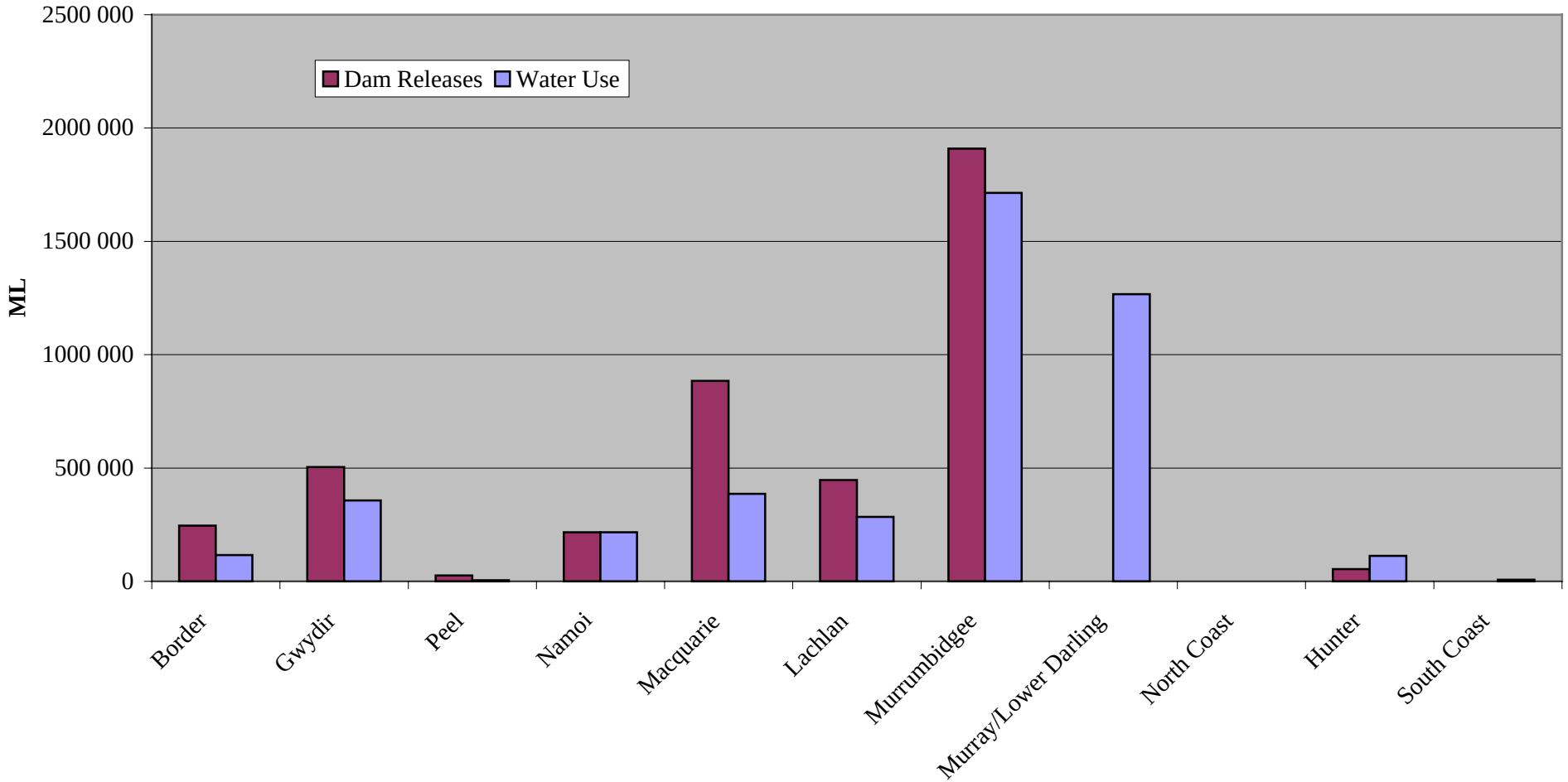
Key Result Area	Strategies	Report for 1999-2000
KRA 3: Asset Management *We will manage safe, reliable and cost efficient structures*	Develop and implement Total Asset Management Plan	Preliminary TAMP completed and distributed to all identified stakeholders
	Develop a surveillance program for all major structures	95% of dam safety audits completed, exceeding target of 90%
	Develop maintenance and surveillance procedures and audit to ensure compliance with established procedures	Research carried out to develop portfolio risk assessment Commenced Keepit Dam upgrade project with development of options underway
KRA 4: Business Development *We will operate a commercially viable business with appropriate financial performance*	Develop and implement business and operational plans	Five year strategic plan developed Business operational procedures and protocols developed for financial and vehicle management
	Implement integrated quality systems that successfully support the business	Component systems being developed Quality assurance for business systems under development
	Implement a Quality Plan based on organisational self assessment and process improvement teams	No progress in 1999-2000 (to be commenced 2000-2001)
	Review existing processes and implement standardised processes	Progress on standardisation of water delivery operations and business processes To be further developed in 2000-2001
	Implement performance management and accountabilities at all levels	1999-2000 Performance Review of Manager Asset Services and General Manager carried out by Director General and Deputy Director-General Performance reviews for other staff scheduled for September 2000 onwards

KRA 5: Our People *We will develop focussed, motivated and highly skilled staff*	Identify competencies required and target recruitment actions for critical skills	Recruitment of new staff almost completed by end of financial year Commenced storages review process
	Develop training and accreditation procedures to match skill and quality requirements	Staff training carried out in safety, operations and staff management and overall training requirements identified for the development of a training strategy
	Involve staff in strategic planning activities and reward the application of business values	Facilitated workshop, involving staff and customers, developed a five-year strategic plan OH&S compliance nearing targets Staff Consultative Committee and OH&S Committees elected
	Survey staff to improve worker involvement, levels of respect and career opportunities	Staff survey scheduled for final year of strategic plan Training plan to be developed 2000-2001
	Communicate with and involve all staff in the Strategic Direction and business operations	Strategic plan distributed to all staff and input by Staff Consultative Committee Organisational matrix developed Staff induction manual developed

WATER DELIVERY STATISTICS

Summary Water Delivery Data 1999-2000 (excluding flood flows)

Water was delivered to customers (irrigation, mining, town water supply, industry, stock and domestic), the environment and other users.



NORTH AREA – Namoi, Peel, Gwydir and Border Rivers Valleys

Overview

All the valleys received very good rain from October to December 1999. This contributed to a good off-allocation (surplus flow) event in all valleys. The rest of the year remained fairly dry.

Copeton Dam was at 96% at the start of the water year, with total inflow of 361GL. The total release was 505GL, with the dam at 63% when the water year ended.

Keepit and Split Rock Dams recorded 61% and 96% of capacity at the start of the season and finished with 52% and 89% respectively. The total inflows to Keepit and Split Rock Dams were 180GL and 40GL respectively. The total releases from Keepit and Split Rock Dams were 216GL and 64GL respectively. A total of 26.6GL was tranferred from Split Rock to Keepit Dam in September 2000 when Keepit was only 46% full and about to embark on the new water year.

Chaffey Dam registered 100.3 % both at the beginning and end of the season. Total inflow was 27GL, against releases of 26GL. Peel Valley was in off-allocation period for all but a few days of the year.

Pindari and Glenlyon Dams were at 95% and 84% at the start of the season and finished with 82% and 59% respectively. Total inflows to Pindari and Glenlyon Dams was 57GL and 38GL, compared to releases of 97GL and 102GL respectively.

a. Water Order and Delivery Statistics

Namoi Valley	**Megalitres**
Water Ordered by Extractors	20,6052
Water Delivered to Extractors	21,6065
Water Released from Keepit Dam Total	21,5903
Water Released from Dam Regulated	21,3109
Minimum Releases	2,794
Peel Valley	
Water Ordered by Extractors	6,136
Water Delivered to Extractors	5,107
Water Released from Chaffey Dam Total	25,736
Water Released from Dam Regulated	6,063
Spill	19,673
Gwydir Valley	
Water Ordered by Extractors	364,015
Water Delivered to Extractors	356,672
Water Released from Copeton Dam Total	504,589
Water Released from Dam Regulated	499,965
Minimum Releases	4,624
Border Valley	
Water Ordered by Extractors	131,589
Water Delivered to Extractors	116,193
Water Released from Pindari Dam Total	97,826
Water Released from Pindari Dam Regulated	63,090
Water Released from Glenlyon Dam Total	101,828
Water Released from Glenlyon Dam Regulated	89,515
Water Released from Glenlyon Dam Regulated for NSW	51,024
Water Released from Coolmunda Dam Total	46,306
Water Released from Coolmunda Dam Regulated	21,266
Water Released from All Dams Total	245,960
Water Released from All Dams Regulated	173,871
Water Released from Pindari & Glenlyon Dams Regulated for NSW	114,114
Minimum Releases (Pindari Dam)	5,788
Stimulus Flow (Pindari Dam)	1,576
Spill (Pindari Dam)	27,372

Notes:

1) The water released for NSW irrigators from Glenlyon Dam is calculated in proportion of share.
2) Glenlyon has 57% NSW share, Pindari has 100% NSW Share and Coolmunda Dam has 100% QLD share.
3) The Peel Valley water year is July-June, while all other north area valleys have October-September water years.
4) Gwydir and Namoi Valleys have Continuous Accounting so the water year has no major significance.

b. Water Delivery Performance

Target Stations	Flow Target (ML/day)	% days below target flows
Namoi Valley		
Namoi River @ Walgett	10	1.9
Peel Valley		
Peel River @ Carrol Gap	10	0
Gwydir Valley		
Mehi River near Collarenebri	20	12.8
Gil Gil Creek @ Galloway	20	25.1
Gwydir River @ Millewa	20	6.8
Border Valley		
Barwon River @ Mungindi	20	8.2

CENTRAL AREA – Macquarie and Lachlan Valleys

a. Water Order and Delivery Statistics

Lachlan Valley	**Megalitres**
Water Order by Extractors	288,933
Water Delivered to Extractors	280,579
Water Released from Dam Total	438,193
Water Released from Dam (Regulated) (1.7.99-14.8.99, 11.10.99-25.10.99, 21.8.99-4.10.99, 1.12.99-30.6.00)	209,002
Water Released from Lakes (Regulated)	230,361
Belubula Valley	
Water Ordered by Extractors	1,687
Water Delivered to Extractors	1,314
Water Released from Dam Total	9,265
Water Released from Dam Regulated (1.7.99-6.11.99, 17.11.99-30.6.00)	8,227
Macquarie Valley	
Water Ordered by Extractors	362,877
Water Delivered to Extractors	383,259
Water Delivered to Macquarie Marshes Environment	683,891
Water Released from Dam Total	884,762
Water Released from Dam Regulated (1.7.99-12.11.99, 11.1.00-9.5.00)	445,639
Cudgegong Valley	
Water Ordered by Extractors	2 166
Water Delivered to Extractors	2 469
Water Released from Dam – Total	3 869
Water Released from Dam – Regulated	3 869

b. Water Delivery Performance

Target stations	**Flow target (ML/day)**	**% of days below target flows**
Macquarie Valley		
Oxley	20	0.2
Pillicawarrina	50	2
Cudgegong at Yamble Bridge	20	3.5
Lachlan Valley		
Belubula at Hellenholme	10	4
Lake Cargelligo Arriving	50	0
Goobang Creek at Condobolin	10	0
Nerathong Return	10	9
Wallaroi Return	10	0
Corrong	25	0
Willandra Creek at Homestead	10	2

SOUTH AREA – Murrumbidgee and Murray Valleys

a. Water Order and Delivery Statistics

Murrumbidgee Valley	**Megalitres**
Orders	
Water Orders - Customers	1,836,495
Water Order - Environmental Rules	236,337
Total Orders	**2,072,832**
Water Released from Burrinjuck Dam - Total	559,798
Water Released from Blowering Dam - Total	1,350,113
Total	**1,909,911**
Water Released from Tombullen En Route Storage	55,597
Releases	
Water Released from Burrinjuck Dam - Environmental Flows	236,787
Water Released from Burrinjuck Dam – Regulated	323,011
Water Released from Blowering Dam – Regulated	1,261,887
Total	**1,821,685**
Deliveries	
Water Delivered to Customers	1,711,138
Water Delivered to Environment (as Translucent Dam) (31.7.99-4.8.99, 15.9.99-30.8.99, 11.9.99-14.10.99, 9.5.00-16.5.00, 1.6.00-30.6.00)	57,461
Total	**1,768,599**
Murray Valley	
Hume releases are controlled by River Murray Water, MDBC	
Water delivered to customers – Murray	
Water delivered to customers – Darling	
Water Orders are Not available.	

b. Water Delivery Performance

Murrumbidgee River at Balranald *(Target 200 ML/day, except when IVT was called by MDBC*)	1.9 % below target
Billabong Creek at Darlot *(Target = 50 ML/day)*	0.2 % below target

Note: Murray end of system targets are not applicable to State Water operations in the Murray.

COASTAL AREA – inc Hunter, Sydney-South Coast and North Coast Regions

Overview

Water usage during the 1999–2000 season was very low compared to previous seasons. The wet conditions along the coast continued from the 1998-1999, with Lostock Dam at more than 99% for nearly the whole season.

Off allocation supplies were available in all river valleys for most of the season, but usage was low. One highlight of the season was that Glenbawn Dam's storage level reached 100% in late April, and started to intrude into the flood mitigation airspace. Some 12,762ML was spilt by controlled release through the hydro power station in May and June to maintain the level at 100%.

Unexpected heatwave conditions in February and March resulted in the flow of the Hunter River at Singleton being lower than the minimum operational targets. The environmental flow rules for Greta (under regulated flow conditions) were not compromised, suggesting there was sufficient water for all customers.

Environmental flow targets for the announcement of off allocation flows in the Hunter regulated river system were all met.

a. Water Usage

	High security on Allocation (ML)	High security off Allocation (ML)	General security on Allocation (ML)	General security off Allocation (ML)
Hunter River	4,635	4,921	22,526	12,651
Macq Generation	nil	n/a	n/a	65,531
Glennies Creek	25	30	614	340
Paterson River	65	0	186	627
Brogo River	287	0	4,043	2,396
Iron Pot Creek	nil	n/a	130	n/a

b. Water Releases

	Total Water Released (ML)	Regulated Water Released (ML)
Hunter Valley		
Glenbawn Dam	30,882 (includes spill of 12,762)	18,274
Glennies Creek Dam	27,997 (includes riparian release 12,242)	15,755
Lostock Dam	161,115	318
Bega Valley		
Brogo Dam	84,808	4,079
Richmond Valley		
Toonumbar Dam	43,652	6,136

Environmental Flow Management

Target Station	Target Min Flow ML/day	Days below target flow
Singleton May - Sept (off allocation)	120	0
Oct – Apr (off allocation)	300	0
Liddell May - Sept (off allocation)	100	0
Oct – Apr (off allocation)	150	0
Greta Regulated flow	50	0
Off allocation flow	100	0
Gostwyck Regulated Flow	20	0
Off Allocation Flow	40	0

Operational Flow Management

Target Station	Target Minimum Flow ML/d	Percentage of days (under regulated flow) below target flow
Liddell - regulated flow (all year)	80	10
Singleton - regulated summer flow	120	18
Greta - regulated summer flow	80	4
Greta - regulated other flow	50	0
Gostwyck regulated flow (all year)	20	0

Off Allocation Events

Brogo and Bega Rivers: 273 days
Paterson River: 362 days
Hunter River and Glennies Creek: 286 days*
*This is the maximum number of days for the whole system. However, reaches within the system had some constraints on off allocation access.

GENERAL STATISTICS

Our People:

Number of staff 1998-1999: 200
1999-2000: 250

Total Licences Per Valley

Area	Regulated	Unregulated	Groundwater
North	884	1321	13090
Central	1670	1945	12334
South	2545	1255	7375
Coastal	1041	7791	17908
Total	6140	12312	50707

Total Revenue:
- by valley

Total Expenditure:
- by valley

For more information contact your nearest State Water office

Head Office
209 Cobra Street, Dubbo 2830
Ph: (02) 6841 7521

Asset Services
23 Bridge Street, Sydney 2000
Ph: (02) 9228 6500

North Area
Government Office Building, Frome Street, Moree 2400
Ph: (02) 6752 9733

Central Area
209 Cobra Street, Dubbo 2830
Ph: (02) 6841 7466

South Area
Chelmsford Place, Wade Avenue, Leeton 2705
Ph: (02) 6953 0776

Coastal Area
3 Market Street, Muswellbrook 2333
Ph: (02) 6542 1222

APPENDIX 4

SUPPLEMENTARY INFORMATION ON COSTS AND REVENUE

1. Accounting for Price Changes

In this submission, bulk water costs and revenues have been expressed in real 2001/02 values by reference to the historical and forecast movements in the Consumer Price Index (CPI), All Groups, Sydney. Insofar as the financial data is expressed in constant values, the reader is provided with more meaningful information. In addition, the data is more useful for trend analysis, including temporal comparisons, and for tariff development (refer Section 4.6).

The GST will impact general price movements, particularly in the first year of its introduction. As the supply of bulk water is GST-free, the GST price component has been removed from the inflator for purposes of adjusting projected financial information for price changes. From 2000/01, being the first year of the GST, the CPI excluding GST component has been utilised for this purpose (refer Section 4.5).

Table 1 shows actual and forecast movements in the CPI, covering the period from the base period in the February 1998 bulk water pricing submission to the end of the price path in this submission.

Table 1: Consumer Price Index, All Groups, Sydney

Year(a)	**CPI Including GST**		**CPI excluding GST**	
	Index (Base 01/02=100)	**Increase** %	**Index** (Base 01/02=100)	**Increase** %
1996/97	88.4	1.4	90.4	1.4
1997/98	88.5	0.1	90.5	0.1
1998/99	89.9	1.6	92.0	1.6
1999/00	92.1	2.4	94.2	2.4
2000/01	97.5	5.9	97.2	3.2
2001/02	100.0	2.5	100.0	2.8
2002/03	102.5	2.5	102.5	2.5
2003/04	105.1	2.5	105.1	2.5

(a) 1996/97 to 1999/00 CPI are actual indexes; 2001/02 to 2003/04 CPI are forecast indexes.

2. Cost Allocation

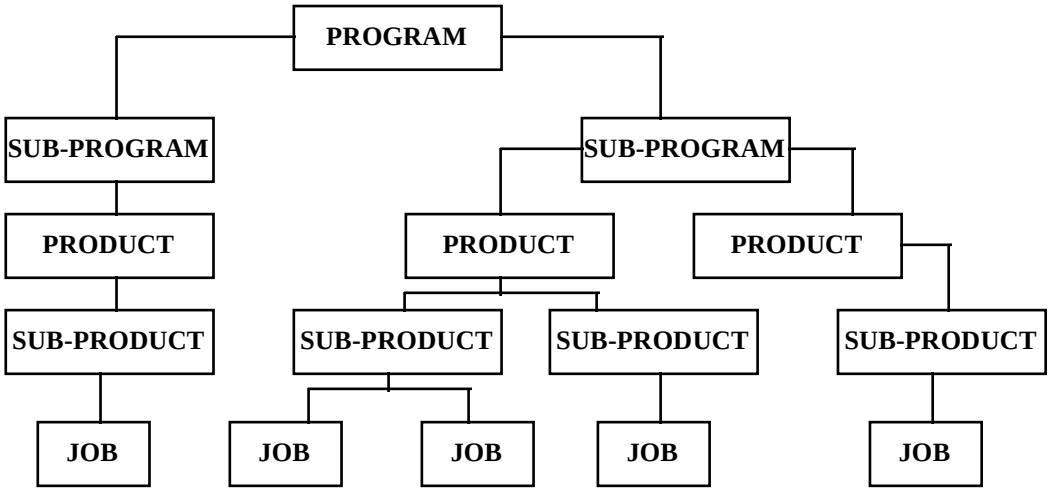
Financial Reporting Program Structure

The NSW Government provides funds to DLWC on the basis of programs leading to desired outcomes. Moreover, the most appropriate and cost effective way of providing cost information to IPART and other stakeholders is in the program format, having the advantage of linking costs to specific activities and outcomes transparently.

In the current program structure, most of the bulk water related activities are in the Rivers and Groundwater program. The program structure can be broken down into subprograms, products, subproducts and jobs. Jobs, which relate to a specifically definable activity, are the foundation of DLWC's activities. Costs and activities are reported at an amalgamated product level.

Figure 1 shows DLWC's program structure.

Figure 1: DLWC Program Structure



In the Rivers and Groundwater programs, 20 of the products are bulk water related. Excluded are products relating to provision of town water services and water quality associated with bacterial and chemical contamination. These 20 products form the framework for reporting on bulk water costs by type of service.

Costing Codes

Bulk water costs are disaggregated into components relating to particular groups of water users for transparency and minimisation of cross subsidies. To achieve this, bulk water river valley/groundwater area cost codes have been set up in the financial system. All bulk water related jobs within the system roll up to one or more of these valley (and area) cost codes, with the majority of jobs mapping directly to a single valley cost code.

All of the valley cost codes are geographically differentiated except one, the Licensing Cost Unit. All costs associated with applications for, renewal of, and transfer of licences administered under the Water Management Act across the State are mapped into this latter cost centre. The costs for these transactions are recoverable through specific transaction charges rather than through annual

fees. These transaction charges are set by regulation and apply uniformly across the State. This submission deals with charges for bulk water services other than licensing of water users.

Spreading Costs across Valleys

For a number of jobs within DLWC's financial system, job costs are spread across multiple valleys. This particularly applies to jobs involving statewide setting of standards, policy, etc. For the 1999/00 costs reported in this submission, the majority were associated with jobs directly chargeable to single valleys, with the remaining costs being related to jobs spanning multiple valleys and therefore requiring a spreading of costs. Generally, cost splits where determined on the basis of a valley's share of direct expenditure.

Spreading Corporate Overhead Costs

Corporate overhead costs, covering such things as building lease costs, financial and human resource services, purchasing and administration, etc, have been built into the 1999/00 costs at job level. The Auditor-General has determined that corporate overheads amount to 36.75 % of DLWC expenditure. Accordingly, bulk water costs for 1999/00 include corporate overheads at the set rate.

Cost Sharing

Table 2 shows bulk water product cost sharing ratios from IPART's July 1998 Determination and cost shares proposed in this submission.

Table 2: Bulk Water Product Cost Sharing Ratios

Product		Bulk Water Product Cost Sharing Ratios			
Code	Description	Current Share(a)		Proposed Share(b)	
		User %	Government %	User %	Government %
PA1	Surface Water Database	50	50	50	50
PA2	Groundwater Database	70	30	70	30
PA3	Other Water Databases	0	100	0	100
PA4	Water Information Products	0	100	0	100
PB1	Surface Water Allocation Strategies	50	50	50	50
PB2	Surface Water Licences	100	0	100	0
PB3	Groundwater Allocation Strategies	70	30	70	30
PB4	Groundwater Licences	100	0	100	0
PC1	Rural Water Supply Strategies	90	10	90	10
PC2	Rural Water Operations	90	10	90	10
PC3	Flood Operations	50	50	50	50
PC4	Rural Water Infrastructure	90	10	90	10
PD1	River Quality/Flow Reforms	0	100	50	50
PD2	Blue-Green Algae Strategies	50	50	50	50
PD3	River Salinity Strategies	50	50	50	50
PD4	Other River Strategies	0	100	0	100
PD5	Groundwater Strategies	70	30	70	30
PD6	Wetland Strategies	0	100	0	100
PD7	Water Industry Strategies	0	100	0	100
PE1	Provision for Doubtful Debts	0	100	100	0

(a) Cost shares from IPART's February 1998 Determination.
(b) Cost shares proposed in this submission.

Murray-Darling Basin Commission (MDBC) and Dumaresq-Barwon Border River Commission (DBBRC) Bulk Water Costs

The MDBC and DBBRC are organisations established by multiple governments, including NSW and are, in effect, owned jointly by these governments. Part of the costs of the activities of these entities is bulk water related. Following a structural change in MDBC, NSW has to contribute a greater proportion (40%) than its previous contribution to the water business (River Murray Water). All bulk water related contributions by the NSW Government to the MDBC and DBBRC are accounted for in the pricing of bulk water services. Costing information for these organisations is provided in Appendix 5.

3. Base Year Costs

Detailed information on costs and revenues for bulk water services in 1999/00 is shown in the bulk water services (special purpose) financial reports in Appendix 2. These reports have been developed by State Water (with assistance from DLWC) from the financial information contained in

DLWC's financial management system, and provided to customer service committees (CSCs) to ensure water user representatives are kept adequately informed on bulk water financial performance.

Table 3 shows bulk water costs by water product for each service in 1999/00. This information incorporates operating cost data from the special purpose financial reports as well as attributable asset costs. In comparison to the information contained in DLWC's February 1998 bulk water pricing submission, the costs included in the financial reports, and adopted for cost recovery purposes in this submission, have been substantially refined. Following the cost sharing decisions in IPART's last determination, catchment management costs have been excluded from the financial reports and cost recovery framework.

The NSW share of MDBC and DBBRC costs of $50.3M and $1.8M respectively for 1999/00 are included in the bulk water costing (refer Appendix 5). The total costs shown are as reported in the MDBC and DBBRC 1999/00 Annual Reports.

'Other services costs' shown in the financial reports do not form part of the bulk water cost recovery framework, but represent a range of bulk water service costs captured by the financial system. By way of example, activities associated with these costs include licensing administration, foreshores water quality improvement and various government funded projects. The costs shown in Table 3 do not contain 'other services costs'.

Table 3: Bulk Water Product Costs 1999/00 ($2001/02)

Product		Bulk Water Product Costs 1999/00(a)			
Code	**Description**	**Regulated Rivers** $000	**Unregulated Rivers** $000	**Groundwater Areas** $000	**Total** $000
PA1	Surface Water Database	5,800	3,121	-	8,921
PA2	Groundwater Database	-	-	2,562	2,562
PA3	Other Water Databases	832	1,255	5	2,091
PA4	Water Information Products	632	425	65	1,121
PB1	Surface Water Allocation Strategies	2,065	1,636	-	3,701
PB2	Surface Water Licences	334	534	-	868
PB3	Groundwater Allocation Strategies	-	-	443	443
PB4	Groundwater Licences	-	-	325	325
PC1	Rural Water Supply Strategies	1,831	30	7	1,868
PC2	Rural Water Operations	6,312	480	547	7,340
PC3	Flood Operations	19	-	-	19
PC4	Rural Water Infrastructure	35,897	249	909	37,055
PD1	River Quality/Flow Reforms	7,105	7,433	-	14,538
PD2	Blue-Green Algae Strategies	274	389	-	662
PD3	River Salinity Strategies	1,592	109	-	1,702
PD4	Other River Strategies	51	36	1,026	1,112
PD5	Groundwater Strategies	10	169	3,173	3,353
PD6	Wetland Strategies	501	739	8	1,249
PD7	Water Industry Strategies	580	68	24	672
PE1	Provision for Doubtful Debts	181	13	9	203
Total		**64,017**	**16,684**	**9,104**	**89,805**

(a) Bulk water product costs include operating costs plus attributed asset costs.

As noted above, the bulk water costs shown in Table 3 include operating and asset related costs. Attributable (or notional) asset costs are included for past years on the basis that they reflect the level of capital contribution that has been necessary to sustain bulk water service provision on an ongoing basis. Attributable asset costs include those costs associated with the MDBC renewals annuity, DBBRC renewals annuity, depreciation charges on minor bulk water assets and return on capital. These cost elements reflect the asset cost regime included as part of the overall costs of bulk water service provision over the price path covered in this submission.

At the product level, 1999/00 bulk water costs may vary somewhat from the 1996/97 costs reported in DLWC's February 1998 bulk water pricing submission. In general, however, relative product costs show reasonable consistency over the period. Movements in the pattern of bulk water costs mainly reflect changes in priorities for funding various activities following implementation of the water reforms, and partially reflect planning initiatives pursuant to IPART recommendations.

Tables 4, 5, 6 and 7 show bulk water costs by service in 1999/00, dissected into net operating and asset cost components.

Table 4: Bulk Water Costs 1999/00 (Regulated Rivers) ($2001/02)

Regulated River	Bulk Water Costs 1999/00		
	Net Operating Costs $000	Asset Costs $000	Total Costs $000
Border	2,227	573	2,800
Gwydir	3,348	953	4,301
Namoi	3,716	869	4,584
Peel	839	194	1,033
Lachlan	5,900	1,072	6,972
Macquarie	4,938	1,683	6,621
Far West	0	0	0
Murray	12,828	7,314	20,142
Murrumbidgee	8,945	3,264	12,209
North Coast	511	186	697
Hunter	3,983	110	4,092
South Coast	472	94	566
Total	**47,705**	**16,311**	**64,017**

Table 5: Bulk Water Costs 1999/00 (Unregulated Rivers) ($2001/02)

Unregulated River	Bulk Water Costs 1999/00		
	Net Operating Costs $000	Asset Costs $000	Total Costs $000
Border	206	1	208
Gwydir	122	0	122
Namoi	763	0	763
Peel	22	0	22
Lachlan	595	1	596
Macquarie	694	11	705
Far West	1,677	66	1,743
Murray	660	0	660
Murrumbidgee	1,053	19	1,072
North Coast	3,488	27	3,514
Hunter	900	17	917
South Coast	6,346	17	6,363
Total	**16,525**	**159**	**16,684**

Table 6: Bulk Water Costs 1999/00 (Groundwater Areas) ($2001/02)

Groundwater Area	Bulk Water Costs 1999/00		
	Net Operating Costs	Asset Costs	Total Costs
	$000	$000	$000
Border	115	39	153
Gwydir	234	28	262
Namoi	1,043	75	1,118
Peel	301	10	311
Lachlan	580	71	651
Macquarie	722	71	793
Far West	1,225	306	1,531
Murray	729	159	888
Murrumbidgee	1,335	134	1,469
North Coast	510	12	522
Hunter	569	5	573
South Coast	832	0	832
Total	**8,195**	**909**	**9,104**

Table 7: Bulk Water Costs (All Services) 1999/00 ($2001/02)

Valley/Area	Bulk Water Costs 1999/00 All Services		
	Net Operating Costs	Asset Costs	Total Costs
	$000	$000	$000
Border	2,548	614	3,162
Gwydir	3,704	981	4,685
Namoi	5,521	943	6,465
Peel	1,162	204	1,366
Lachlan	7,075	1,144	8,218
Macquarie	6,354	1,764	8,118
Far West	2,902	372	3,274
Murray	14,217	7,473	21,690
Murrumbidgee	11,332	3,417	14,750
North Coast	4,509	224	4,733
Hunter	5,451	131	5,582
South Coast	7,650	112	7,761
Total	**72,425**	**17,380**	**89,805**

4. Asset Costs

Background

IPART's September 1997 determination identified an annuity of $27.7M per annum to cover the cost of a projected 30 year program of $752M for maintenance and refurbishment of dams and river structures. The determination drew on the outcomes from a review by Gutteridge Haskins and Davey (GH&D) of DLWC's Asset Management Plan.

As part of NSW Treasury's reporting requirements and for purposes of the submission to IPART on 1997/98 bulk rural water prices, DLWC developed a plan to review its major rural water infrastructure assets. Following this process, a revised methodology was developed for calculating the asset annuity as reported in DLWC's February 1998 submission, wherein asset related expenditure was grouped into three expenditure categories:

Category 1: routine maintenance - these costs were included, as previously, in recurrent cost reporting
Category 2: major periodic maintenance, rehabilitation and replacement, and
Category 3: future capital development including regulatory compliance (eg dam safety works), environmental (eg variable level off take towers) and growth (eg dam wall enhancement works)

Costs associated with Category 2 were translated into a renewals annuity. The renewals annuity is an ongoing annual provision calculated on forecast expenditures over a set time horizon. As previously, a 30 year time horizon was adopted as the basis for calculating the annuity with projected expenditure calculated in five year blocks. Annual renewals annuity charges for 1998/99 and 1999/00 were $9M with water users assigned a 90% share of these costs.

IPART's July 1998 determination sought a completed Total Asset Management Plan (TAMP) from State Water and accompanying report as part of the next pricing submission. DLWC's April 2000 submission, in conjunction with this submission, meets that requirement and provides substantial refinement in the determination and presentation of asset associated costs.

The categorisation and reporting on assets now better reflects the bulk water cost structure. In addition to a renewals annuity for State Water infrastructure assets, the costing profile includes a compliance annuity for other components of the infrastructure reflecting costs associated with raised standards and environmental requirements; a renewals annuities for River Murray Water (a business unit of MDBC) and DBBRC assets; depreciation charges for other DLWC bulk water and State Water assets; and, a return on capital for State Water assets acquired since 1 July 1997. The profile is tailored to the bulk water services operating environment and the approach adopted is consistent with the SCARM (Standing Committee of the Agricultural and Resource Management Council of Australia and New Zealand) Water Industry Asset Valuation Study Guidelines for Determining Full Cost Recovery, August 1997. The TAMP process has been given the highest rating of any NSW Government asset management planning process.

Total Asset Management Plan

As indicated in the February 1998 submission, a project to develop a 30 year TAMP for State Water asset management planning had commenced. The TAMP is now complete. Consultants GH&D

recommended that State Water develop the TAMP in order to understand and better manage its assets. This followed government policy directives to ensure efficient management of public sector assets to enable achievement of optimal operational, environmental and financial performance.

The key business drivers for development of the TAMP have been:

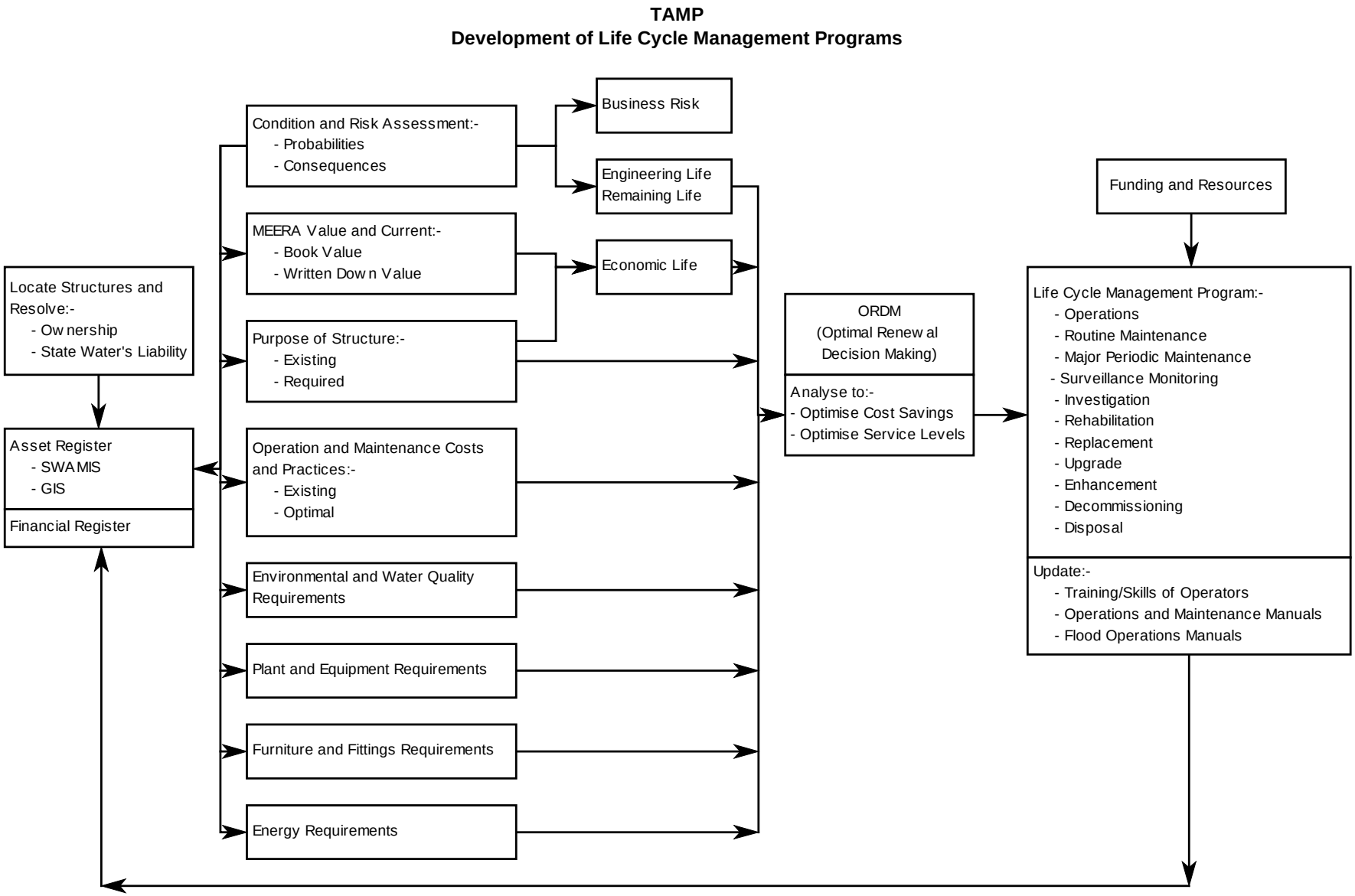
- the identification of service levels required to meet the needs of customers and stakeholders
- the need for strong internal management of the large portfolio of assets to deliver required service levels, supported by critically based decisionmaking information
- the identification of the commercial and community risks, and the development of appropriate risk reduction strategies
- IPART's preference for development of a plan of sufficient quality and detail to enable the quantification of costs, and to meet price setting guidelines
- the need for rigorous measurement and benchmarking of costs associated with the infrastructure, including operations and maintenance costs
- the development of improved operations and maintenance strategies to optimise recurrent and capital expenditure
- the need for information to support the preparation of budgets, including capital, operating and maintenance
- the need to identify the linkages between assets, risks and the insurance requirements of State Water
- the need to determine an optimal organisational structure and staffing levels for State Water
- the need to urgently capture intellectual knowledge, resulting from the dissipation of that knowledge caused by organisational restructuring
- the need to identify the potential commercial and safety risks associated with embedded Year 2000 issues, and
- as a source of information to customers and stakeholders

Benefits from the development of the TAMP include:

- a transparent framework benefiting all stakeholders for the future management of risk
- improvements in the commercial and safety risk assessment processes
- a transparent method for listing, describing and categorising the major characteristics of the assets in themselves
- a transparent system for the identification and measurement of the key elements of the assets' life cycle costs
- provision to stakeholders of adequate information for the allocation of resources
- consistency and efficiency in the operations and maintenance of infrastructure
- information to measure the benefits and risks of capital investments, and
- capacity to review and spread the future fund flow requirements of State Water, including operations, maintenance and capital costs

The process that State Water is following for the development of life cycle management programs for each asset is outlined in Figure 2. Individual asset programs roll up to form the TAMP for each river valley, then State Water Customer Service Area and then for the State as a whole.

Figure 2: TAMP - Development of Life Cycle Management Programs



State Water has implemented a computerised asset management information system (SWAMIS), a module of which is a computerised maintenance management system, and a GIS system. In addition, DLWC's financial assets register has been aligned with State Water's assets register.

The Modern Engineering Equivalent Replacement Asset (MEERA) valuation and current depreciated value are determined for each structure to allow:

- completion of economic consequence assessments, and
- estimation of economic lives

Over the past two years, a detailed condition assessment has been made of all river structures. This assessment has led to a program of repair and refurbishment that is reflected in the renewals annuity and has provided information on which to base the remaining engineering lives of the structures. Comparison of a structure's engineering or remaining life with its economic life allows management to decide when a structure should be rehabilitated, replaced, upgraded or decommissioned. For water infrastructure such as State Water's, long lead times are involved before structures can be rehabilitated, etc, and management must have the capability to make timely decisions.

The major asset management planning activities which have been finalised include:

- portfolio risk assessment
- major weir risk assessment
- minor weir risk assessment
- dam risk assessment
- dam building condition assessment
- computerisation of dam maintenance
- weir feasibility studies, and
- asset management information systems

An independently review of the condition and risk assessment (Screening Level Risk Assessment) undertaken as part of TAMP process indicates the assessment has been carried out in a sound manner, with only minor amendment. As expected, the assessment identified the following:

- previously unidentified major periodic maintenance, rehabilitation and replacement associated with river structures
- a requirement to upgrade the structures to reflect the current expectations regarding OH&S and public liability, and
- ongoing periodic maintenance requirements

These costs are reflected in the renewals annuity for each valley, with more detailed information becoming available as the investigation process continues on an ongoing basis.

At this juncture, both routine maintenance and major periodic maintenance of dams and river structures have continued in accordance with maintenance schedules. The major renewals activities have been:

- rehabilitation of dam spillway gates
- replacement of flood warning systems, and
- rehabilitation and replacement of a number of river structures

Cost of Capital

In determining State Water's asset costs, it has been necessary to establish an appropriate interest rate for use in the calculation of its asset annuities and return on capital. Nominal (uninflated) asset costs are adjusted for inflation when aggregated with other recurrent costs for setting prices. Hence a real interest rate is utilised for calculation of State Water capital charges.

The institutional structure of State Water is somewhat different than most other state controlled entities. State Water carries out a commercial business operation in a public monopoly environment as an internal business unit of DLWC. Consequently, State Water does not enjoy the status of a government trading enterprise or the separate legal status of a state owned corporation. In addition, as a budget dependent arm of DLWC, the organisation does not raise debt to fund its recurrent and capital operations, the latter being fully funded through user charges, grants and government contributions.

Ideally, entities such as State Water would develop a weighted average cost of capital (WACC) for calculation of capital charges. This would be based on an analysis of their capital structures and risk profiles utilising, for example, the capital asset pricing model. Given the above scenario, development of a unique cost of capital rate for State Water tends to have limited merit. DLWC considers it more appropriate to use an 'industry benchmark' rate as a proxy for State Water's cost of capital. While the reference organisations may employ different structures to State Water, they generally carry out similar types of activities as public monopoly utilities.

The organisations benchmarked have cost of capital rates falling within a fairly narrow band:

- Sydney Water Corporation endorses a (pre tax) real discount rate of 7% for their Statement of Corporate Intent. This rate approximates the Corporation's WACC and was utilised for cost recovery purposes in its last pricing submission to IPART.
- Hunter Water Corporation employs a 7% real rate for return on capital/ investment appraisals, consistent with its WACC for shareholder value added reporting.
- External financial consultants undertaking a financial structure study for the establishment of the Sydney Catchment Authority recommended a real rate of 7%, after determining that a WACC within a range of 6.3% to 8.6% was possible.
- The renewals annuity for DBBRC's bulk water infrastructure developed by the Queensland Department of Natural Resources currently utilises a real discount rate of 7%.
- In IPART's June 1999 report, 'Pricing for Electricity Networks and Retail Supply', a real rate of return of 7.5% was proposed for Advance Energy, Integral Energy, Northpower and Great Southern Energy and a rate of 7.75% proposed for Advance Energy and Australian Inland Energy.

Having regard to the abovementioned benchmark rates, a real discount rate of 7% is considered a reasonable approximation of State Water's cost of capital for a medium term price path.

State Water Renewals Annuity - Category 2

The renewals annuity is a mechanism that enables State Water to fund its ongoing asset renewals and refurbishment program. SCARM has adopted the view that an annuity based on the cash requirements for a renewals approach is the most appropriate method for determining the true depreciation or asset consumption and future liabilities of a water business rather than traditional

accounting depreciation. Consultation has taken place with the NSW Treasury and IPART regarding the methodology for calculating the annuity.
SCARM favours a minimum period of 30 years to project future cashflows. A 30 year view is considered to be far enough into the future to be acceptable from a strategic planning and business survival perspective whilst not being so far that the water users of today are funding renewal of assets that will be used by future generations or may not be needed at all due to changed economic, business or environmental conditions.

The 30 year refurbishment cycle is designed to provide sufficient funds, based upon known factors, to maximise the capacity of a structure's service potential for its designed life cycle. However, this timeframe does not provide for deterioration of the bedrock infrastructure investment; that is, the elements of a structure that will deteriorate regardless of refurbishment. The life of the bedrock is in most cases materially in excess of the 30 year timeframe. Under conventional accounting treatment, water users would effectively be funding the renewal of all assets through depreciation charges, including those that are not expected to be renewed for over 100 years. The annuity method, then, is considered to be a more equitable approach to determining the liability the current generation of users should meet. Users should only contribute to the renewal of assets now and not into the distant future.

The TAMP assesses renewals costs on a year by year basis for the next five years. Due to the uncertainty of timing of the works after the first five years, renewal costs are projected in five year blocks for the following 25 years. For the purpose of calculating the annuity, these five year blocks of expenditure have been spread equally over each five year period within the annuity. These are shown in table 8.

Table 8: 30 Year Bulk Water Renewals Expenditure and Annuity (Regulated Rivers) - Category 2 ($2001/02)

Regulated River	**Renewals Expenditure 2000/01 to 2029/30**							
	2000/01 to 2004/05(a) $000	**2005/06 to 2009/10** $000	**2010/11 to 2014/15** $000	**2015/16 to 2019/20** $000	**2020/21 to 2024/25** $000	**2025/26 to 2029/30** $000	**Total** $000	**Annuity** (c) $000
Border(b)	771	848	486	1,259	441	738	4,543	161
Gwydir	4,391	2,473	1,912	2,224	2,063	1,706	14,768	600
Namoi	3,662	2,192	1,776	2,122	851	1,758	12,362	508
Peel	931	381	412	323	305	224	2,576	110
Lachlan	4,512	3,035	2,134	2,558	3,043	3,377	18,659	683
Macquarie	12,138	1,815	1,864	1,599	1,349	2,008	20,773	1,076
Far West	0	0	0	0	0	0	0	0
Murray(b)	9,044	702	913	361	413	310	13,777	728
Murrumbidgee	9,525	6,746	4,258	4,636	27,752	10,488	61,371	1,784
North Coast	623	928	478	309	505	288	3,131	121
Hunter	3,755	1,706	1,713	1,538	881	1,394	10,988	62
South Coast	395	243	270	275	139	368	1,690	62
TOTAL	**49,746**	**21,068**	**16,216**	**17,205**	**37,742**	**22,658**	**164,637**	**5,894**

(a) Details for the 2000/01 to 2004/05 five year period are shown in Table 9; excludes infrastructure support costs.
(b) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Border Rivers respectively.
(c) A real discount rate of 7% is used.

Tables 9 breaks down renewals expenditures for regulated rivers for the first five years shown in Table 8.

Table 9: Five Year Bulk Water Renewals Expenditure Regulated Rivers Category 2($2001/02)

Regulated River	**Renewals Expenditure 2000/01 to 2004/05**							
	Major Periodic Maintenance		**Refurbishment**		**Replacement**		**Total Asset Management Plan**	**Total**
	Dams $000	River Structures $000	Dams $000	River Structures $000	Dams $000	River Structures $000	$000	$000
Border(a)	522	1	0	22	62	0	164	771
Gwydir	1,731	474	0	800	829	174	383	4,391
Namoi	999	497	679	614	413	162	298	3,662
Peel	307	0	0	0	519	0	105	931
Lachlan	1,695	278	0	1,695	510	39	295	4,512
Macquarie	1,099	164	402	1,059	417	8,401	595	12,138
Far West	0	0	0	0	0	0	0	0
Murray(a)	863	301	0	1,116	380	5,924	460	9,044
Murrumbidgee	3,245	1,020	0	2,070	463	2,195	531	9,525
North Coast	531	0	0	0	42	0	50	623
Hunter	2,310	0	53	0	931	0	461	3,755
South Coast	245	0	0	0	111	0	38	395
TOTAL	**13,547**	**2,735**	**1,134**	**7,376**	**4,678**	**16,896**	**3,379**	**49,746**

(a) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Border Rivers respectively.

Tables 10 shows projected Category 2 renewals expenditures and annuity for unregulated rivers over the next 30 years.

Table 10: 30 Year Bulk Water Renewals Expenditure and Annuity (Unregulated Rivers) - Category 2 ($2001/02)

Unregulated River	**Renewals Expenditure 2000/01 to 2029/30**							
	2000/01 to 2004/05(a) $000	**2005/06 to 2009/10** $000	**2010/11 to 2014/15** $000	**2015/16 to 2019/20** $000	**2020/21 to 2024/25** $000	**2025/26 to 2029/30** $000	**Total** $000	**Annuity** (c) $000
Border(b)	2	10	9	9	1	16	46	1
Gwydir	0	0	0	0	0	0	0	0
Namoi	0	0	0	0	0	0	0	0
Peel	0	0	0	0	0	0	0	0
Lachlan	3	7	5	5	5	5	30	1
Macquarie	61	40	24	61	20	55	260	9
Far West	513	217	70	229	44	240	1,312	57
Murray(b)	0	0	0	0	0	0	0	0
Murrumbidgee	0	0	0	0	0	0	0	0
North Coast	226	59	51	46	39	60	480	23
Hunter	41	9	7	7	7	7	79	15
South Coast	123	58	41	46	21	66	354	15
TOTAL	**969**	**399**	**206**	**402**	**135**	**449**	**2,560**	**121**

(a) Details for the 2000/01 to 2004/05 five year period are shown in Table 9; excludes infrastructure support costs.

(b) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Border Rivers respectively.

(c) A real discount rate of 7% is used.

Tables 11 breaks down renewals expenditures for unregulated rivers for the first five years shown in Table 10.

Table 11: Five Year Bulk Water Renewals Expenditure (Unregulated Rivers) - Category 2 ($2001/02)

Unregulated River	**Renewals Expenditure 2000/01 to 2004/05**							
	Major Periodic Maintenance		**Refurbishment**		**Replacement**		**Total Asset Management Plan**	**Total**
							$000	$000
	Dams $000	River Structures (b) $000	Dams $000	River Structures $000	Dams $000	River Structures $000		
Border(a)	0	0	0	2	0	0	0	2
Gwydir	0	0	0	0	0	0	0	0
Namoi	0	0	0	0	0	0	0	0
Peel	0	0	0	0	0	0	0	0
Lachlan	0	3	0	0	0	0	0	3
Macquarie	0	17	0	39	0	5	0	61
Far West	0	50	0	456	0	0	7	513
Murray(a)	0	0	0	0	0	0	0	0
Murrumbidgee	0	0	0	0	0	0	0	0
North Coast	0	26	0	184	0	16	0	226
Hunter	0	6	0	35	0	0	0	41
South Coast	0	8	0	82	0	33	0	123
TOTAL	**0**	**110**	**0**	**798**	**0**	**54**	**7**	**969**

(a) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Border Rivers respectively.

(b) River structures primarily comprise weirs and regulators.

State Water Compliance Annuity - Category 3

Table 12 shows the projected Category 3 compliance expenditures and annuity for regulated rivers over the next 30 years.

Table 12: 30 Year Bulk Water Compliance Expenditure and Annuity (Regulated River) - Category 3 ($2001/02)

Regulated River	**Compliance Expenditure 2000/01 to 2029/30**							
	2000/01 to 2004/05(a) $000	**2005/06 to 2009/10** $000	**2010/11 to 2014/15** $000	**2015/16 to 2019/20** $000	**2020/21 to 2024/25** $000	**2025/26 to 2029/30** $000	**Total** $000	**Annuity** (c) $000
Border(b)	224	3,447	42	42	42	42	3,842	182
Gwydir	17,959	30,832	42	42	42	42	48,961	2,597
Namoi	35,387	8,169	85	85	85	85	43,896	2,698
Peel	11,034	1,104	42	42	42	0	12,266	763
Lachlan	11,830	14,473	106	127	106	106	26,749	1,429
Macquarie	9,945	11,726	42	42	42	42	21,841	1,178
Far West	0	0	0	0	0	0	0	0
Murray(b)	1,137	371	0	0	0	0	1,508	95
Murrumbidgee	17,969	4,481	332	647	403	488	24,321	1,370
North Coast	267	1,755	42	42	42	42	2,192	106
Hunter	853	7,901	8,619	127	127	127	17,755	23
South Coast	236	51	42	42	42	42	456	23
TOTAL	**106,842**	**84,311**	**9,396**	**1,242**	**976**	**1,019**	**203,787**	**10,465**

(a) Details for the 2000/01 to 2004/05 five year period are shown in Table 9; excludes infrastructure support costs..

(b) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Barwon Rivers respectively.

(c) A real discount rate of 7% per annum is used.

Tables 13 breaks down for the first five years shown in Table 12.

Table 13: Five Year Bulk Water Compliance Expenditure (Regulated Rivers) - Category 3 ($2001/02)

Regulated River	Compliance Expenditure 2000/01 to 2004/05		
	Safety & Security $000	**Environmental** $000	**Total** $000
Border(a)	150	74	224
Gwydir	13,502	4,458	17,959
Namoi	27,140	8,247	35,387
Peel	8,752	2,282	11,034
Lachlan	10,938	892	11,830
Macquarie	8,002	1,942	9,945
Far West	0	0	0
Murray(a)	1,137	0	1,137
Murrumbidgee	17,364	605	17,969
North Coast	257	11	267
Hunter	853	0	853
South Coast	236	0	236
TOTAL	**88,332**	**18,511**	**106,842**

(a) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Barwon Rivers respectively.

Tables 14 shows projected Category 3 compliance expenditures and annuity for unregulated rivers over the next 30 years.

Table 14: 30 Year Bulk Water Compliance Expenditure and Annuity (Unregulated Rivers) - Category 3 ($2001/02)

Unregulated River	**Compliance Expenditure 2000/01 to 2029/30**							
	2000/01 to 2004/05(a) $000	**2005/06 to 2009/10** $000	**2010/11 to 2014/15** $000	**2015/16 to 2019/20** $000	**2020/21 to 2024/25** $000	**2025/26 to 2029/30** $000	**Total** $000	**Annuity** (c)$000
Border (b)	6	0	0	0	0	0	6	0
Lachlan	2	0	0	0	0	0	2	0
Macquarie	2	0	0	0	0	0	2	0
Far West	15	0	0	0	0	0	15	1
North Coast	19	0	0	0	0	0	19	1
Hunter	4	0	0	0	0	0	4	4
South Coast	58	0	0	0	0	0	58	4
TOTAL	**107**	**0**	**0**	**0**	**0**	**0**	**107**	**12**

(a) Details for the 2000/01 to 2004/05 five year period are shown in Table 13; excludes infrastructure support costs..

(b) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Barwon Rivers respectively.

(c) A real discount rate of 7% per annum is used.

Table 15 breaks down compliance expenditures for unregulated rivers for the first five years shown in Table 14.

Table 15: Five Year Bulk Water Compliance Expenditure (Unregulated Rivers) - Category 3 ($2001/02)

Unregulated River	Compliance Expenditure 2000/01 to 2004/05		
	Safety & Security $000	**Environmental** $000	**Total** $000
Border(a)	6	0	6
Lachlan	2	0	2
Macquarie	2	0	2
Far West	15	0	15
North Coast	19	0	19
Hunter	4	0	4
South Coast	58	0	58
TOTAL	**107**	**0**	**107**

(a) From 1999/00, MDBC and DBBRC introduced renewals annuities to assist in managing their bulk water supply assets. Accordingly, MDBC and DBBRC asset costs are excluded from the Murray and Barwon Rivers respectively.

State Water Capital Annuities - Category 4

Capital development works are undertaken on regulated rivers and represent an augmentation to the service potential of an asset. They include upgrading or growth in infrastructure capacity, such as dam wall enhancement works and spillway enlargements, as well as physical improvements in service performance or capability. While automation does not change the quantity of water delivered to customers, it is included in this category since it improves the efficiency of supply and thus reduces wastage through the delivery mechanism.

The levy to fund construction costs for the Pindari Dam in the Barwon Region is an example of a capital annuity. Under a contractual arrangement, the levy is met through user and government contributions. Tables 16 lists the 30 year projected capital development expenditures.

Table 16: 30 Year Bulk Water Capital Development Expenditure (Regulated Rivers) - Category 4 ($2001/02)

Regulated River	Capital Development Expenditure 2000/01 to 2029/30						
	2000/01 to 2004/05 $000	2005/06 to 2009/10 $000	2010/11 to 2014/15 $000	2015/16 to 2019/20 $000	2020/21 to 2024/25 $000	2025/26 to 2029/30 $000	Total $000
Border	467	106	0	106	0	106	785
Gwydir	202	106	0	106	0	106	520
Namoi	594	212	0	212	0	212	1,231
Peel	53	106	0	106	0	106	371
Lachlan	2,409	106	106	106	106	106	2,939
Macquarie	2,773	106	252	0	106	0	3,238
Far West	0	0	0	0	0	0	0
Murray	1,497	239	0	0	0	0	1,735
Murrumbidgee	1,008	2,229	71,380	106	106	106	74,935
North Coast	647	0	53	0	0	53	754
Hunter	892	849	0	0	0	0	1,741
South Coast	371	0	0	0	0	0	371
TOTAL	**10,914**	**4,060**	**71,791**	**743**	**318**	**796**	**88,622**

MDBC Renewals Annuity

MDBC has recently undertaken a series of projects aimed at assisting in the management of the bulk water assets of its water business, River Murray Water (RMW). These projects have enabled RMW to develop an enhanced capacity to carry out long term asset management planning and develop better estimates of future refurbishment and renewals capital requirements of its assets. As part of this process, RMW has introduced an asset renewals annuity.

RMW initially made very preliminary assessments of a renewals annuity mechanism to assist in business development. The current annuity now provides a more comprehensive estimate of renewals based on a breakdown of assets to major component level. New works, such as enhanced spillways to meet contemporary flood design standards, environmental enhancements such as multi-level offtakes and fishways and the construction of new salt interception schemes, are not included in the annuity.

DBBRC Renewals Annuity

DBBRC's asset renewals annuity covers renewals (major periodic maintenance, refurbishment and replacement expenditure) for the major DBBRC assets, including the Glenlyon Dam, Boggabilla Weir and other river structures. All renewals are associated with the Border Regulated River.

The SCARM annuity model has been utilised to construct a 30 year annuity. At a real discount rate of 7% per annum, annual payments under the annuity amount to $0.170M. As NSW and Queensland share equally in the funding of DBBRC, annual asset costs for DBBRC attributable to NSW are $0.85M.

Groundwater Monitoring Bores

DLWC maintains a network of monitoring bores for groundwater assessment purposes; that is, to obtain information on and understand the quantity and quality of the State's groundwater resources, so that informed decisions can be made regarding the ecologically sustainable development of the resource and its rational utilisation in conjunction with surface water resources.

There are approximately1,800 bores recorded in the Groundwater Data System, comprising 3,900 individual piezometer records (one bore can contain a number of piezometers therefore providing access to a number of aquifers via any one bore). The 1996 MEERA construction cost for these bores is $33M, with a written down value of $18M. Bores not recorded in the database have not been valued nor entered in DLWC's financial asset register. Action is being taken to record all bores in the database over the next few years. Thus depreciation charges for groundwater bores included in asset costs for pricing purposes are relatively conservative. Table 17 shows capital costs and depreciation charges on groundwater monitoring bores.

Table 17: Capital Costs and Depreciation Charges on Groundwater Monitoring Bores 1999/00 ($2001/02)

Groundwater Area	MEERA Cost $000	Capital Cost - WDV@ 30/6/00 $000	Average Annual Depreciation Rate %	Depreciation Charge $000
Border	1,216	767	5.41	39
Gwydir	2,016	563	5.41	28
Namoi	6,458	1,484	5.41	75
Peel	1,180	205	5.41	10
Macquarie	2,808	1,399	5.20	71
Lachlan	2,808	1,399	5.20	71
Far West	5,801	6,055	3.74	306
Murray	4,594	3,150	3.67	159
Murrumbidgee	5,364	2,660	5.16	134
North Coast	517	239	6.84	12
Hunter	215	090	9.62	5
South Coast	000	000	-	-
TOTAL	**32,978**	**18,011**	**4.73**	**909**

River Gauging Stations

Certain supply related infrastructure is not captured as part of asset costs in this submission. River gauging stations, for example, are not capitalised primarily due to the difficulties in monitoring the number of and movements in the various items of component equipment throughout the State. Gauging stations have a resource management function, but more critically, are integral to bulk water operations.

A management plan is currently being developed to optimise the allocation and utilisation of gauging stations. This will also provide the necessary data to monitor and control the distribution of equipment and allow for inclusion in DLWC's assets register. Under current arrangements,

therefore, recovery of costs for gauging stations as part of recurrent operations is lower than should be were the relative depreciation charges to be made available. This will be reviewed and reported on in the next submission on bulk water pricing.

State Water Non Infrastructure Assets

State Water non infrastructure assets are replaced on a periodic basis, and comprise motor vehicles, buildings, watercraft, computers and scientific equipment. Table 18 shows capital costs and depreciation charges on State Water non infrastructure assets for regulated rivers.

Table 18: Capital Costs and Depreciation Charges on State Water Non Infrastructure Assets 1999/00 (Regulated Rivers) ($2001/02)

Regulated River	**Original Cost** $000	**Capital Cost – WDV @ 30/6/00** $000	**Depreciation Charge @ 4%** $000
Border	-	-	-
Gwydir	261	94	4
Namoi	259	149	6
Peel	14	0	0
Lachlan	618	357	14
Macquarie	150	31	1
Far West	-	-	-
Murray	1,232	951	38
Murrumbidgee	1,005	522	21
North Coast	4	0	0
Hunter	67	7	0
South Coast	14	0	0
TOTAL	**3,625**	**2,112**	**84**

State Water Return on Capital

Table 19: State Water Return on Capital ($2001/02)

River Valley	Annual Return On Capital(a) 2001/02 to 2003/04	
	Regulated River $000	**Unregulated River** $000
Border	248	0
Gwydir	181	-
Namoi	248	-
Peel	74	-
Lachlan	145	-
Macquarie	704	3
Far West	-	27
Murray	1,271	-
Murrumbidgee	775	13
North Coast	3	14
Hunter	85	2
South Coast	7	7
TOTAL	**3,740**	**66**

(a) Actual return on capital converted to a series of equal annual payments, using a real discount rate of 7% per annum. Capital comprises refurbishment and replacement expenditure on infrastructure assets.

Summary of Asset Costs

Table 20 shows DLWC's bulk water annualised asset costs by service from 2001/02 to 2003/04. These costs are adjusted for inflation as appropriate when aggregated with other recurrent costs.

Table 20: Bulk Water Annual Asset Costs 2001/02 to 2003/04 ($2001/02)

Valley/Area	State Water Renewals Annuity $000	State Water Compliance Annuity $000	MDBC Renewals Annuity $000	DBBRC Renewals Annuity $000	DLWC & State Water Depreciation Charges $000	State Water Return on Capital $000	Total Asset Costs $000
Regulated River							
Border	179	189	0	85	0	248	701
Gwydir	669	2,696	0	0	4	181	3,550
Namoi	566	2,801	0	0	6	248	3,620
Peel	122	792	0	0	0	74	988
Lachlan	761	1,484	0	0	14	145	2,405
Macquarie	1,199	1,222	0	0	1	704	3,127
Far West	0	0	0	0	0	0	0
Murray	811	105	5,944	0	38	1,271	8,169
Murrumbidgee	1,988	1,423	0	0	21	775	4,206
North Coast	135	110	0	0	0	3	248
Hunter	69	24	0	0	0	85	178
South Coast	69	24	0	0	0	7	100
TOTAL	**6,568**	**10,871**	**5,944**	**85**	**84**	**3,740**	**27,293**
Unregulated River							
Border	1	0	0	0	0	0	2
Gwydir	0	0	0	0	0	0	0
Namoi	0	0	0	0	0	0	0
Peel	0	0	0	0	0	0	0
Lachlan	1	0	0	0	0	0	1
Macquarie	10	0	0	0	0	3	14
Far West	64	1	0	0	0	27	92
Murray	0	0	0	0	0	0	0
Murrumbidgee	0	0	0	0	0	13	13
North Coast	25	1	0	0	0	14	41
Hunter	16	5	0	0	0	2	23
South Coast	16	5	0	0	0	7	28
TOTAL	**135**	**12**	**0**	**0**	**0**	**66**	**213**
Groundwater Area							
Border	0	0	0	0	39	0	39
Gwydir	0	0	0	0	28	0	28
Namoi	0	0	0	0	75	0	75
Peel	0	0	0	0	10	0	10
Lachlan	0	0	0	0	71	0	71
Macquarie	0	0	0	0	71	0	71
Far West	0	0	0	0	306	0	306
Murray	0	0	0	0	159	0	159
Murrumbidgee	0	0	0	0	134	0	134
North Coast	0	0	0	0	12	0	12
Hunter	0	0	0	0	5	0	5

South Coast	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**909**	**0**	**909**

5. New Tax System

An input cost modelling service was utilised, as required by IPART, to identify savings from removal of the WST. Savings were calculated using the Econtech 'ANTS Calculator'. The modelling included all costs (including operating and capital) of bulk water service provision, and calculated immediate savings from not paying WST and flow on savings from the lower cost structures of the supplier chain due to abolition of WST.

Inputs to the model were subject to independent audit to certify that the costs used were accurate and representative, with overall results from the modelling reviewed by Econtech. IPART subsequently advised DLWC of the price adjustment factors to be applied to bulk water services from July 2000. This process ensures charges for bulk water services conform to Australian Competition and Consumer Commission guidelines on price exploitation and the new tax system (ACCC, *Price Exploitation and the New Tax System*, March 2000).

In the September 2000 determination, IPART used the short term savings (refer Table 4.5) to reduce bulk water prices for 2000/01. As indicated in the table, savings in 2000/01, the first year of introduction of the GST, are relatively small - 0.5% to 0.6% of bulk water costs - and therefore to date have had a minimal impact on bulk water charges.

Savings from removal of the WST are incorporated in DLWC's budget and forward estimates and have been included in the full cost recovery projections for provision of bulk water services over the medium term (as discussed in Section 4.6). As maximum prices proposed for the period are set below full cost recovery price levels incorporating ANTS cost savings, these savings are effectively absorbed by the associated revenue shortfall.

Additional (compliance) costs will be imposed on GST registered organisations to administer the GST. DLWC will absorb these costs through efficiency improvements. In addition, expenditures on certain bulk water services are classified as input taxed supplies. In these instances, DLWC will absorb the cost of the GST as a tax credit cannot be claimed on purchases under input taxed transactions.

6. Medium Term Costs and Revenue

Gross Operating Costs

Table 21 shows bulk water gross operating costs by service over the eight years 1996/97 to 2003/04.

Table 21: Bulk Water Gross Operating Costs ($2001/02)

Year	Bulk Water Gross Operating Costs(a)			
	Regulated Rivers	**Unregulated Rivers**	**Groundwater Areas**	**Total**
	$000	$000	$000	$000
1996/97	55,462	10,043	5,936	71,441
1997/98	57,348	13,343	7,128	77,819
1998/99	52,704	16,387	8,193	77,284
1999/00	47,705	16,525	8,195	72,425
2000/01	47,705	16,525	8,195	72,425
2001/02	47,705	16,525	8,195	72,425
2002/03	47,705	16,525	8,195	72,425
2003/04	47,705	16,525	8,195	72,425

(a) 1996/97 - 1999/00 bulk water gross operating costs are actuals; 2000/01 - 2003/04 bulk water gross operating costs are estimates.

Cost Savings

In addition to efficiency factors, bulk water costs have been effectively reduced as a result of implementation of ANTS, through removal of the Wholesale Sales Tax and other indirect taxes. As indicated in Sections 4.5 and 4.6, these savings have been accounted for by direct adjustment to bulk water charges (refer Section 5) rather than adjustment to the cost estimates used in establishing the charges.

Table 22 shows bulk water efficiency savings estimates by service over the four years 2000/01 to 2003/04.

Table 22: Annual Bulk Water Efficiency Savings ($2001/02)

Year	Bulk Water Efficiency Savings(a)			
	Regulated Rivers	**Unregulated Rivers**	**Groundwater Areas**	**Total**
	$000	$000	$000	$000
2000/01 - 2003/04	2,086	1,992	-	4,078

(a) Bulk water efficiency savings are estimates.

Additional Costs (costs not yet incorporated in full cost recovery regime)

Once water meters are installed on unregulated rivers under the volumetric conversion program, operations involve routine maintenance, periodic meter readings, data management and fee collection. State Water will undertake the monitoring of usage and billing functions as for regulated rivers.

Table 23 shows bulk water additional cost estimates by service over the four years 2000/01 to 2003/04.

Table 23: Annual Bulk Water Additional Costs ($2001/02)

Year	**Bulk Water Additional Costs**(a)			
	Regulated Rivers	**Unregulated Rivers**	**Groundwater Areas**	**Total**
	$000	$000	$000	$000
2000/01 -2003/04	4,692	2,927	39	7,658

(a) Bulk water additional costs are estimates.

Net Operating Costs

In deriving bulk water net operating costs, gross operating costs (Table 21) have been reduced by cost savings (Table 22) and increased by additional costs (Table 23). For the years 1996/97 to 1999/00, net operating costs are identical to gross operating costs, since actual costs incorporate cost savings and additional costs.

Table 24 shows bulk water net operating costs by service over the eight years 1996/97 to 2003/04.

Table 24: Bulk Water Net Operating Costs ($2001/02)

Year	Bulk Water Net Operating Costs(a)			
	Regulated Rivers	Unregulated Rivers	Groundwater Areas	Total
	$000	$000	$000	$000
1996/97	55,462	10,043	5,936	71,441
1997/98	57,348	13,343	7,128	77,819
1998/99	52,704	16,387	8,193	77,284
1999/00	47,705	16,525	8,195	72,425
2000/01	50,311	17,460	8,234	76,006
2001/02	50,311	17,460	8,234	76,006
2002/03	50,311	17,460	8,234	76,006
2003/04	50,311	17,460	8,234	76,006

(a) 1996/97 to 1999/00 bulk water net operating costs are actuals; 2000/01 to 2003/04 bulk water net operating costs are estimates.

Asset Costs

For comparative purposes, prior year asset costs have been normalised. As an initial adjustment, asset costs been adjusted to include 'attributable costs'; that is, other asset costs as discussed in Section 4.4. Secondly, State Water renewals annuity costs for 1998/99 and 1999/00, as reported in IPART's July 1998 Determination, have been adopted for earlier years. Thirdly, the apportionment of past asset costs to river valleys and groundwater areas has been based on the pattern of regional expenditure applied over the period of the price path. Finally, to minimise distortions to cost trends, historical asset values for the years 1996/97 to 1998/99 are recorded in real terms.

Table 25 shows bulk water asset costs by service over the eight years 1996/97 to 2003/04.

Table 25: Annual Bulk Water Asset Costs ($2001/02)

Year	Bulk Water Asset Costs(a)			
	Regulated Rivers	Unregulated Rivers	Groundwater Areas	Total
	$000	$000	$000	$000
1996/97 - 1999/00	16,311	159	909	17,380
2000/01 - 2003/04	27,293	213	909	28,415

(a) 1996/97 to 1999/00 bulk water asset costs have been adjusted to permit comparison with 2000/01 - 2003/04 bulk water asset cost estimates.

The marked increase in asset costs for regulated rivers between 1999/00 and 2000/01 is primarily attributable to postponement of a number of capital works projects related to compliance activities pending completion of the TAMP. The TAMP is now available and it projects a substantial increase in capital expenditure to clear the backlog.

Total Costs

Table 26 shows bulk water total costs by service over the eight years 1996/97 to 2003/04.

Table 26: Bulk Water Total Costs ($2001/02)

Year	**Bulk Water Total Costs**(a)			
	Regulated Rivers $000	**Unregulated Rivers** $000	**Groundwater Areas** $000	**Total** $000
1996/97	71,774	10,202	6,845	88,821
1997/98	73,659	13,502	8,037	95,199
1998/99	69,015	16,546	9,103	94,665
1999/00	64,017	16,684	9,104	89,805
2000/01	77,604	17,673	9,144	104,421
2001/02	77,604	17,673	9,144	104,421
2002/03	77,604	17,673	9,144	104,421
2003/04	77,604	17,673	9,144	104,421

(a) 1996/97 to 1999/00 bulk water total costs include actual operating costs and attributable asset costs; 2000/01 to 2003/04 bulk water total costs are estimates.

The information below shows total bulk water costs dissected by product cost and by valley/area in 2003/04 - the reference period for establishing revenue targets, as discussed in Section 4.6.

Table 27 shows bulk water product costs by service in 2003/04.

Table 27: Bulk Water Product Costs 2003/04 ($2001/02)

Product		**Bulk Water Product Costs 2003/04**(a)			
Code	**Description**	**Regulated Rivers** $000	**Unregulated Rivers** $000	**Groundwater Areas** $000	**Total** $000
PA1	Surface Water Database	6,174	3,123	-	9,297
PA2	Groundwater Database	-	-	2,562	2,562
PA3	Other Water Databases	832	1,255	5	2,091
PA4	Water Information Products	632	425	65	1,121
PB1	Surface Water Allocation Strategies	2,065	1,636	-	3,701
PB2	Surface Water Licences	1,327	1,351	-	2,677
PB3	Groundwater Allocation Strategies	-	-	443	443
PB4	Groundwater Licences	-	-	325	325
PC1	Rural Water Supply Strategies	2,009	34	7	2,050
PC2	Rural Water Operations	7,183	2,551	584	10,318
PC3	Flood Operations	10,897	-	-	10,897
PC4	Rural Water Infrastructure	37,478	324	909	38,712
PD1	River Quality/Flow reforms	5,793	5,441	-	11,235
PD2	Blue-Green Algae Strategies	274	389	-	662
PD3	River Salinity Strategies	1,592	109	-	1,702
PD4	Other River Strategies	51	36	1,026	1,112
PD5	Groundwater Strategies	10	169	3,173	3,353
PD6	Wetland Strategies	501	739	8	1,249
PD7	Water Industry Strategies	580	68	24	672
PE1	Provision for Doubtful Debts	205	24	12	241
Total		**77,604**	**17,673**	**9,144**	**104,421**

(a) Bulk water product costs for 2003/04 are estimates.

Cost Recovery Revenue

Table 28 shows bulk water user product cost estimates by service in 2003/04, based on the proposed cost sharing ratios shown in Table 2. These estimates derive full cost recovery revenue requirements for bulk water services.

Table 28: Bulk Water User Product Costs 2003/04 ($2001/02)

Product		**Bulk Water User Product Costs 2003/04**(a)				
Code	**Description**	**Share of Total Costs** %	**Regulated Rivers** $000	**Unregulated Rivers** $000	**Groundwater Areas** $000	**Total** $000
PA1	Surface Water Database	50	3,087	1,561	-	4,648
PA2	Groundwater Database	70	-	-	1,793	1,793
PA3	Other Water Databases	0	-	-	-	-
PA4	Water Information Products	0	-	-	-	-
PB1	Surface Water Allocation Strategies	50	1,033	818	-	1,850
PB2	Surface Water Licences	100	1,327	1,351	-	2,677
PB3	Groundwater Allocation Strategies	70	-	-	310	310
PB4	Groundwater Licences	100	-	-	325	325
PC1	Rural Water Supply Strategies	90	1,808	31	7	1,845
PC2	Rural Water Operations	90	6,465	2,296	526	9,287
PC3	Flood Operations	50	5,448	-	-	5,448
PC4	Rural Water Infrastructure	90	33,730	291	819	34,840
PD1	River Quality/Flow reforms	50	2,897	2,721	-	5,617
PD2	Blue-Green Algae Strategies	50	137	194	-	331
PD3	River Salinity Strategies	50	796	54	-	851
PD4	Other River Strategies	0	-	-	-	-
PD5	Groundwater Strategies	70	-	0	2,939	2,939
PD6	Wetland Strategies	0	-	-	-	-
PD7	Water Industry Strategies	0	-	-	-	-
PE1	Provision for Doubtful Debts	100	209	61	16	285
Total			**56,936**	**9,378**	**6,734**	**73,049**

(a) Bulk water user product costs are based on product cost estimates and proposed cost sharing ratios, and are inclusive of miscellaneous income recoveries.

Table 29 shows total bulk water costs, full cost recovery revenue, cost recovery revenue based on the maximum prices proposed in this submission and the resultant cost recovery shortfall for regulated rivers in 2003/04.

Table 29: Bulk Water Costs and Revenue (Regulated Rivers) 2003/04 ($2001/02)

Regulated River	**Total Costs**(a) $000	**Full Cost Recovery Revenue**(b) $000	**Proposed Cost Recovery Revenue**(c) 2004 $000	**Cost Recovery Shortfall** 2004 $000
Border	3,067	2,155	2,155	-
Gwydir	7,276	4,634	4,616	18
Namoi	7,635	4,965	4,610	355
Peel	1,993	1,349	598	751
Lachlan	8,452	5,593	5,319	274
Macquarie	8,327	5,925	5,925	-
Far West	0	-	-	-
Murray	20,178	14,365	14,335	30
Murrumbidgee	13,455	8,876	8,886	- 10
North Coast	795	582	58	524
Hunter	5,752	4,102	2,450	1,651
South Coast	674	537	165	373
TOTAL	**77,604**	**53,083**	**49,118**	**3,965**

(a) Bulk water total costs are estimates.
(b) Revenue levels based on application of user cost shares proposed for the price path and exclude miscellaneous income.
(c) Revenue levels based on cost recovery levels adjusted for proposed prices.

Table 30 shows total bulk water costs, full cost recovery revenue, cost recovery revenue based on the maximum prices proposed in this submission and the resultant cost recovery shortfall for unregulated rivers in 2003/04.

Table 30: Bulk Water Costs and Revenue (Unregulated Rivers) 2003/04 ($2001/02)

Unregulated River	**Total Costs**(a) $000	**Full Cost Recovery Revenue**(b) $000	**Proposed Cost Recovery Revenue**(c) 2004 $000	**Cost Recovery Shortfall** 2004 $000
Border	248	143	84	59
Gwydir	176	105	105	- 0
Namoi/Peel	818	442	227	215
Lachlan	590	297	108	189
Macquarie	760	439	421	19
Far West	2,066	1,239	463	776
Murray	348	194	84	109
Murrumbidgee	669	342	310	32
North Coast	4,314	2,276	566	1,710
Hunter	1,482	934	375	559
South Coast	6,200	2,889	613	2,276
TOTAL	**17,673**	**9,300**	**3,356**	**5,944**

(a) Bulk water total costs are estimates.
(b) Revenue levels based on application of user cost shares proposed for the price path and exclude miscellaneous income; excludes Sydney Water and Hunter Water Corporations revenues.
(c) Revenue levels based on cost recovery levels adjusted for proposed prices; excludes Sydney Water and Hunter Water Corporations revenues.

Table 31 shows total bulk water costs, full cost recovery revenue, cost recovery revenue based on the maximum prices proposed in this submission and the resultant cost recovery shortfall for groundwater in 2003/04.

Table 31: Bulk Water Costs and Revenue (Groundwater) 2003/04 ($2001/02)

Groundwater Area	**Total Costs**(a) $000	**Full Cost Recovery Revenue**(b) $000	**Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
Barwon Region	1,858	1339	806	533
Lachlan/Macquarie	1,451	1044	547	-63
Far West	1,533	1149	396	753
Murray	893	677	456	221
Murrumbidgee	1,473	1087	426	661
North Coast	525	352	106	246
Hunter	577	394	121	273
South Coast	835	595	76	519
TOTAL	**9,144**	**6,637**	**2,934**	**3,143**

(a) Bulk water total costs are estimates.
(b) Revenue levels based on application of user cost shares proposed for the price path and exclude miscellaneous income.
(c) Revenue levels based on cost recovery levels adjusted for proposed prices.

Cost recovery revenues over the medium term are based on the maximum prices proposed in this submission phased in progressively from 2000/01. Details of the projected revenues are provided below. This information also enables assessment of the extent to which the costs of bulk water service provision is being recovered from water user revenues, including progress towards achievement of full cost recovery for these services.

Table 32 shows total bulk water costs, full cost recovery revenue and cost recovery revenue based on the maximum prices proposed in this submission phased in progressively over the medium term from 2000/01, for regulated rivers over the eight years 1996/97 to 2003/04.

Table 32: Bulk Water Costs and Revenues (Regulated Rivers) ($2001/02)

Year	**Bulk Water Costs and Revenue Regulated Rivers**			
	Total Costs(a) $000	**Full Cost Recovery Revenue**(b) $000	**Actual & Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
1996/97	71,774	49,895	22,931	26,964
1997/98	73,659	51,367	24,971	26,396
1998/99	69,015	48,431	25,823	22,608
1999/00	64,017	46,585	28,800	17,785
2000/01	77,604	54,388	32,095	22,293
2001/02	77,604	53,083	37,144	15,939
2002/03	77,604	53,083	42,950	10,132
2003/04	77,604	53,083	49,118	3,965

(a) 1996/97 to 1999/00 bulk water total costs are actuals (including attributed asset costs); 2000/01 to 2003/04 bulk water total costs are estimates.

(a) 1996/97 to 2000/01 revenues have been normalised by application of user cost shares proposed for the price path, and exclude miscellaneous income.

(b) 1996/97 to 19999/00 revenues are actuals, 2000/01 revenue is an estimate and 2001/02 to 2003/04 revenues are based on cost recovery levels adjusted for proposed prices; all revenues exclude miscellaneous income.

Table 33 shows total bulk water costs, full cost recovery revenue and cost recovery revenue based on the maximum prices proposed in this submission phased in progressively over the medium term from 2000/01, for unregulated rivers over the eight years 1996/97 to 2003/04.

Table 33: Bulk Water Costs and Revenues (Unregulated Rivers) ($2001/02)

Year	**Bulk Water Costs and Revenue Unregulated Rivers**			
	Total Costs(a) $000	**Full Cost Recovery Revenue**(b) $000	**Actual & Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
1996/97	10,202	4,652	1,162	3,490
1997/98	13,502	5,842	2,687	3,155
1998/99	16,546	6,927	2,762	4,165
1999/00	16,684	7,692	2,923	4,769
2000/01	17,673	9,300	1,976	7,324
2001/02	17,673	9,300	2,357	6,943
2002/03	17,673	9,300	2,815	6,485
2003/04	17,673	9,300	3,356	5,944

(a) 1996/97 to 1999/00 bulk water total costs are actuals (including attributed asset costs); 2000/01 to 2003/04 bulk water total costs are estimates; excludes Sydney Water and Hunter Water Corporations revenues.

(b) 1996/97 to 2000/01 revenues have been normalised by application of user cost shares proposed for the price path, and exclude miscellaneous income; excludes Sydney Water and Hunter Water Corporations revenues.

(c) 1996/97 to 19999/00 revenues are actuals, 2000/01 revenue is an estimate and 2001/02 to 2003/04 revenues are based on cost recovery levels adjusted for proposed prices; all revenues exclude miscellaneous income.

Table 34 shows total bulk water costs, full cost recovery revenue and cost recovery revenue based on the maximum prices proposed in this submission phased in progressively over the medium term from 2000/01, for groundwater over the eight years 1996/97 to 2003/04.

Table 34: Bulk Water Costs and Revenues (Groundwater) ($2001/02)

Year	**Bulk Water Costs and Revenue Groundwater Areas**			
	Total Costs(a) $000	**Full Cost Recovery Revenue**(b) $000	**Actual & Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
1996/97	6,845	4,677	2,168	2,509
1997/98	8,037	5,612	2,425	3,187
1998/99	9,103	6,459	2,644	3,815
1999/00	9,104	5,977	3,128	2,849
2000/01	9,144	6,637	1,930	4,707
2001/02	9,144	6,637	2,316	4,321
2002/03	9,144	6,637	2,779	3,858
2003/04	9,144	6,637	2,934	3,703

(a) 1996/97 to 1999/00 bulk water total costs are actuals (including attributed asset costs); 2000/01 to 2003/04 bulk water total costs are estimates.

(b) 1996/97 to 2000/01 revenues have been normalised by application of user cost shares proposed for the price path, and exclude miscellaneous income.

(c) 1996/97 to 19999/00 revenues are actuals, 2000/01 revenue is an estimate and 2001/02 to 2003/04 revenues are based on cost recovery levels adjusted for proposed prices; all revenues exclude miscellaneous income.

Table 35 shows total bulk water costs, full cost recovery revenue and cost recovery revenue based on the maximum prices proposed in this submission phased in progressively over the medium term from 2000/01, for all services over the eight years 1996/97 to 2003/04.

Table 35: Bulk Water Costs and Revenues (All Services) ($2001/02)

Year	Bulk Water Costs and Revenue All Services			
	Total Costs(a) $000	**Full Cost Recovery Revenue**(b) $000	**Actual & Proposed Cost Recovery Revenue**(c) $000	**Cost Recovery Shortfall** $000
1996/97	88,821	59,224	26,261	32,964
1997/98	95,199	62,821	30,083	32,738
1998/99	94,665	61,817	31,229	30,588
1999/00	89,805	60,251	34,851	25,400
2000/01	104,421	70,325	36,001	34,324
2001/02	104,421	69,020	41,817	27,202
2002/03	104,421	69,020	48,544	20,476
2003/04	104,421	69,020	55,408	13,612

(a) 1996/97 to 1999/00 bulk water total costs are actuals (including attributed asset costs); 2000/01 to 2003/04 bulk water total costs are estimates.
(b) 1996/97 to 2000/01 revenues have been normalised by application of user cost shares proposed for the price path, and exclude miscellaneous income and Sydney Water and Hunter Water Corporations revenues.
(c) 1996/97 to 19999/00 revenues are actuals, 2000/01 revenue is an estimate and 2001/02 to 2003/04 revenues are based on cost recovery levels adjusted for proposed prices; all revenues exclude miscellaneous income and Sydney Water and Hunter Water Corporations revenues.

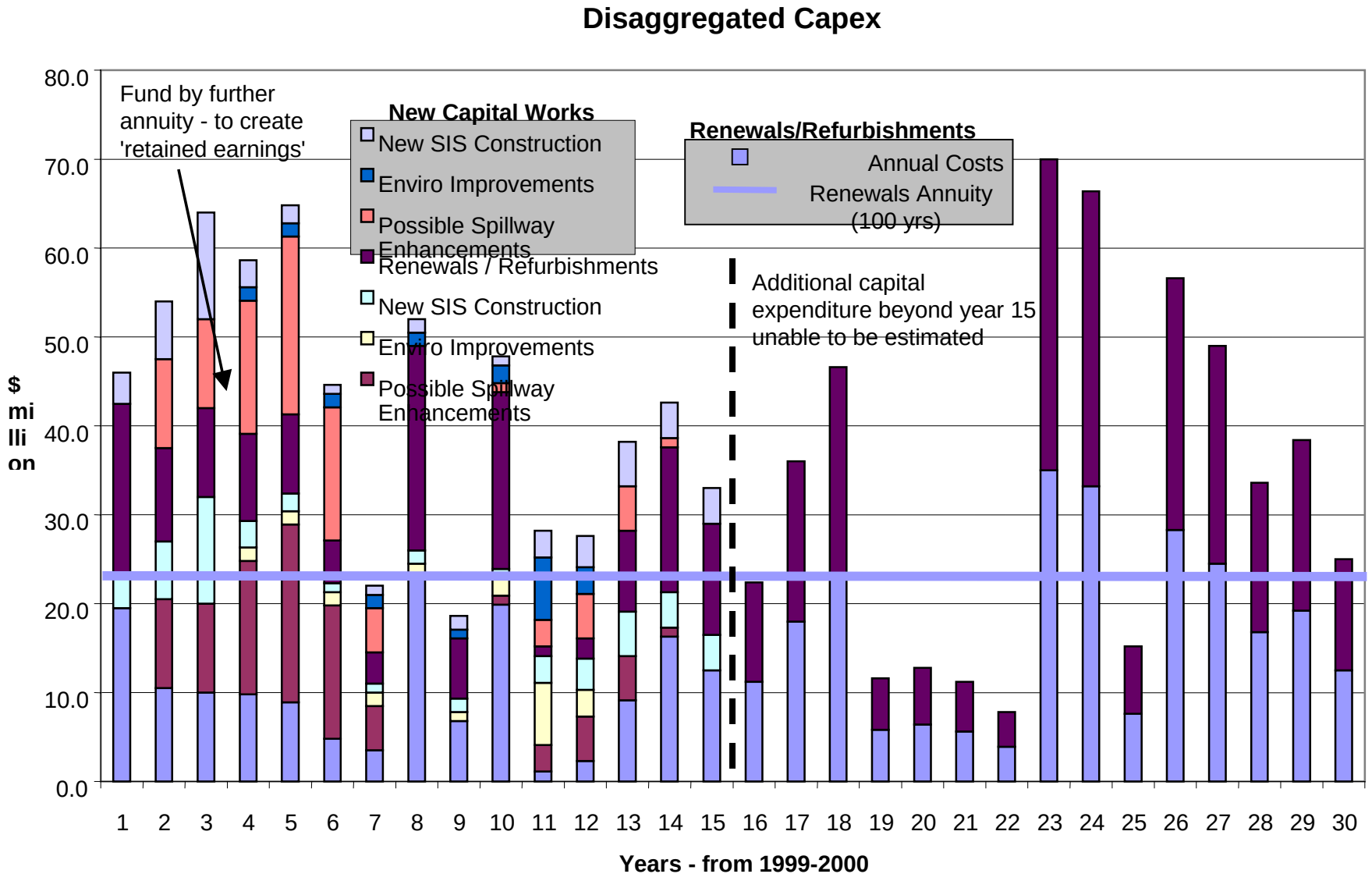
Progress towards Full Cost Recovery

As indicated above, the overall level of cost recovery for bulk water services is highest for regulated rivers and lowest for unregulated rivers, with groundwater in the mid range. Substantial effort has been made to redress the imbalances, as appropriate, with the levels of cost recovery for unregulated rivers showing the largest (percentage) increase over the price path compared to the more moderate growth for regulated rivers and decline for groundwater.

Overall cost recovery in 2003/04 is still low in terms of a full cost recovery benchmark for the water industry given that proposed rather than current cost shares are utilised.

The degree of cost recovery also varies somewhat between river valleys and between groundwater areas. These variations reflect regional diversity in the pattern of bulk water product costs, in some instances being attributable to an element of cross subsidisation. Given the effort to align the costing system for bulk water services with the physical boundaries of river valleys and groundwater areas, the relatively minor levels of cross subsidisation that do occur are considered reasonable.

MDBC 30 YEAR CAPITAL EXPENDITURE PROJECTIONS AND RENEWALS ANNUITY



APPENDIX 5

(a) The capital expenditure projections shown in the table are used to calculate DBBRC's asset renewals annuity.

DBBRC ASSET RENEWALS EXPENDITURE (a)				
Year	**Glenlyon Dam** $	**Boggabilla Weir** $	**Other Assets** $	**Total** $
2000	38,500	130,000	7,000	175,500
2001	382,000	14,000	0	396,000
2002	40,000	2,000	0	42,000
2003	15,000	7,000	0	22,000
2004	45,000	2,000	0	47,000
2005	20,000	7,000	0	27,000
2006	453,150	9,000	0	462,150
2007	0	7,000	0	7,000
2008	2,500	2,000	22,500	27,000
2009	20,000	7,000	2,500	29,500
2010	3,000	2,000	2,500	7,500
2011	34,000	60,000	8	94,008
2012	0	2,000	0	2,000
2013	0	7,000	0	7,000
2014	55,000	2,000	0	57,000
2015	15,000	7,000	0	22,000
2016	358,415	829,000	0	1,187,415
2017	0	7,000	500,000	507,000
2018	0	2,000	22,500	24,500
2019	100,000	7,000	2,500	109,500
2020	39,000	2,000	2,500	43,500
2021	39,000	145,000	2,500	186,500
2022	5,000	2,000	0	7,000
2023	0	7,000	0	7,000
2024	22,000	2,000	0	24,000
2025	0	7,000	0	7,000
2026	1,563,010	19,000	0	,582,010
2027	0	7,000	5,000	12,000
2028	0	2,000	20,000	22,000
2029	20,000	7,000	2,500	29,500
2030	45,900	2,000	2,500	50,400
2031	46,000	878,750	2,500	927,250

APPENDIX 6
BULK WATER PRODUCTS: DESCRIPTION & COST SHARING

Product		Function	IPART User Cost Share (a)	Rationale for IPART User Cost Share	DLWC Proposed User Cost Share	Rationale for DLWC Proposed User Cost Share
PA1	Surface Water Database	Resource Management and Operations	50%	The database is used by DLWC, other public and private sector bodies. This information is essential for DLWC to perform its role as steward and manager of water resources on behalf of the general community. Water users benefit from this information because DLWC is required to deliver water on regulated rivers and allow access to water on unregulated rivers. Other benefits are generated by way of flood warnings, land use planning (ie flood levels) and recreational water use.	50%	No change from IPART user cost share. Surface water data is critically required for river operations, water allocation and sharing. It is also used for flood warning, land use planning (ie flood levels), recreational water use etc. However the major use is related to bulk water use. The user share has been split between regulated and unregulated rivers.
PA2	Groundwater Database	Resource Management	70%	The database is used by DLWC and other community public and private sector bodies. This information is essential for DLWC to perform its role as steward and manager of water resources, but that role is less extensive than for surface water and rivers. Licensed groundwater users benefit from this information because DLWC must advise them on water quality and whether extraction rates are in excess of recharge rates. Other, non chargeable, ground water users benefit from DLWC's monitoring of aquifer levels to preserve access by stock and domestic bores. Groundwater users may benefit from advice on where to locate new bores.	70%	No change from IPART user cost share. Groundwater data is critical for allocation and sharing. The majority of the data collection is directly associated with areas of high water extraction. There is, however, some benefit for non-chargeable water users (ie stock & domestic bores). Part of the data collection and management relates to the quality of the groundwater, which is often impacted by land use activities rather than water use.

PA3	Other Water Databases	Resource Management	0%	These databases are designed to develop a statewide picture of river health and to facilitate research. The main beneficiaries of this product are DLWC and other government agencies which require knowledge about water quality to carry out their statutory obligations. Any charges for this product should be on a fee for service basis to the agency or individual wishing to access the information.	0%	No change from IPART user cost share. DLWC's river health monitoring is partially a response to the impacts of water extraction and strategies to reduce these impacts. However, there are also other impactors on river health. The water GIS is used to develop and implement strategies relating to reducing the adverse impacts of water use (particularly on wetlands), but it is also used to develop and implement strategies which do not directly relate to water extraction (eg bank degradation caused by cattle etc).
PA4	Water Information Products	Resource Management	0%	This product does not include information about how to share or deliver water. The main beneficiaries of these products are government agencies (such as DLWC and MDBC) which require the information to carry out their statutory functions. Any charges for these product should be on a fee for service basis to the agency or individual wishing to access the information.	0%	No change from IPART user cost share. These reports are strongly related to water extraction and river regulation activities. Some reports also relate to water pollution and various water quality issues, which may not be related directly to extractive water users.
PB1	Surface Water Allocation Strategies	Resource Management	50%	This product is designed to share the State's surface water resource to achieve the overall mix of social, economic and environmental outcomes most acceptable to the community. DLWC must do this work to carry out its statutory functions (which benefit the general community). Water users also require this work to best meet their demands for water within limits set by the community. Some benefits accrue to non charged users and the community in terms of better environments.	50%	No change from IPART user cost share. The development, implementation and review of water sharing plans relates directly to chargeable water users. The user share is set below 100% in recognition of the consideration given in these plans to non-chargeable water extractors such as stock and domestic users, even though these users take a very small proportion of the water
PB2	Surface Water Licences	Regulation	100%	Licensed water users are the main beneficiaries of this work because it is required to enforce their rights to access water. Separate fees exist for licence renewals, transfer and applications.	100%	No change from IPART user cost share. Licence surveillance, monitoring and compliance is a clear direct cost to licence holders and there are no other beneficiaries. The fees for licence renewals, transfer and application are accounted for separately at State level.

PB3	Groundwater Allocation Strategies	Resource Management	70%	This product is designed to share the State's ground water resource to achieve the overall mix of social, economic and environmental outcomes most acceptable to the community. DLWC must do this work to carry out it statutory functions (which benefits the general community), but those functions are less extensive than in surface water and rivers. Groundwater users also require this work to best meet their demands for water within limits set by the community.	70%	No change from IPART user cost share. The development, implementation and review of water sharing planning relates directly to chargeable water users. It has been reduced below 100% in recognition that non chargeable water users obtain a small benefit, although they take only a small share of the water.
PB4	Groundwater Licences	Regulation	100%	Licensed groundwater users are the main beneficiaries of this work because it is required to enforce their rights to access water. Separate fees exist for licence renewals, transfer and applications.	100%	No change from IPART user cost share. Licence surveillance, monitoring and compliance is a clear direct cost to licence holders and there are no other beneficiaries. The fees for licence renewals, transfer and application are accounted for separately at State level.
PC1	Rural Water Supply Strategies	Operations	90%	This work is required to deliver water to water users on regulated rivers. Some non chargeable water users obtain benefits but take only a small share (estimated at 10%) of the extracted water. The best proxy for the relative share of benefits is the share of extracted flow taken by each group.	90%	No change from IPART user cost share. Protocols and plans for supplying and distributing water is done because of, and for the benefit of water users. It has been reduced below 100% in recognition that non-chargeable water users obtain a small benefit, although they take only a small share of the water.
PC2	Rural Water Operations	Operations	90%	This work is required to deliver water to water users on regulated rivers and allow access on unregulated rivers. Some non chargeable water users obtain benefits but take only a small share (estimated at 10%) of the extracted water. The best proxy for the relative share of benefits is the share of extracted flow taken by each group. Licensed water users should pay 100% of the cost of billing.	90%	No change from IPART user cost share. Operational supply and distribution of water is done because of, and for the benefit of, water users. It has been reduced below 100% in recognition that non-chargeable water users obtain a small benefit, although they take only a small share of the water.

PC3	Flood Operations	Operations	50%	This work is carried out to protect dams from being damaged by floods and to benefit flood plain residents. While considerable benefit accrues to floodplain residents, extractive users also benefit through protection of infrastructure.	50%	No change from IPART user cost share. These activities are carried out to protect the State's water supply infrastructure and provide some flood impact reduction. The cost of asset compliance works should be shared on the same basis as other associated recurrent costs directed to ameliorating flood events. These works are essential in ensuring infrastructure meets minimal operational requirements through satisfying environmental and safety standards.
PC4	Rural Water Infrastructure	Operations	90%	This work is required to deliver water to water users on regulated rivers. Some non chargeable water users obtain benefits but take only a small share (estimated at 10%) of the extracted water. The best proxy for the relative share of benefits is the share of extracted flow taken by each group.	90%	No change from IPART user cost share. Rural water supply infrastructure exists to provide security of supply to water users. Note that structures which do not have this purpose (eg old railway dams, some weirs) are excluded from consideration in the bulk water supply costs. 10% of costs have been excluded in recognition of secondary benefits associated with dams and weirs.
PD1	Water Management Planning and annual implementation Programs and reporting	Resource Management	0%	DLWC performs this Water reform work to involve the community in deciding how to allocate water resources between competing uses. This product is undertaken as a component of government policy. The main beneficiary of this work is the general community (represented by the State and Federal agencies involved in the administration of water in NSW). DLWC will continue to set limits to the amount and timing of water use to (among other objectives) minimise the impact of water extraction on river health. There is no obvious reason to further increase charges to reduce water consumption below DLWC's determined limits.	50%	Ongoing costs for water management planning and annual implementation programs and reporting. The prime reason for previous exclusion is that the product was seen as a (one off) water reform cost funded by government. Environmental flow planning is only required because of the impacts of water extraction and river regulation, and consequently, the associated costs should be shared at least on an equal basis with users and government.

PD2	Blue-Green Algae Strategies	Resource Management	50%	Algal problems result from river regulation and extraction, the establishment of water storages and increased nutrient inputs from towns and agriculture. River salinity problems result from dryland and naturally occurring salinity, river regulation, water extraction which reduces dilution factors, and irrigation practices. Some share of the costs of these activities is attributable to water users on the basis of polluter pays. However, the relative contribution to blue-green algae and salinity problems by water users and others may vary considerably between valleys. If sufficient information were available, relative contributions to pollutant loads in rivers could be used as the proxy for how these costs should be shared. It may be more appropriate to recover some proportion of these costs by way of charges on discharge of nutrient laden or saline water into rivers rather than water supply charges.	50%	No change from IPART user cost share. Algal problems result from river regulation and extraction, the establishment of water storages and increased nutrient inputs from towns and agriculture. A significant part of this cost can be attributed to extractive water users.
PD3	River Salinity Strategies	Resource Management	50%		50%	No change from IPART user cost share. River salinity problems result from dryland and naturally occurring salinity, river regulation, water extraction which reduces dilution factors, and irrigation practices. A significant part of this cost can be attributed to extractive water users
PD5	Groundwater Management Strategies	Resource Management	70%	DLWC must do this work to carry out it statutory functions (which benefits the general community), but those functions are less extensive than in surface water and rivers. Groundwater users also require this work to best meet their demands for water within limits set by the community.	70%	No change from IPART user cost share. Even though groundwater planning relates to both extraction and quality protection, most of DLWC's activities relate to aquifers which are at, or near, sustainable levels of water extraction. The proximity of extraction levels to sustainable limits makes careful management of this complex resource essential.

PD6	Wetland Strategies	Resource Management	0%			No change from IPART user cost share. DLWC's wetland activities are in response to the impacts of water extraction and river regulation on wetlands and, in some areas, other land use impacts.
PD7	Water Industry Strategies	Resource Management	0%			No change from IPART user cost share. These reforms are aimed at building an efficient water industry. They will deliver long term benefits to water users in terms of definition of access rights and strategies to protect those rights in the longer term.
PE1	Provision for Doubtful Debts	Operations	Not applicable	New product	100%	Funding set aside to meet liabilities arising from outstanding water accounts is reflected in the provision for doubtful debts. The amount of the provision represents a direct cost of bulk water operations and should be recovered.

APPENDIX 7

Murray – Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Murray	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Lucerne	10	1.01%	12	1.21%	15	1.45%	18	1.74%	982	-0.16%	980	-0.21%	977	-0.25%	974	-0.30%
Maize	8	0.80%	10	0.95%	12	1.14%	14	1.37%	445	-0.29%	443	-0.37%	441	-0.44%	439	-0.53%
Millet	8	1.85%	10	2.21%	12	2.64%	14	3.16%	197	-0.65%	195	-0.83%	193	-1.00%	191	-1.22%
Rice - Long	13	1.55%	16	1.85%	19	2.21%	23	2.64%	939	-0.22%	936	-0.28%	933	-0.34%	929	-0.41%
Rice - Medium	13	1.50%	16	1.80%	19	2.15%	23	2.57%	954	-0.22%	952	-0.28%	948	-0.33%	945	-0.40%
Soybeans	8	1.19%	9	1.42%	11	1.70%	13	2.03%	247	-0.48%	246	-0.62%	244	-0.75%	242	-0.90%

Source: Adapted from Southern Summer Irrigated Cropping (Murray) Gross Margin Budgets, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Murrumbidgee - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Murrumbidgee	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Lucerne	8	0.58%	9	0.61%	9	0.63%	10	0.66%	549	-0.04%	549	-0.07%	548	-0.05%	548	-0.07%
Maize	7	0.69%	7	0.72%	8	0.74%	8	0.77%	591	-0.03%	591	-0.06%	590	-0.04%	590	-0.06%
Rice	11	1.25%	11	1.31%	12	1.36%	12	1.42%	1,092	-0.02%	1,092	-0.05%	1,091	-0.04%	1,091	-0.05%
Sorghum	7	1.06%	7	1.11%	7	1.14%	8	1.19%	259	-0.06%	259	-0.12%	259	-0.09%	258	-0.12%
Soybeans	7	1.29%	7	1.35%	7	1.40%	8	1.46%	408	-0.04%	408	-0.08%	408	-0.06%	407	-0.08%

Source: Adapted from Southern Summer Irrigated Cropping (Murrumbidgee) Gross Margin Budgets, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Lachlan - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Lachlan	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Lucerne	52	4.52%	63	5.37%	75	6.38%	83	6.99%	753	-0.40%	742	-1.39%	730	-1.69%	722	-1.07%
Maize	44	6.93%	52	8.20%	63	9.68%	69	10.58%	864	-0.29%	856	-1.01%	845	-1.23%	839	-0.77%
Sorghum	32	6.60%	38	7.82%	46	9.23%	50	10.09%	526	-0.35%	520	-1.21%	512	-1.47%	507	-0.92%
Adzuki Beans	44	6.91%	52	8.17%	63	9.65%	69	10.54%	1,360	-0.19%	1,351	-0.64%	1,341	-0.78%	1,334	-0.48%
Soybeans	36	9.38%	43	11.05%	51	12.97%	57	14.12%	576	-0.36%	568	-1.24%	560	-1.51%	555	-0.95%
Sunflowers	28	6.42%	33	7.60%	40	8.99%	44	9.83%	275	-0.58%	270	-2.02%	263	-2.47%	259	-1.57%

Source: Adapted from Summer Crop Budget Handbook Jemalong-Wyldes Plains Irrigation District and the Lachlan Valley, 1994/95, NSW Agriculture Forbes.

Macquarie - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Macquarie	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Canola	25	5.25%	28	5.91%	31	6.56%	34	7.20%	308	-1.13%	305	-1.07%	301	-1.07%	298	-1.09%
Lucerne	54	5.58%	61	6.29%	68	6.97%	76	7.65%	832	-0.92%	825	-0.87%	818	-0.87%	811	-0.89%
Wheat	25	5.71%	28	6.42%	31	7.12%	34	7.82%	246	-1.41%	242	-1.34%	239	-1.34%	236	-1.38%

Source: Adapted from Central Winter Irrigated Cropping Gross Margin Budget, 1999, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Namoi - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Namoi	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Cotton	29	1.43%	35	1.71%	42	2.04%	50	2.44%	1,964	-0.24%	1,958	-0.29%	1,951	-0.35%	1,943	-0.43%
Lucerne	38	3.53%	45	4.20%	54	5.00%	65	5.94%	1,552	-0.39%	1,545	-0.49%	1,536	-0.58%	1,525	-0.70%
Mungbeans	9	2.23%	11	2.67%	13	3.18%	16	3.79%	287	-0.50%	286	-0.63%	284	-0.76%	281	-0.92%
Navy Beans	18	3.33%	22	3.97%	26	4.72%	31	5.62%	733	-0.40%	729	-0.49%	725	-0.59%	720	-0.72%
Sorghum	30	5.78%	36	6.85%	43	8.11%	52	9.58%	581	-0.83%	575	-1.04%	568	-1.25%	559	-1.52%
Soybeans	36	9.43%	43	11.11%	52	13.04%	62	15.25%	689	-0.84%	682	-1.06%	673	-1.27%	663	-1.54%
Sunflowers	30	6.44%	36	7.63%	43	9.02%	52	10.63%	513	-0.94%	507	-1.19%	499	-1.42%	491	-1.73%
Wheat	20	5.79%	25	6.87%	29	8.13%	35	9.60%	412	-0.79%	408	-1.00%	403	-1.20%	397	-1.46%

Source: Adapted from Northern Summer Irrigated Cropping Gross Margin Budget, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Peel - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Peel	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Cotton	29	1.43%	35	1.71%	42	2.04%	50	2.44%	1,964	-0.24%	1,958	-0.29%	1,951	-0.35%	1,943	-0.43%
Lucerne	38	3.53%	45	4.20%	54	5.00%	65	5.94%	1,552	-0.39%	1,545	-0.48%	1,536	-0.58%	1,525	-0.70%
Mungbeans	9	2.23%	11	2.67%	13	3.18%	16	3.79%	287	-0.50%	286	-0.63%	284	-0.76%	281	-0.92%
Navy Beans	18	3.33%	22	3.97%	26	4.72%	31	5.62%	733	-0.40%	729	-0.49%	725	-0.59%	720	-0.72%
Sorghum	30	5.78%	36	6.85%	43	8.11%	52	9.58%	581	-0.83%	575	-1.03%	568	-1.25%	559	-1.52%
Soybeans	36	9.43%	43	11.11%	52	13.04%	62	15.25%	689	-0.84%	682	-1.05%	673	-1.27%	663	-1.54%
Sunflowers	30	6.44%	36	7.63%	43	9.02%	52	10.63%	513	-0.94%	507	-1.17%	499	-1.42%	491	-1.73%
Wheat	20	5.79%	25	6.87%	29	8.13%	35	9.60%	412	-0.79%	408	-0.99%	403	-1.20%	397	-1.46%

Source: Adapted from Northern Summer Irrigated Cropping Gross Margin Budget, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Gwydir - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Gwydir	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Cotton	16	0.78%	19	0.94%	23	1.12%	27	1.34%	1,960	-0.03%	1,957	-0.16%	1,953	-0.19%	1,949	-0.23%
Lucerne	21	1.93%	25	2.30%	30	2.75%	36	3.28%	1,548	-0.04%	1,544	-0.27%	1,539	-0.32%	1,533	-0.39%
Mungbeans	5	1.22%	6	1.46%	7	1.75%	9	2.09%	286	-0.06%	285	-0.35%	284	-0.42%	283	-0.50%
Navy Beans	10	1.82%	12	2.18%	14	2.60%	17	3.11%	731	-0.05%	729	-0.27%	726	-0.33%	724	-0.39%
Sorghum	17	3.15%	20	3.76%	24	4.47%	29	5.32%	578	-0.10%	574	-0.57%	570	-0.69%	566	-0.83%
Soybeans	20	5.12%	24	6.08%	29	7.21%	34	8.53%	684	-0.10%	680	-0.58%	676	-0.70%	670	-0.84%
Sunflowers	17	3.51%	20	4.18%	24	4.98%	29	5.91%	509	-0.11%	506	-0.65%	502	-0.78%	497	-0.95%
Wheat	11	3.16%	13	3.76%	16	4.48%	19	5.33%	410	-2.67%	407	-0.55%	405	-0.66%	401	-0.80%

Source: Adapted from Northern Summer Irrigated Cropping Gross Margin Budget, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Border Rivers - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Border Rivers	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Cotton	17	0.84%	20	1.00%	24	1.17%	27	1.34%	1,960	-0.03%	1,956	-0.18%	1,953	-0.18%	1,949	-0.18%
Lucerne	22	2.06%	27	2.47%	31	2.88%	36	3.28%	1,547	-0.05%	1,542	-0.29%	1,538	-0.29%	1,533	-0.29%
Mungbeans	5	1.31%	6	1.57%	7	1.83%	9	2.09%	286	-0.06%	285	-0.38%	284	-0.38%	283	-0.38%
Navy Beans	11	1.95%	13	2.33%	15	2.72%	17	3.10%	730	-0.05%	728	-0.30%	726	-0.30%	724	-0.30%
Sorghum	18	3.36%	21	4.02%	25	4.67%	28	5.31%	577	-0.10%	573	-0.62%	570	-0.63%	566	-0.63%
Soybeans	21	5.47%	26	6.51%	30	7.53%	34	8.53%	684	-0.11%	679	-0.63%	675	-0.64%	671	-0.64%
Sunflowers	18	3.75%	21	4.48%	25	5.20%	28	5.91%	508	-0.12%	505	-0.71%	501	-0.71%	497	-0.72%
Wheat	12	3.37%	14	4.03%	17	4.68%	19	5.33%	409	-2.85%	407	-0.60%	404	-0.60%	402	-0.61%

Source: Adapted from Northern Summer Irrigated Cropping Gross Margin Budget, 1998/99, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

Hunter - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

Hunter	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Broccoli	15	0.20%	18	0.25%	22	0.29%	26	0.35%	1,914	-0.04%	1,911	-0.16%	1,907	-0.19%	1,903	-0.23%
Butternut Pumpkins	27	0.33%	32	0.40%	38	0.48%	46	0.57%	1,335	-0.11%	1,329	-0.40%	1,323	-0.48%	1,315	-0.58%
Carrots - Fresh	21	0.33%	25	0.40%	30	0.48%	36	0.58%	2,411	-0.05%	2,406	-0.17%	2,401	-0.21%	2,395	-0.25%
Carrots - Processing	21	0.71%	25	0.85%	30	1.02%	36	1.22%	3,273	-0.04%	3,269	-0.13%	3,264	-0.15%	3,258	-0.18%
Cauliflower	15	0.20%	18	0.23%	22	0.28%	26	0.34%	526	-0.16%	523	-0.58%	520	-0.70%	515	-0.84%
Garlic	29	0.16%	34	0.20%	41	0.24%	49	0.28%	6,756	-0.02%	6,750	-0.08%	6,743	-0.10%	6,735	-0.12%
Onions	25	0.38%	30	0.46%	36	0.55%	43	0.66%	1,326	-0.10%	1,321	-0.37%	1,315	-0.45%	1,308	-0.54%
Parsnips	21	0.17%	25	0.20%	30	0.24%	36	0.29%	1,986	-0.06%	1,982	-0.21%	1,977	-0.25%	1,971	-0.31%
Potatoes - Autum/Winter	30	0.59%	37	0.70%	44	0.84%	53	1.01%	1,031	-0.16%	1,025	-0.59%	1,018	-0.71%	1,009	-0.86%
Potatoes - Spring/Summer	30	1.20%	37	1.44%	44	1.72%	53	2.05%	3,696	-0.05%	3,690	-0.16%	3,682	-0.20%	3,674	-0.24%

Source: Adapted from Vegetable Irrigated Cropping Gross Margin Budget, 1996, NSW Agriculture, http:// www.agric.nsw.gov.au/econ/budget/

South Coast - Change in Variable Costs and Gross Margins as a Result of Increased Water Charges

South Coast	Water Charge 2000/01		Water Charge 2001/02		Water Charge 2002/03		Water Charge 2003/04		Gross Margin 2000/01		Gross Margin 2001/02		Gross Margin 2002/03		Gross Margin 2003/04	
	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	% of TVC	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM	($/Ha)	Change in GM
Dairy	16	0.75%	19	0.90%	23	1.08%	28	1.29%	1,802	-0.16%	1,799	-0.18%	1,795	-0.22%	1,791	-0.26%

Source: Adapted from Bega Dairy - Farm Benchmarking Report, 1996/97, Far South Coast Dairy Development Group

APPENDIX 8

ENQUIRIES

Any questions relating to the maximum prices in this determination should be directed to the DLWC officer in your region

SYDNEY
23-33 Bridge St
GPO Box 39
Sydney NSW 2001
Contact:
Ph: 02 9228 6111

PARRAMATTA
Macquarie Tower
10 Valentine Ave
Parramatta NSW 2150
PO Box 3720
Parramatta NSW 2124
Contact:
Ph: 02 9895 6211

STATE WATER
211 Cobra Street
PO Box 717
Dubbo NSW 2830
Contact:
Ph: 02 6841 7523

BARWON
155-157 Marius St
PO Box 550
Tamworth NSW 2340
Contact:
Ph: 02 6764 5900

CENTRAL WEST
181 Anson St
PO Box 53
Orange NSW 2800
Contact:
Ph: 02 6393 4300

MURRUMBIDGEE
43-45 Johnston St
PO Box 10
Wagga Wagga NSW 2650
Contact:
Ph: 02 6923 0400

SYDNEY SOUTH COAST
84 Crown St
PO Box 867
Wollongong East NSW 2520
Contact:
Ph: 02 4226 8563

HUNTER
Suite 6, 464 King St
Newcastle West
PO Box 2213
Dangar
Newcastle West NSW 2309
Contact:
Ph: 02 4929 4346

FAR WEST
45 Wingewarra St
PO Box 1840
Dubbo NSW 2830
Contact:
Ph: 02 6883 3000

MURRAY
8-20 Edwardes St
PO Box 205
Deniliquin NSW 2710
Contact:
Ph: 03 5881 9200

NORTH COAST
76 Victoria St
Locked Bag 10
Grafton NSW 2460
Contact:
Ph: 02 6640 2000

Economic Assessment of Water Charges in the Peel Valley

Report to the Department of land and Water Conservation

July 2000

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NSW Agriculture

[1] Economist, NSW Agriculture, Orange
[2] Economist, NSW Agriculture, Tamworth

Acknowledgments

A number of people contributed information and their expertise to the completion of this study. The assistance of the following people is gratefully acknowledged by the authors.

Tim Budd, Resource Officer, DLWC, Tamworth

Chris Binks, DLWC, Tamworth

Laurie Pengelley, current President- Peel Valley Water Users Association

Raelene Cramp, Valuer-General's Office, Tamworth

Ian Collett, District Agronomist, NSW Agriculture, Tamworth

Lew Hyson, Irrigation Technical Assistant, NSW Agriculture, Tamworth

Peter Smith, Irrigation Officer, NSW Agriculture, Tamworth

Resource Information Unit, NSW Agriculture, Orange

Rob Young, Program Leader, Economic Resource Policy, Orange

Bryony Mika, Natural Resource Pricing Unit, DLWC, Parramatta

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1. Introduction

1.1 Background

In 1995 the NSW Government endorsed its commitment to the principles of full cost recovery pricing as agreed to by COAG. The package resulted in the introduction of interim rural water charges for NSW irrigators in the 1995-96 season and referral of the rural water pricing issue to the Independent Pricing and Regulatory Tribunal (IPART). IPART subsequently undertook an inquiry into bulk water pricing in NSW and has made bulk water price determinations for each irrigation season from 1996-97 onwards.

IPART's last determination was released in July 1998 in which it set maximum prices to be charged for bulk water services for the 1998-99 and 1999-00 irrigation seasons. IPART is continuing its role in determinations and is currently involved in setting water prices for 2000-01 and 2001-02 irrigation seasons.

As part of the IPART process, the Department of Land and Water Conservation (DLWC) was concerned about the effects that proposed price increases may have on users. The DLWC contracted NSW Agriculture to undertake an evaluation of the impact of proposed water price increases on irrigators in the Lachlan and Peel Valley as two case study catchments. This report focuses on the Peel Valley.

1.2 Objectives

The objectives of this study relate to the impact of increased water price charges on irrigators in the regulated river section of the Peel Valley. The terms of reference for the study are built around describing these impacts by addressing the following three areas:

i) The importance of water to total farm costs as well as its importance to enterprise costs;

ii) The adjustment responses irrigators are likely to make in response to changes in water charges; and

iii) The impact of increasing water charges on the viability and profitability of farms.

1.3 Approach

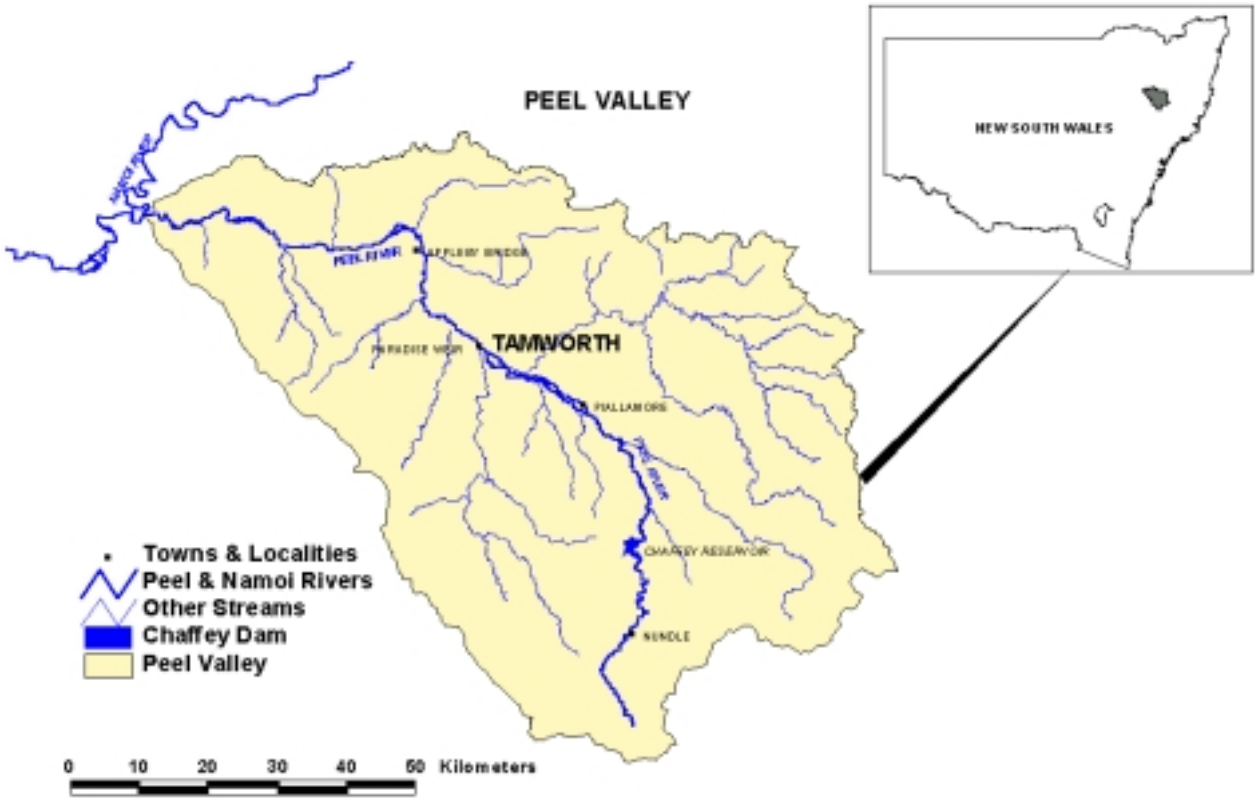
NSW Agriculture adopted a representative farm approach to the assessment of impacts of water price increases in the Peel Valley. This involved the development of whole farm models to represent the key physical and financial characteristics of irrigation farming along the Peel Valley. For the analysis undertaken, the regulated section of the Peel River was broken down into four zones consistent with the availability of hydrology data from the DLWC. The impacts of proposed bulk water price increases were assessed on each of these representative farms under average climatic conditions and allocation availability.

2. Description of the Peel Valley[1]

2.1 Overview

The Peel Valley is located in Northern NSW (see Figure 1). The Valley is defined from the headwaters of the Peel River at Ben Halls Gap above Nundle, through Woolomin, Dungowan Piallamore and Tamworth to the junction with the Namoi River close to Lake Keepit. The Peel catchment covers approximately 4,670 square kilometres.

Figure 1 : The Peel Valley



The Peel Valley contains the entire Tamworth and Nundle Local Government areas and a major proportion of the Parry Local Government area (See Appendix 1). There are a total of 848 agricultural holdings in the Peel Valley[2]. Agriculture is a significant contributor to the local economy with a total value of production in 1996-97 in excess of $142 million (ABS, 1998). Around 60 per cent of this value is derived from the intensive livestock industries (poultry, pig and dairy production).

[1] This discussion draws on a Situation Statement produced by the Peel & Upper Namoi Valley Irrigation Project Team (1989).

[2] For the purposes of the discussion, the whole area of the Parry shire has been included in the Peel Valley.

The contribution of irrigated agriculture to the total value of agricultural production is not directly attainable. NSW Agriculture undertook satellite imagery and aerial photography analysis as part of this project and the results indicate that there is approximately 3,500 ha of irrigated crops and pasture in the area. Data from DLWC suggests that around 2,000 ha of this can be attributed to irrigation from regulated supplies out of the Peel.

The main agricultural activity in the upper reaches of the Peel River Valley is the grazing of sheep for wool, though this is often supplemented by poultry raising and dairying. Around Tamworth, extensive irrigation is carried out for the production of lucerne fodder and grain crops with dairying and pig raising still having some importance. Below Tamworth, extensive areas of wheat, lucerne and fodder crops are grown together with the grazing of cattle and sheep for meat and wool.

The major water storage in the catchment is Chaffey Dam located some 43 km upstream of Tamworth on the Peel River. The dam was completed in 1979 with a capacity of 62,000 megalitres and has a catchment area of approximately 420 square kilometres. Chaffey Dam was constructed for the dual purposes of irrigation and for Tamworth City water supply.

Landslopes in the Peel River Valley are predominantly mountainous with approximately 51% of the total area of the valley having slopes of 15 degrees or more. Undulating to hilly and hilly to steep areas of the valley comprise 11% and 5% respectively of the total area while flat areas comprise the remaining 33%. The Peel Valley has extensive areas of highly fertile irrigable land located along alluvial river flats. This land is occasionally inundated with flood waters bringing sediments from higher reaches and contributing to soil fertility.

Average annual rainfall in the Peel Valley increases with elevation. The annual median rainfalls over the headwaters of the river above 920m are between 890mm and 1140mm, the greater values are recorded in the high peaks of the Divide. Closer to the junction of the Peel and the Namoi Rivers, the annual median rainfalls are approximately 580mm. January is the wettest month of the year whilst May is the driest.

2.2 Irrigated agriculture

2.2.1 Regulated and groundwater supplies

The construction of Chaffey Dam increased the irrigation potential of the Peel Valley which was previously restricted by unreliable water supplies. Information from DLWC's hydrology model show that irrigation supplies from the Peel River are very secure compared to other Northern Valleys. Under current levels of development, irrigators can expect to receive their full allocations in 92 years out of 100 (see Appendix 1). Simulated announced allocations for the Peel Valley, using historical climatic information from 1891 to 1998, yielded an average announced allocation of 94 per cent. Actual announced allocations show marginally lower, but still relatively high, allocation reliability. Between 1981 and 1996 irrigators received their full allocations in 80% of years[1].

The Peel Valley is relatively under developed compared to many other valleys with usage commonly below half of total entitlement. The annual use of regulated irrigation entitlement

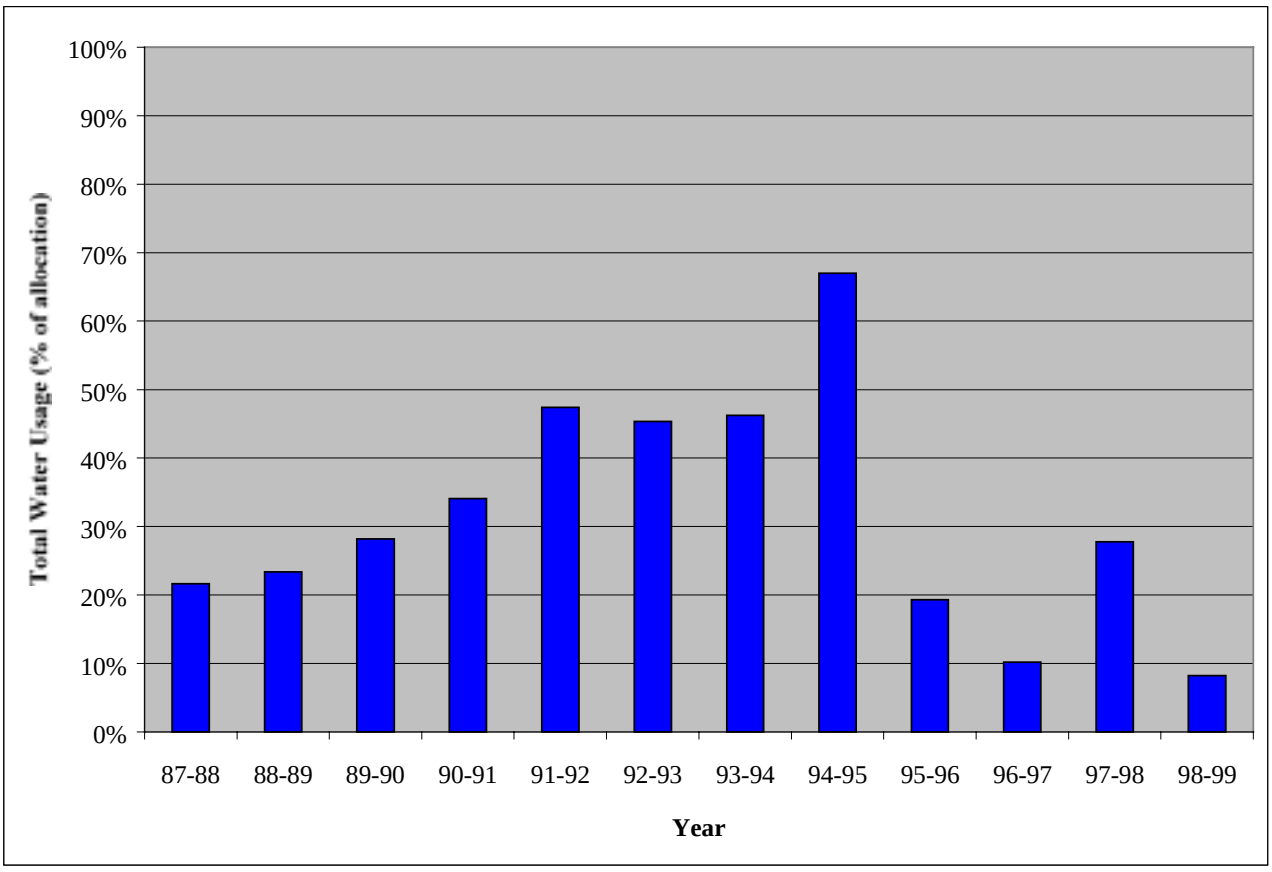
[1] Up until 1997 the announced allocation was calculated using a utlisation factor reflecting less than 100% entitlement usage. Since 1997 DLWC have changed the method used to calculate allocations which is based on full utilisation of entitlement through temporary trading. As a consequence, allocation announcements will now be lower than previously and more active irrigators may now have to use the temporary trading market to maintain water usage.

averaged just 34 per cent over the last 12 years. This is strongly climatically related with usage ranging from 8 to 67 per cent over the 1987-88 to 1998-99 period. Figure 2 plots total irrigation diversions in the regulated section of the Peel Valley as a proportion of irrigation entitlement.

Many irrigators in the Peel Valley also have access to groundwater reserves. The bulk of the Valley's groundwater is contained within the alluvium of the river's flats. The flats have significant groundwater potential and irrigation is undertaken along the Peel River and Tributaries from wells[1], bores and excavations[2]. The greatest development in groundwater use is in the central part of the Valley near Tamworth downstream to Attunga. It is here that flats are at their widest and fairly intensive irrigation is undertaken.

The alluvium in the Peel is typically between 10 to 20 metres thick with a porosity of 10%. Therefore, under each hectare of river flat there would be 10 to 20 ML of stored groundwater. There is a close connection between river levels, rainfall and groundwater levels. However, in times of drought, groundwater reserves are a more reliable source of irrigation water.

Figure 2: Irrigation diversions in the Peel Valley



Source: Data provided by DLWC, Tamworth

Like surface water availability, groundwater allocations to irrigators on the Peel far exceed actual use. Table 1 provides information on groundwater allocation and use in the Peel Valley in 1998-99.

[1] 95% of irrigation from groundwater in the Peel is out of wells (pers comm Binks, 2000)

[2] An excavation is a pit dug in the ground until the groundwater table is reached. These are located close to the river and are usually 5-6 m deep. There are only 3 – 4 excavations in use in the Peel Valley.

It indicates an average usage of between 10-11 per cent for both the Upper and Lower Peel sections. For those farms extracting groundwater in 1998-99, average entitlement usage was between 15-16 per cent in both sections. It is likely that both the total and average figures presented are likely to underestimate long term average usage of groundwater entitlements in the Peel Valley with 1998-99 being a wetter year than average.

Table 1 Peel Valley Groundwater Allocation and Use in 1998-99

	Allocation (ML)	Use (ML)
Peel		
- Total	41,957	4,455
- Average per farm	160	29

Source: Data provided by DLWC, Tamworth

2.2.2 Irrigated agricultural enterprises

Lucerne hay grown under spray irrigation is the main irrigated crop in the Peel Valley, accounting for more than 50% of the irrigated area in the late 1980's (Peel & Upper Namoi Valley Irrigation Project Team, 1989). More recent information from DLWC indicates that lucerne accounted for 65% of irrigated crop area in 1996/97, 64% in 1997/98 and 76% in 1998/99 (Table 2). The average contribution of crops to total irrigated area over the last three years is provided in Figure 3.

Table 2: **Recent agricultural production in the Peel Valley**

Crop	1996/97 (ha)	% of irrigated area	1997/98 (ha)	% of irrigated area	1998/99 (ha)	% of irrigated area
Lucerne	1,069	65%	1,234	64%	970	76%
Pasture	177	11%	303	16%	145	11%
Oats	198	12%	131	7%	65	5%
Sudax (forage sorghum)	37	2%	91	5%	60	5%
Summer cereal	105	6%	134	7%	20	2%
Wheat	38	2%				
Cow Peas			16	1%		
Soybeans			20	1%		
Navy beans	18	1%				
Vegetables	10	1%			20	2%
TOTAL	**1,652**		**1,929**		**1,280**	

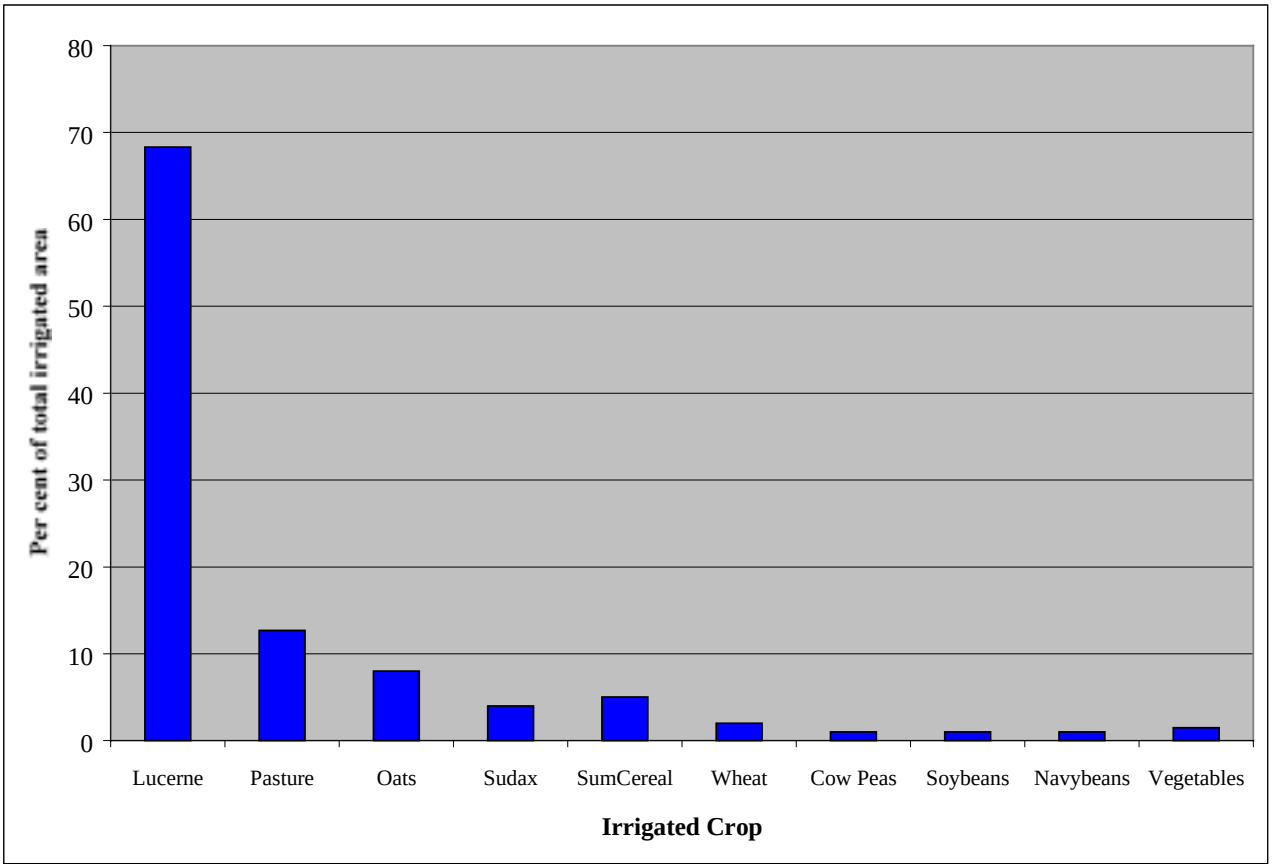
Source: Data based on return card information provided by DLWC, Tamworth

Lucerne is a perennial crop which produces it's highest yields during the second year of growth. In climates of mild winters, lucerne is grown for 3 to 4 years continuously. Following seeding, the lucerne crop takes 3 months to establish. The number of cuts for a crop varies depending on the climate (warm and dry with sufficient irrigation has more cuts) and ranges from between 2 and 12 per growing season. Lucerne hay can grow under a wide range of climates. The optimum

temperature for growth is 25°C with growth dramatically inhibited when temperatures are below 10 or above 30°C.

The majority of lucerne producers in the Peel Valley utilise spray irrigation systems. A small number of irrigators use flood systems and there has been more recently some uptake of sub surface drip irrigation systems.

Figure 3: Average contribution of crops to total irrigated area (1996/97 – 1998/99)



3. Methodology

3.1 Outline of approach

The purpose of this analysis is to provide information to the DLWC on the magnitude of financial impacts on irrigators in the Peel Valley of increased irrigation water prices. A clearer picture of the likely impacts of price increases can be incorporated into the DLWC's assessment of proposed increases, and ultimately, would place IPART in a better position to make its overall price determination.

A number of techniques could be used for the assessment of on-farm impacts of water reforms. These techniques range from simple budgeting methods to formal optimisation models. An evaluation of financial impacts from water price increases can be undertaken in a reasonably straightforward manner using a standard whole farm budgeting framework.

Where there is significant homogeneity amongst irrigation farms in terms of allocations, irrigation systems, enterprise areas, productivity and overhead cost structures, a single agricultural model of the region or a single representative farm model may be adequate. However, in the case of the Peel Valley there are significant differences between farms suggesting a more disaggregated approach is required. While the majority of farms irrigating from the Peel River grow lucerne, key farm characteristics such as farm size, areas of lucerne grown and cost structures vary.

Representative farm models were developed for use in the evaluation of water price increases. The models are spreadsheet based and attempt to capture the key characteristics of irrigation farming in different zones in the Peel Valley. The models are set out as a whole farm budget with key farming decisions based on information elicited from irrigators and local technical experts. Consequently, the representative farm models differ from formal optimisation models such as linear and dynamic programming models in that they are based on key decision rules rather than profit maximisation objectives.

3.2 Developing the representative farm – data collection

Developing representative farm models can involve extensive data search, local consensus data workshops, and direct community consultation. While a full survey of irrigation farms wasn't possible, DLWC, ABARE, NSW Agriculture technical staff and local irrigators provided input into this analysis. The key inputs to the representative farm modeling are discussed below.

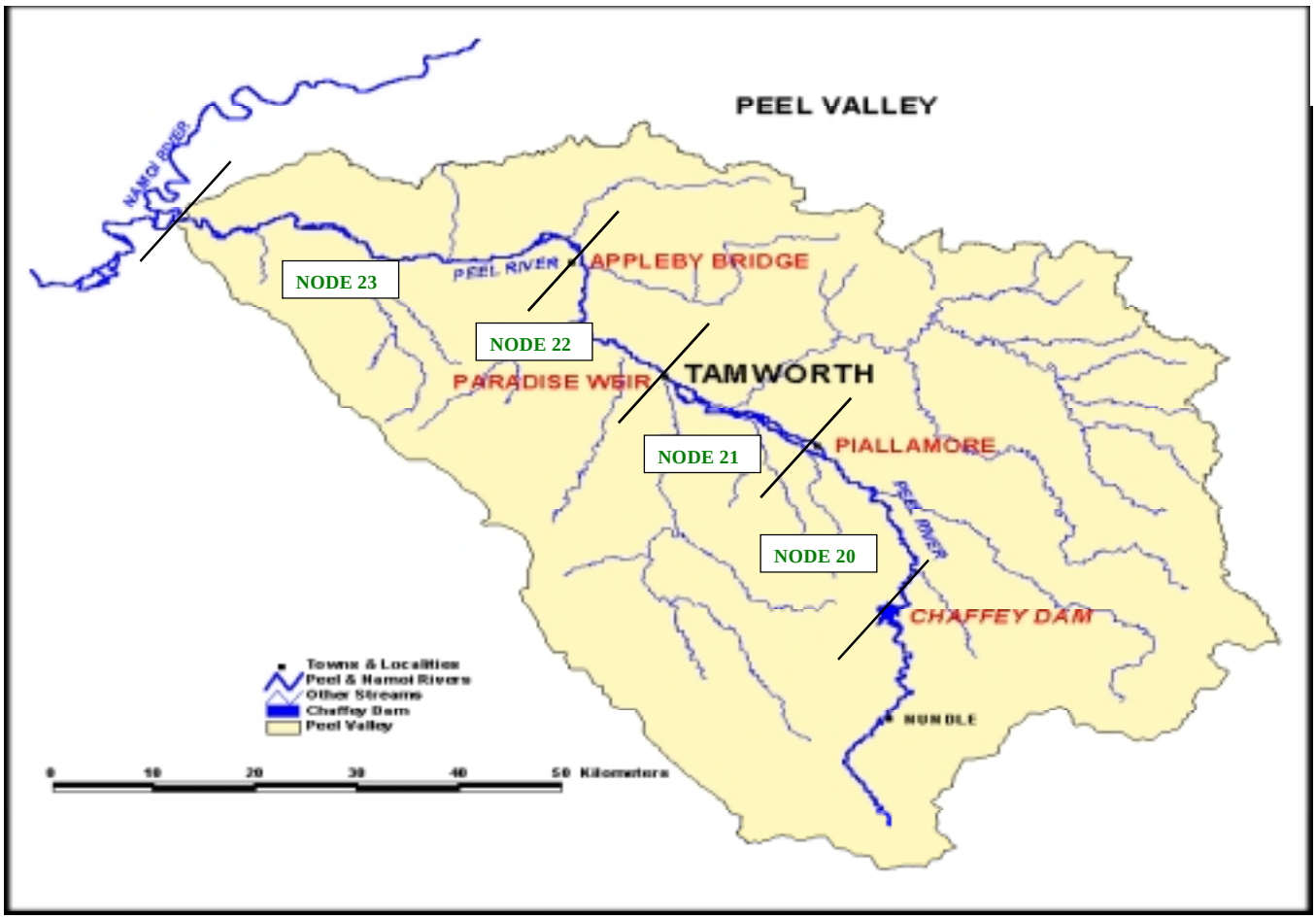
3.2.1 Base physical characteristics

To determine the base physical characteristics of farms in the Peel Valley information was collected on water entitlements, water usage, property size and extent of irrigated areas. Water allocations and historical usage information for the Peel Valley were obtained from DLWC at Tamworth. The data were provided on an individual licence basis for the last twelve years with licences allocated to a particular sub catchment as per the DLWC's hydrology model. Data for the Peel Valley was broken down into the following four 4 sections (see **Figure 4**), referred to as nodes:

- Chaffey Dam to Piallamore Water Use (Node 20)

- Piallamore to Paradise Weir Water Use (Node 21)
- Paradise Weir to Appleby Bridge Water Use (Node 22)
- Appleby Bridge to Namoi Junction Water Use (Node 23)

Figure 4: Location of Nodes in the Peel Valley



Information on property size and irrigated areas were obtained from a geographic information system (GIS) database established using ARC/INFO software. Information on property sizes were originally gained from an existing cadastre overlay obtained from the Land Information Centre. This was modified in accordance with topographic maps illustrating each property provided by the DLWC and further refined on the basis of data provided by the Valuer General's Department. Irrigated areas were obtained by the interpretation of 1998 colour aerial photography of the Peel Valley provided by DLWC and interpreted by NSW Agriculture's local technical staff. These data were digitised as a layer of the Peel Valley GIS.

With the assistance of DLWC technical staff and the Resource Information Unit of NSW Agriculture, individual data on properties was compiled into a database of irrigated agricultural production on a node by node basis. A description of the nodes in terms of the number of licences, property areas, irrigated areas, allocation size and water usage is given in Table 3.

Table 3: Description of irrigated agriculture in Nodes

	Unit	Node 20	Node 21	Node 22	Node 23
Farm numbers					
No. of irrigation farms		35	28	35	29
No. of irrigation farms that used water in 1997-98		25	16	19	16
Farm area and irrigated area					
Average irrigated area of all irrigation farms	Ha	28	21	38	53
Average property size of all irrigation farms	Ha	108	60	82	388
Water allocation					
Average base allocation	ML	171	113	176	386
Range of base allocation	ML	12 – 753	12 – 390	12 – 972	18 – 1,359
Water use					
Average use of all irrigation farms	ML	62	30	28	100
Average use of irrigation farms that used water in 1997-98	ML	90	56	52	182

Water usage information is reported on a farm basis rather than an individual licence basis given that some farms have multiple irrigation licences. For the purpose of discussion the water use figures are based on the 1997-98 irrigation season. 1997-98 was a reasonably typical rainfall year with 436 mm received over the main growing season (September to March). The average growing season rainfall over the last 30 yrs in Tamworth (1968-98) was 463 mm.

3.2.2 Financial characteristics

In order to fulfill objectives one and three of the study, variable and overhead costs for the representative farms were required. Overhead costs are those costs incurred regardless of the enterprise mix. ABARE was the primary source of financial information for the representative farm. ABARE extracted farm physical and financial data from their 1996/97 survey of irrigation farms for a "cluster" of five sample points relating to farms in the Peel Valley predominantly involved in pasture/lucerne production. Key characteristics of survey farms reported by ABARE were checked against existing data sources to assess its suitability. Further financial information was provided by the Valuer General's Office in terms of land values. Land values were used to determine local government rates on land and to provide a basis for equity calculations.

3.2.3 Lucerne Enterprise Information

As discussed in Section 2, lucerne is the major irrigated enterprise in the Peel Valley. To gain a picture of the enterprise costs and returns of lucerne, data from the 'Haymaker' project (NSW Agriculture, 1994) was assessed. The 'Haymaker' project was developed by NSW Agriculture in 1989 and funded by the Rural Industries Research and Development Corporation (RIRDC) after ABARE statistics indicated that average lucerne hay yields in the Peel Valley in 1986/87 were as

low as 9 tonnes/ha/year. This was despite previous trials with irrigated lucerne growers which found that around 21 tonnes/ha/year was not unrealistic in the Peel Valley.

The 'Haymaker'program identified inefficient irrigation management, poor agronomic management of lucerne and inferior hay making techniques as causes of the low average yield. The program aimed to combine the practical knowledge of growers, scientific principles and research results to address the problem of continuously low lucerne yield. For comparative analysis, the 'Haymaker'program required lucerne growers to record production and physical inputs of a lucerne stand over the growing season. Key performance indicators such as yield, costs and gross margin were provided back to farmers.

Lucerne gross margins for each node are derived[1] from the data recorded from the 'Haymaker' project. This was the only data set available that had some measure of returns and costs for lucerne in the Peel Valley. Owing to the low sample numbers in each node, gross margins for node 20 and 21 were amalgamated, as were those for Nodes 22 and 23 and these are displayed in Table 4.

Table 4: Representative Lucerne Gross Margin Characteristics

		Node 20 & 21	Node 22 & 23	All Nodes	NSW Ag Handbook
		Full production	Full production	Establishment	Full production
Income	($/ha)	$2,203	$1,682	$1,435	2,810
Yield	(t/ha)	15.00	12.00	10.00	15.4 t/ha
% prime		56%	39%	48%	
% medium		28%	42%	35%	
% poor		16%	19%	17%	
Seed cost	($/ha)	na	na	$93	
Fertiliser cost	($/ha)	$26	$8	$33	
Chemical cost	($/ha)	$23	$8	$17	
Water use	(ML/Ha)	2.7	3.7	3.0	6.25
Water pumping cost	($/ha)	$119	$155	$130	
Harvest cost	($/ha)	$395	$367	$291	
Total Costs	($/ha)	$562	$538	$607	1,041
Gross margin/ HA		**$1,641**	**$1,144**	**$828**	1,769
Gross margin/ ML		**$608**	**$309**	**$276**	283

The returns per megalitre for Nodes 20 and 21 are quite high due to relatively low water use per hectare. Also reported in Table 4 are lucerne returns from budgets published by NSW Agriculture from the Farm Enterprise Budgets series. The returns provided are not dissimilar to the Haymaker data with the exception of returns per megalitre which again relates to low water use per ha of

[1] After discussions with NSW Agriculture officers involved with the Haymaker project, yields were revised downwards to reflect more average district yields. This was considered necessary given the likelihood that the 'Haymaker' group probably consisted of better producers and therefore may have biased the yield estimates upwards.

nodes 21 and 22. This low level of water use may in part relate to lucerne accessing some of its water requirements directly from shallow groundwater aquifers lying close to the Peel River.

Information on other agricultural enterprises were taken from NSW Agriculture's Farm Budget Handbooks for the North West. This included dryland wheat and livestock gross margins and information on machinery costs for different size plant and equipment. The extent of livestock ran on properties were taken from the 1998 Rural Lands Protection Boards' (RLPB) Association Annual Report.

3.3 Representative farm models of the Peel Valley

Four representative farm models were developed to represent irrigated agriculture in the Peel Valley, one model for each node. After an assessment of water use data for the Peel Valley, it was decided that the analysis should focus on commercial sized farms rather than small hobby farms. For the purpose of this study those farms which had a water use of greater than or equal to 20ML and an irrigated area of greater than or equal to 10 ha were considered to be commercial farms. The characteristics of the commercial farms were averaged for each node and this average was used as a basis of the representative farms[1]. The physical characteristics of the four representative farms are summarised in Table 5.

Table 5: Representative Farm - Key Physical Characteristics

	Number of all farms	No. of farms meeting size criteria	Base Allocation ML	Irrigated Area Ha	Farm area Ha	Water use (1997/98) ML	Water use per ha (1997/98) ML
Node 20	35	18	253	37	151	103	2.8
Node 21	28	7	126	24	78	65	2.7
Node 22	35	11	314	34	111	86	2.6
Node 23	29	12	471	50	502	184	3.7

Information from the 1999 ABARE "Grains Access" database indicated that for farms around Tamworth, 39.6% of total farm area was cropped. As discussed in the previous section, irrigated area per farm was estimated from maps, aerial photographs and local knowledge of DLWC and NSW Agriculture staff. The irrigated area was subtracted from the total crop area, and the remainder of the crop area was assumed to be sown to dryland wheat, the most common dryland crop option. The rest of the farm area was assumed to be under pasture for livestock.

Consultation with NSW Agriculture staff indicates that carrying capacity on farms in the area can be estimated at 5 DSE (dry sheep equivalents) per hectare (I. Collett, pers. comm.). Enterprise costs and income for livestock were drawn from NSW Agriculture Farm Budget Handbooks, using the 'Inland weaners-stores' budget from Davies *et al*, (1999) and second cross lambs from Webster (1998). Proportions of sheep to cattle were estimated using the gross livestock figures listed for the Tamworth RLPB district in the RLPB Association Annual Report for 1998. These figures indicated

[1]The focus of the study was on farms predominantly involved in lucerne hay production. Dairy farms were identified in the database and their effect removed from the calculations for representative farms reported in Table 5.

that on a number of livestock basis, 34% of the district carries sheep and the other 66% cattle. Hence these proportions were used for the pasture area in the whole farm model.

The key financial characteristics of the four representative farms are provided in Table 6. Further information on financial assumptions can be found in Appendix 2.

Table 6: Representative Farm – Key Financial Characteristics

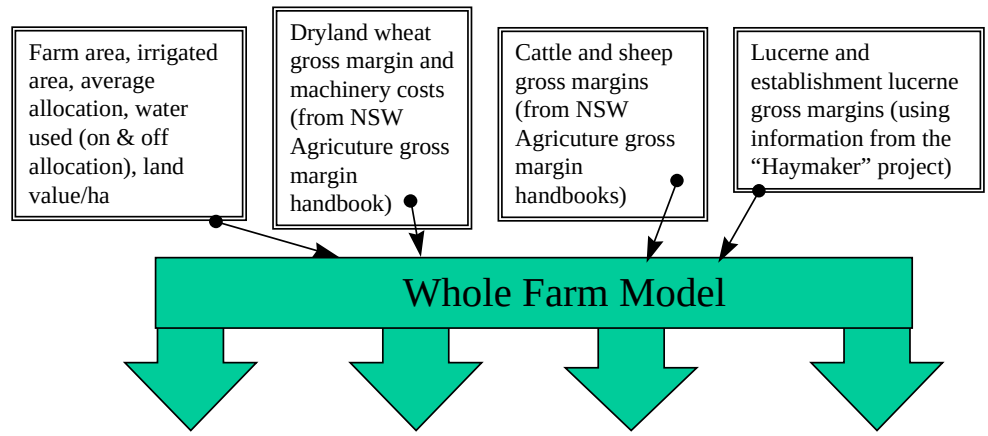
Overhead Costs	**Node 20**	**Node 21**	**Node 22**	**Node 23**
Administration Expenses	$1,461	$755	$1,077	$4,862
- Bank Charges	$120	$120	$120	$120
- Insurance	$1,349	$697	$995	$4,491
- Workers compensation	$636	$329	$469	$2,117
Loan repayments	$2,186	$1,130	$1,612	$7,276
Labour	$6,359	$3,286	$4,690	$21,166
Fuel and Oil	$1,693	$1,054	$1,494	$3,860
Electricity (not including pumping costs)	$900	$900	$900	$900
Repairs and Maintenance				
- Plant and equipment	$3,931	$4,115	$4,001	$3,921
- Structures	$238	$238	$238	$238
Depreciation				
- tractor 1	$2,229	$1,353	$1,895	$3,790
- tractor 2	$0	$0	$0	$5,051
- Other plant and equipment	$9,947	$9,071	$9,613	$12,768
- Structures	$1,250	$1,250	$1,250	$1,250
Rates				
- Land	$1,084	$1,060	$1,017	$1,931
- Water	$1,108	$553	$1,380	$2,069
Equity	95%	97%	97%	91%

With this data, the representative farm model determines the area of irrigated and dryland crop planted, calculates irrigated crop yield and outputs farm performance data such as water use, gross margin and financial indicators. A graphical representation of the model structure is provided in Figure 5.

Profitability indicators used to calculate the impact of increasing water charges on the viability and profitability of farms were net farm income, business return, operating return, return on total assets and return on equity. For all results, the issue of tax has been excluded, since different business structures have different tax levels, and time and resources prevent an exhaustive study of business structures in the region.

Appendix 3 contains the full details of the representative farm models.

Figure 5: The Representative Farm Model



Gross margin by enterprise

Total farm gross margin

Total farm overhead costs

Net Farm Income

Assets & Liabilities Statement

Profit and Financial Analysis Statement

Business return

Operating return

Return on Equity

Return on Assets

•Bulk water usage charge as a proportion of lucerne variable costs
•Ratio of bulk water use charge to total farm variable costs
•Ratio of total water costs to total farm costs
•Effect of Water Charge Price Increases on Key Profitability Indicators

4. Assessment of bulk water price increases

This section reports on the analysis undertaken to address the three key objectives outlined by DLWC. They include the importance of water costs to enterprise and farm costs, the impact of increasing water charges on the profitability of farms and the adjustment responses irrigators are likely to make to changes in water charges.

The price scenarios used in the analysis are given in Section 4.1 together with a discussion of what the increases mean in terms of effective prices paid. The importance of water costs to enterprise and farm costs are assessed in Section 4.2. Finally, Section 4.3 discusses both the impact of water charges on the profitability of farms and the types of adjustment responses that irrigators are likely to make. These two elements are discussed together because of the integral role that responses can play in determining impacts.

4.1 Pricing scenarios and effective prices

Information on the estimated increases in bulk water charges were supplied by DLWC in March 2000. The increases are based on DLWC's 1998 submission to IPART and are provided in Table 7 below. These estimated prices may change in the final determination.

Table 7: **Estimated bulk water charges**

Year	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Est. usage charge ($/ML)	$ 5.12	$ 7.81	$ 10.50	$ 13.19	$ 15.88
Est. entitlement charge ($/ML)	$ 4.39	$ 6.50	$ 8.61	$ 10.72	$ 12.83

Source: Natural Resource Pricing Unit, DLWC, 2000

Previous submissions from irrigator groups to the IPART Inquiry into Bulk Water Pricing has raised concerns about the impact of fixed entitlement charges. One of the concerns has been in respect to the significance of fixed charges at times of low water availability. Fixed entitlement charges become more significant as utilisation of entitlement falls. Consequently, the balance between variable and fixed components of water charges has a differential effect on water users depending on their level of entitlement utilisation. The costs of water to less active irrigators increases as the reliance of cost recovery moves away from water usage charges towards fixed entitlement charges and vice versa.

This has been raised as a particular issue for Peel Valley irrigators given that the average utilisation of regulated water supplies in the Valley has averaged just 34 per cent of entitlement over the last 12 years. This low level of utilisation raises effective water prices (charges per ML of water actually used) paid by irrigators. To guage the significance of this issue, effective prices per ML have been calculated for each of the representative farms and are presented in Table 8 below.

The effective prices per ML used differ for each representative farm depending upon the utilisation of entitlement. The results indicate that effective prices paid by less active irrigators can be significant even under current price levels. However, while effective prices per ML are of interest they tell us little about the contribution of water costs to farm costs and ultimately little about the impacts of price increases on farm profitability. The following sections focus on this issue.

Table 8: Water prices in terms of effective prices per ML used

	Utilisation of allocation	Years				
		1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Node 20	41%	$15.87	$23.73	$31.58	$39.44	$47.30
Node 21	52%	$13.63	$20.41	$27.19	$33.97	$40.75
Node 22	27%	$21.21	$31.63	$42.05	$52.47	$62.90
Node 23	39%	$16.34	$24.43	$32.51	$40.59	$48.68

4.2 Relative importance of water charges to farm costs

The importance of water charges in farm costs is analysed using the four representative farms identified in Section 3. Water use for each representative farm is based on actual usage in 1997-98 which rainfall records suggest is a reasonably 'average' year. The importance of water charges to farm costs is expressed in terms of the contribution of water to enterprise (lucerne) variable costs and total farm costs. Water charges in the current year (1999/2000) and the final determination year (2003-04) are used to provide an assessment of the relative importance of water costs.

In considering the importance of water charges to farm costs it is important to compare like cost items. Water charges are made up of both variable and fixed components. Usage charges are the variable component of total water charges in that they vary with the amount of water applied. Irrigators can attempt to minimise these costs through changing water application rates, modifying enterprise mix, adopting water use technologies etc. Entitlement charges on the other hand are fixed costs which cannot be avoided. These costs effect overall farm profit but are not allocated to any individual enterprise because they cannot be avoided and remain the same (by definition) irrespective of the nature and level of enterprises run on a property. In making comparisons, variable water charges should be assessed in terms of their contribution to enterprise variable costs while total water charges should be considered in their contribution to total farm costs. This approach is followed below.

4.2.1 Contribution of water usage charges to enterprise costs

Table 9 presents results on the contribution of water usage charges to the variable costs (eg. fertiliser, chemicals, hay making costs, freight etc) associated with growing lucerne. Also reported is the contribution of water usage charges to water variable costs (bulk water use charges plus pumping costs[1]) incurred in lucerne production. The ratios presented are based on water use information for the 1997-98 irrigation season. Water use per hectare for lucerne production is estimated at 2.7 ML/ha for Nodes 20 and 21 and 3.7 ML/ha for Nodes 22 and 23.

Table 9: Bulk water usage charge as a proportion of lucerne variable costs

Node 20 & 21	1999/00	2003/04

[1] Pumping costs per megalitre have been drawn from the Haymaker Project records from the early 1990's, and are estimated at $43.23 per megalitre for Nodes 20 and 21, with $41.82 the estimated pumping cost per megalitre for Nodes 22 and 23.

Ratio of water use charges to lucerne variable costs	3.1%	9.7%
Ratio of water use charges to lucerne water variable costs	10.6%	26.9%
Nodes 22 & 23		
Ratio of water use charges to lucerne variable costs	3.5%	10.9%
Ratio of water use charges to lucerne water variable costs	10.9%	27.5%

In Nodes 20 and 21, the contribution of water use charges to lucerne variable costs increases from 3.1 to 9.7 percent over the 1999/00 to the 2003/04 period. Over the same period, the contribution of the water charges to the water variable costs increases from 10.6 to 26.9 percent (assuming pumping costs remain unchanged).

The proportion of variable water charges to lucerne variable costs in Nodes 22 and 23 increases from 3.5 to 10.9 percent from 1999/2000 to 2003/04. Over the same period, the contribution of usage charges to the variable water costs increases from 10.9 to 27.5 percent (assuming pumping costs remain unchanged).

The results suggest that the proposed water usage charges will in the future make a more significant contribution to enterprise variable costs and water variable costs than they do now. While the rate of increase in importance is significant, the increases come from a relatively low base.

4.2.3 Total farm costs

The proportion that total water costs (water use charge plus the water entitlement charge) contribute to the total farm (variable plus fixed) costs is displayed in Table 10 below. Given the estimated price increases, the proportion of total water costs to total farm costs approximately triples in all nodes from 1999/2000 to 2003/04. However, the contribution to total farm costs from water charges after the price rise again remains relatively small.

Table 10: Ratio of total water costs to total farm costs

	1999/2000	2003/2004
Node 20	2.6%	7.4%
Node 21	2.0%	5.9%
Node 22	3.5%	9.8%
Node 23	2.2%	6.5%

From the results presented above, it can be concluded that the price paths for water charges result in a significant rate of rise in their contribution to farm costs. However, the overall contribution of both water usage and entitlement charges to enterprise and total farm costs remain relatively small. These results support past IPART studies and some submissions which concluded that water charges are a small proportion of farm business costs. The significance of these price changes on farm viability are discussed in the next section.

4.3 Impact of increasing water charges on the profitability of farms and likely adjustment responses

4.3.1 The elasticity of demand for water

A major determinant of the impact of water charges on the profitability of irrigation farms relates to the elasticity of demand for water. The price elasticity of demand for water is defined as the percentage change in quantity of water demanded for a one percent change in the price. This is a derived demand based on the value of water as an input into agricultural production. As a consequence, the value of water is dependent on the profitability of the crops to which it is applied.

The sensitivity of water demand is a key issue in looking at water charges. If water demand is found to be inelastic, indicating that adjustment to higher water prices is limited, then the burden of any price rises falls on farm incomes. If demand is elastic, indicating potential for adjustment, impacts on farm incomes will be less severe as farmers modify their production systems to mitigate impacts.

A number of studies have estimated the demand for irrigation water. Some examples include Briggs-Clarke, Menz, Collins and Firth (1986), Collins, Hall and Scoccimaro (1996), Hall, Poulter and Curtotti (1994), Read, Sturgess and Associates (1991) and Jones and Fagan (1996) . These studies have largely relied on the use of short run models[1] and have focused on southern portion of the Murray-Darling Basin. Collins et al (1996) found that irrigation water demand is highly inelastic in the Southern Murray Darling Basin over water delivery prices consistent with prevailing temporary transferable water entitlement prices of $20-30 per megalitre. Jones and Fagan (1996) also found that water demand remained inelastic for the MIA up to $45 per megalitre. The implications of these results for these areas suggest that increases in water prices within a reasonable range is unlikely to greatly effect water use or cropping areas, but are more likely to impact on farmer incomes and possibly farm viability.

There have been no studies undertaken in the Peel Valley on the elasticity of demand for water. However, an indication of the elasticity of demand for water can be gained by looking at the various adjustment options available to farmers and whether these are likely to mitigate some of the impacts of price rises. Possible responses to increased prices may include reducing water use on current enterprises, changing enterprise mix, substitution of groundwater for surface water, improvements in irrigation efficiency and water trading. These adjustment responses are discussed below.

i) Reduce water use on current enterprises

In theory, farmers would continue to apply the same amount of irrigation water to lucerne as long as the variable cost of water (bulk water usage charge plus pumping costs) is less than or equal to the marginal return at that level of use. The probability of farmers adopting this option partly depends on the lucerne yield response function to water. Unfortunately, there is limited information on what that yield response function might look like for the types of lucerne production systems in the Peel making it difficult to form judgements about the rationality of this option. It is apparent that lucerne yields are not constrained by water availability, given a history of under use in the Peel Valley, but are more likely to be associated with irrigation and agronomic practices and the possibility of other constraints on lucerne yields (eg. labour involved with irrigations).

[1] Short run models are broadly defined as those models which are constrained to a time period that does not allow for all factors of production to be varied. For example, short run models commonly do not enable farm capital investment.

ii) Change enterprise mix

Some change to alternative enterprises may be justified depending on the magnitude of price change. The most likely change in enterprise mix would be the increase in double cropping of irrigated crops such as wheat or beans (L. Hyson, pers comm). There would appear to be ample water resources (at current levels of development) for most farms to support a shift into these enterprises but land and labour resources may be constraining. Additional crop management skills and possible changes to irrigation infrastructure may also be required.

From the information presented in section 3.2 on the relative profitability of lucerne hay production compared with other enterprises, there would appear to be little grounds for changing enterprise mix. Per ML returns from lucerne hay compared quite well with other enterprises based on both the 'Haymaker' data used in this study and the more general gross margin information from NSW Agriculture's farm budget handbooks. Anecdotal information suggest that changes away from lucerne hay production are more likely to be associated with the availability of farm labour than water prices. For comparison, Appendix 2 contains information on irrigated crop gross margins for Northern NSW published by NSW Agriculture from the Farm Enterprise Budgets series.

iii) Substitute surface water with groundwater use

Some irrigators in the Peel Valley have access to both surface water and groundwater. Information from DLWC on ownership of irrigation licences suggests that this varies from 0 to 23 per cent of irrigators between nodes. Substitution of surface water with groundwater may be feasible if the cost of using surface water (the bulk water usage charge plus pumping costs) was greater than the cost of using groundwater (groundwater charge plus pumping costs) and on-farm irrigation infrastructure was capable of making this change. Looking at the costs involved in utilising groundwater rather than surface water, there would appear to be some merit in this option.

Additional pumping costs associated with accessing groundwater (due to slightly greater depths of water extraction) have been estimated at just $3 per ML, whilst usage charges for groundwater are $0.30 per ML compared to $4.39 ML for surface water (1999-2000). At current prices, the substitution of groundwater for surface water is marginally preferable. If the price paths for surface water supplies (outlined in section 4.1) are not matched by the price path for ground water charges, then there will be increasing incentives for irrigators, with access to both resources, to substitute supplies.

iv) Improve irrigation efficiency

Increased water prices may provide an incentive for irrigators to assess their current irrigation system for efficiency. The most likely efficiency responses would be ensuring that pumping pressures are correct and perhaps the introduction of irrigation scheduling. The 'Haymaker' project demonstrated that there are potential improvements in irrigation efficiency that could be made relatively easily at little additional costs to farmers.

In the longer term, increased water prices may be partially offset by the introduction of more efficient irrigation technologies such as sub surface drip irrigation. Sub surface drip irrigation systems can potentially decrease the water used by 30% and increase lucerne crop yields by between 20 and 30% (L. Hyson, pers comm). As well as using water more efficiently and increasing

yield, sub surface drip irrigation requires less labour than traditional spray irrigation. However, implementing a sub surface drip irrigation system costs between $2,000 and $3,000/ha suggesting that increases in water prices alone are unlikely to make these systems financially attractive to irrigators.

v) Trading[1]

Water trading allows water to move to areas where it can be most profitably used. This provides financial benefits to irrigators who decide to sell their water whilst also providing benefits to water purchasers by providing additional production opportunities. Trade is also likely to improve water use efficiency by making the opportunity costs of using water more transparent in that irrigators are able to financially benefit from water that they choose not to use.

The transferability of water resources, particularly between the Peel and the Namoi Valleys, could have a major bearing on the nature, extent and efficiency of irrigated agriculture in the Peel Valley. Increase in water prices may make it more financially attractive for irrigators in the Peel to trade their allocation down stream to higher value users in the Namoi catchment rather than use it themselves. However, even without any price increases there is likely to be a significant transfer of water from the Peel to the Namoi if inter valley trade is permitted. This is likely to arise in response to the relatively low levels of development in the Peel and the significant level of competition for water which exists in the Namoi catchment largely driven by cotton production.

Currently there is no trade between the Namoi and the Peel Rivers. However, this option is being discussed by the Namoi River Management Committee and there are more general moves to further free up trade as outlined in the NSW Governments recent White Paper on the proposed Water Management Act.

4.3.2 Analysis of the impact of increasing water charges on farm profitability

The previous section discussed the concept of elasticity of demand and looked at the possible adjustment options that farmers may take in response to increased water prices. Some of the adjustment options, like the adoption of new irrigation systems and the adoption of significantly different enterprises (requiring different machinery, irrigation infrastructure etc), are options that could only be implemented over the longer term.

The analysis undertaken in this study had a more short term focus and was undertaken under the assumption that within the relevant price range, the demand for water in the Peel Valley is inelastic. This assumption has some support from information provided earlier which indicated that returns per ML for lucerne hay production far exceed the marginal costs of water use. Previous analyses undertaken as part of the IPART Inquiry also concluded that water prices are generally only a small proportion of farm costs and increases would have a marginal impact, if any, on the farm enterprise. Consequently, the analysis assumes that irrigators continue with current farm operations and associated water use ie. irrigators bear price increases through higher water costs and lower net returns.

[1] Trading rules are in place that allow trade between regulated irrigators on the Peel river. However, at present there is very little water traded within the Peel. This is not surprising given the relatively secure supplies and the low level of activation on the Peel river. Current rules prevent trading from the Peel to the Namoi.

The impact of increasing water charges on the viability and profitability of farms is assessed in terms of their impact on a number of financial indicators including net farm income, business return, operating return and return on equity. Definitions of indicators are as follows:

- Net Farm Income: Total farm gross margin (income less variable costs) less overhead costs.
- Operating return: Net farm income less operators labour (valued at a base level of $10,000).
- Business Return: Operating return less interest paid and rent on leases.
- Return on equity: The ratio of business return to equity.

Figure 6 provides an overview of the impact of water charge increases on net farm income while detailed results looking at a number of financial indicators are presented in Table 11. In all nodes, the increase in water charges has a negative effect on the key profitability indicators. The impact in dollar terms is larger for Nodes 20 and 23 ($3,241 and $5,961 respectively). However, Nodes 21 and 22 have relatively lower net incomes, business return and returns on equity. This results in the relative impact on viability of water charge increases being higher for Nodes 21 and 22.

Figure 6: Impact of water charge increases on Net Farm Income

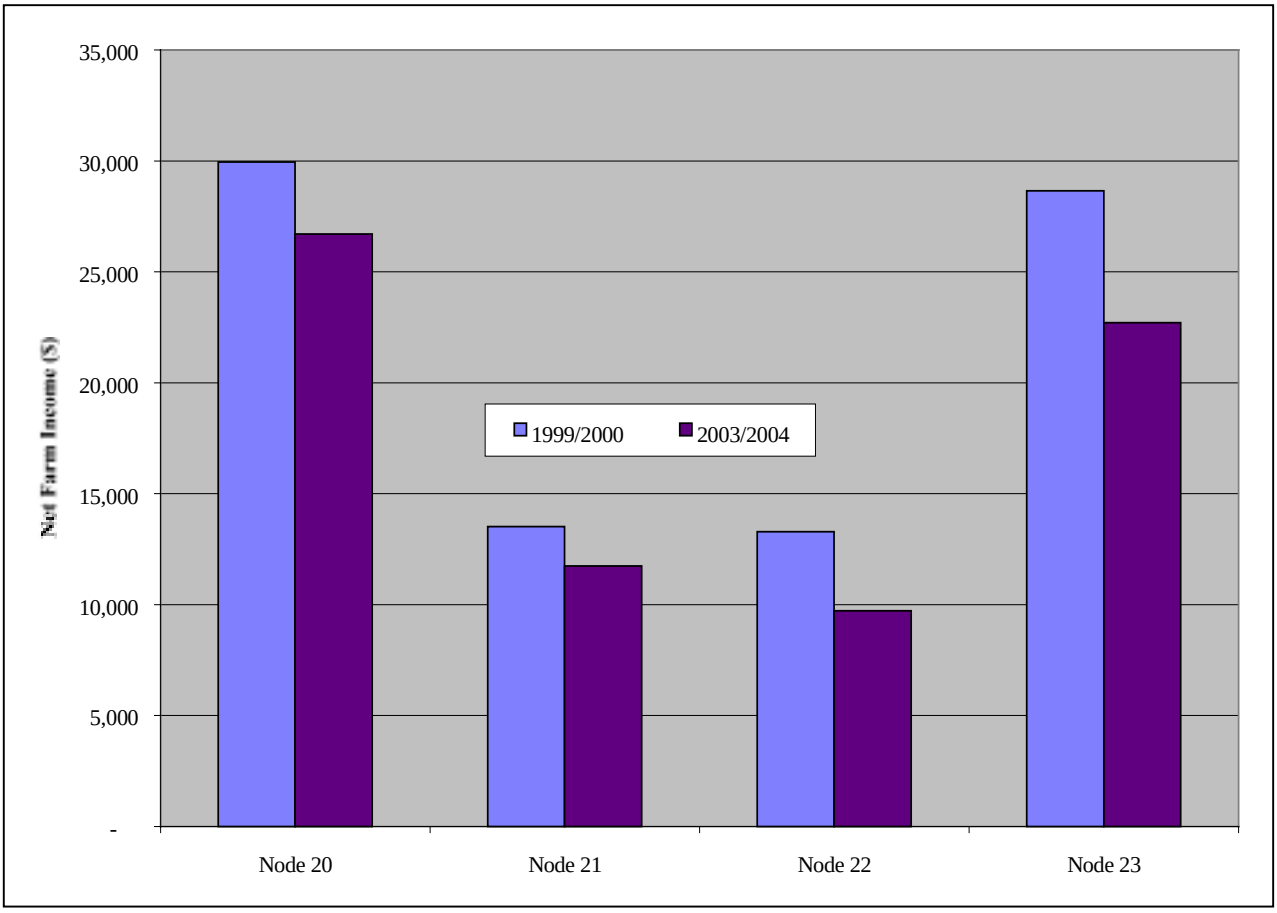


Table 11: Effect of Water Charge Price Increases on Key Profitability Indicators

	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004	Amount of change	% change
Node 20							

Net Farm Income	29,943	29,132	28,322	27,512	26,702	- 3,241	-11%
Operating return	19,943	19,132	18,322	17,512	16,702	- 3,241	-16%
Business return	17,762	16,952	16,142	15,332	14,521	- 3,241	-18%
Return on equity	4.6%	4.4%	4.2%	4.0%	3.8%	-0.8%	-18%
Node 21							
Net Farm Income	13,505	13,064	12,623	12,182	11,742	- 1,763	-13%
Operating return	3,505	3,064	2,623	2,182	1,742	- 1,763	-50%
Business return	2,378	1,937	1,496	1,056	615	- 1,763	-74%
Return on equity	0.7%	0.6%	0.4%	0.3%	0.2%	-0.5%	-74%
Node 22							
Net Farm Income	13,289	12,395	11,501	10,607	9,713	- 3,576	-27%
Operating return	3,289	2,395	1,501	607	- 287	- 3,576	-109%
Business return	1,680	786	- 108	- 1,002	- 1,896	- 3,576	-213%
Return on equity	0.4%	0.2%	0.0%	-0.2%	-0.5%	-0.9%	-213%
Node 23							
Net Farm Income	28,653	27,163	25,673	24,182	22,692	- 5,961	-21%
Operating return	18,653	17,163	15,673	14,182	12,692	- 5,961	-32%
Business return	11,395	9,905	8,415	6,924	5,434	- 5,961	-52%
Return on equity	1.7%	1.5%	1.3%	1.1%	0.8%	-0.9%	-52%

NB: 'Amount of change' and '% change' indicate the change from 2003/2004 compared to 1999/2000.

The results of the study indicate that farms in Nodes 21 and 22 will have more difficulty absorbing the proposed water price increases than Nodes 20 and 23. This largely because their net farm incomes under existing water prices are estimated to be relatively low to begin with[1]. Water price increases simply exacerbate their current financial position. Node 22 is particularly effected by the price increases and this can be partly attributed to the farms low level of entitlement utilisation which increases the significance of fixed entitlement charges. The representative farm for this node is only irrigating a small area relative to its water entitlement and is not capable of generating sufficient income to meet price increases. With future growth likely in the water market in the Peel it is likely that this farm type would sell the unused portion of its entitlement (temporarily or permanently) or expand production to lift its income generation capacity. These options have not been considered in this analysis.

This analysis holds all other costs and income levels constant to assess the relative impacts of the water price increases. Agriculture in general has been facing declining terms of trade for the last 30 years, with costs increasing relative to income. While little data is available on farm cost increases in the Peel Valley specifically, it is apparent that prices for lucerne hay have remained fairly static for the last 10 years. Generally, lucerne prices do not appear to have increased significantly since at least the early 1990's (L. Pengelley, pers. comm.). The implication is that the increase in water charges will increase the rate of decline of terms of trade of lucerne hay producers in the Peel Valley. Farms in Nodes 21 and 22 appear to be under the greatest pressure if the overall trend is maintained in the future.

[1] The analysis excludes any sources of Off-farm income. Information provided by ABARE using their 1996-97 survey of irrigation farms in the Peel Valley indicated that $13,070 of off-farm income was received.

5. Conclusions

The study used representative farm models of irrigated agriculture in the Peel Valley to assess the importance of water to farm costs and the implications of proposed price increases nominated by DLWC. The models are spreadsheet based and attempt to capture the key characteristics of irrigation farming in different zones in the Peel Valley. For the analysis undertaken, the regulated section of the Peel was broken down into four zones consistent with the availability of hydrology data from the DLWC. The impacts of proposed water price increases were assessed on each of these representative farms under average climatic conditions and allocation availability.

The first part of the analysis considered the importance of water to farm costs. Results were presented on the contribution of water charges to enterprise (lucerne) variable costs, water variable costs and total farm costs. In each section, water charges in the 1999/2000 and 2003-04 are used to provide an assessment of the relative importance of water costs. The results indicate that, in all sections of the Peel, the proposed increased water prices almost triples the contribution of water use charges to per hectare water costs for lucerne growing, to lucerne variable costs and to total farm costs. While these percentage increases are large, they occur from a relatively low base. It is apparent that total water costs will continue to account for only a small proportion of over all farm costs for all sections of the Peel despite the proposed water price increases.

The second part of the analysis considered the impacts of proposed price increases on the viability of farms in the Peel Valley. The elasticity of demand for water was discussed as an important factor in determining the nature of the impacts from higher water prices. Possible adjustment responses by irrigators in the Peel to higher water prices were discussed also in the absence of previous work on demand elasticities in the area.

An analysis was then undertaken on the impacts of price rises under the assumption that demand for irrigation water was inelastic over a reasonable water price range. Across the nodes, the impact of the final year water charges (2003-04) found that net farm incomes would fall between 11-27 per cent with farms in Nodes 21 and 22 most severely effected. These projected falls in farm profitability are sensitive to level of entitlement utilisation and the overhead cost structure of farms. The latter is an area where data availability is particularly limited and some caution should be exercised over the interpretation of results.

The results indicate that the proposed price increases are unlikely to pose major viability issues for most irrigation farms in the Peel Valley. They will however add to the general picture of declining terms of trade common to many broadacre agricultural industries. This implies that in the longer term, farmers in the Peel Valley will need to continue to improve the productivity and efficiency of their production systems to remain viable or gain other income beyond the operation of the farm.

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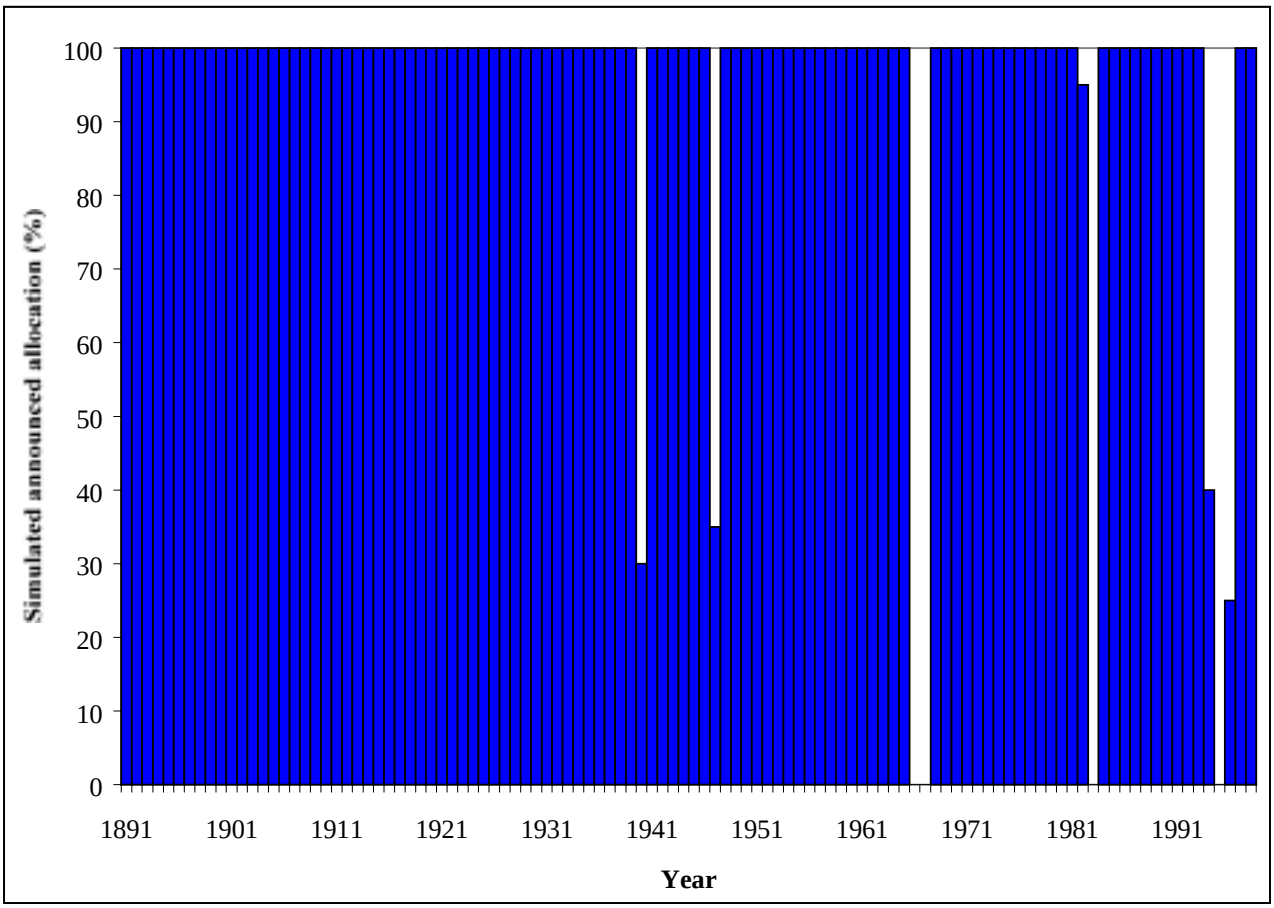
Appendix 1: Background information on the Peel Valley

A1.1 Local Government Areas in the Peel Valley

A1.2. Allocation reliability in the Peel Valley

Figure 7: Simulated announced allocation availability for the Peel Valley



Appendix 2: Irrigated crop gross margins in Northern NSW

Table 12 shows irrigated crop gross margins published by NSW Agriculture from the Farm Enterprise Budgets series. These crops are potential alternatives for lucerne, however some (eg cotton) are not suitable for the Tamworth/Peel district due to climatic limitations. These budgets are published to provide a guide for farmers to the relative profitability and an indication of management operations involved in different cropping enterprises. Budgets are calculated using crop yields for the region that are consistent with the operations given, forecast commodity price, current input costs and technical information provided by district agronomists. Therefore they are *not* regional averages.

Table 12: Irrigated crop gross margins for northern NSW

Crop	Yield	Income	Costs	Gross Margin Per Ha	GM per Ml	Est. ML used
Mungbeans	1.5 t/ha	712	398	314	209	1.50
Maize	10.0 t/ha	1,200	828	372	52	7.15
Sunflowers	3.0 t/ha	840	463	377	75	5.00
Sorghum	8.0 t/ha	1,040	550	490	98	5.00
Soybeans	3.0 t/ha	960	457	503	84	6.00
Navy beans	2.0 t/ha	1,320	542	778	259	3.00
Cotton	6.75 bales/ha	3,065	2,004	1,061	221	4.80
Bread wheat	5.00	850	300	550	162	3.40
Durum wheat	5.50	1,045	350	695	204	3.40

Source: Scott, 1999 and 2000.

Appendix 3: Representative farm details for each node

WHOLE FARM BUDGET	**NODE 20**	
Farm gross margin	**GM/ha**	**GM/enterprise**
Hay (full production stand)	**1,637**	**47,900**
Hay (new stand)	**828**	**6,057**
Wheat	**189**	**3,305**
Cattle	**72**	**4,574**
Sheep	**95**	**3,126**
Off farm income		-
Other		
	Sub-total gross margin	**64,962**

Water costs		
Water usage charge	On allocation	413
	Off allocation	114
	Total Water Usage Costs	528
	Total Gross Margin	**64,434**

Overheads		
Administration Expenses		$1,461
- Bank Charges		$120
- Insurance		$1,349
- Workers compensation		$636
Loan repayments		$2,186
Labour		$6,359
Fuel and Oil		$1,693
Electricity (not including pumping costs)		$900
Repairs and Maintenance		
- Plant and equipment	3%	$3,931
- Structures	1%	$238
Depreciation		
- tractor 1	57 KW PTO (76 HP) & 63 KV	$2,229
- tractor 2	74 KW PTO (94 HP) & 83 KV	$0
- Other plant and equipment		$9,947
- Structures		$1,250
Rates		
- Land		$1,084
- Water entitlement (allocation) charge		$1,108
Other Overheads		$0
Total overhead costs (excluding interest)		**$ 34,492**

NET FARM INCOME	**29,943**

Depreciation		
Depreciation - machinery		12,176
Depreciation - structures		1,250
	Total Depreciation	**$ 13,426**

Interest payments		
Loan 1	10.50%	**2,181**
Loan 2	10.50%	**-**
Overdraft	10.50%	-
0	10.50%	-
	Total Interest	**$ 2,181**

WHOLE FARM BUDGET	NODE 21	
~~Farm gross margin~~	**GM/ha**	**GM/enterprise**
Hay (full production stand)	**1,641**	**31,154**
Hay (new stand)	**828**	**3,931**
Wheat	**184**	**911**
Cattle	**66**	**2,144**
Sheep	**96**	**1,608**
Off farm income		-
Other		
	Sub-total gross margin	**39,748**

~~Water costs~~		
Water usage charge	On allocation	253
	Off allocation	79
	Total Water Usage Costs	333
	Total Gross Margin	**39,415**

~~Overheads~~		
Administration Expenses		$755
- Bank Charges		$120
- Insurance		$697
- Workers compensation		$329
Loan repayments		$1,130
Labour		$3,286
Fuel and Oil		$1,054
Electricity (not including pumping costs)		$900
Repairs and Maintenance		
- Plant and equipment	3%	$4,115
- Structures	1%	$238
Depreciation		
- tractor 1	57 KW PTO (76 HP) & 63 KV	$1,353
- tractor 2	74 KW PTO (94 HP) & 83 KV	$0
- Other plant and equipment		$9,071
- Structures		$1,250
Rates		
- Land		$1,060
- Water entitlement (allocation) charge		$553
Other Overheads		$0
Total overhead costs (excluding interest)		**$ 25,911**

NET FARM INCOME	**13,505**

Depreciation		
Depreciation - machinery		10,425
Depreciation - structures		1,250
	Total Depreciation	**$ 11,675**

Interest payments		
Loan 1	10.50%	**1,127**
Loan 2	10.50%	-
Overdraft	10.50%	-
0	10.50%	-
	Total Interest	**$ 1,127**

WHOLE FARM BUDGET	NODE 23	
~~Farm gross margin~~	**GM/ha**	**GM/enterprise**
Hay (full production stand)	**1,144**	**45,503**
Hay (new stand)	**832**	**8,277**
Wheat	**192**	**25,775**
Cattle	**75**	**15,659**
Sheep	**94**	**10,193**
Off farm income		-
Other		
	Sub-total gross margin	**105,406**

~~Water costs~~		
Water usage charge	On allocation	673
	Off allocation	271
	Total Water Usage Costs	944
	Total Gross Margin	**104,462**

~~Overheads~~		
Administration Expenses		$4,862
- Bank Charges		$120
- Insurance		$4,491
- Workers compensation		$2,117
Loan repayments		$7,276
Labour		$21,166
Fuel and Oil		$3,860
Electricity (not including pumping costs)		$900
Repairs and Maintenance		
- Plant and equipment	3%	$3,921
- Structures	1%	$238
Depreciation		
- tractor 1	57 KW PTO (76 HP) & 63 KV	$3,790
- tractor 2	74 KW PTO (94 HP) & 83 KV	$5,051
- Other plant and equipment		$12,768
- Structures		$1,250
Rates		
- Land		$1,931
- Water entitlement (allocation) charge		$2,069
Other Overheads		$0
Total overhead costs (excluding interest)		**$ 75,809**

NET FARM INCOME	**28,653**

Depreciation		
Depreciation - machinery		21,608
Depreciation - structures		1,250
	Total Depreciation	**$ 22,858**

Interest payments		
Loan 1	10.50%	**7,258**
Loan 2	10.50%	-
Overdraft	10.50%	-
0	10.50%	-
	Total Interest	**$ 7,258**

WHOLE FARM BUDGET	NODE 23	
~~Farm gross margin~~	GM/ha	GM/enterprise
Hay (full production stand)	**1,270**	**53,794**
Hay (new stand)	**1,002**	**10,609**
Wheat	**189**	**18,876**
Cattle	**75**	**13,229**
Sheep	**94**	**8,632**
Off farm income		-
Other		
	Sub-total gross margin	**105,142**

EXPENDITURES-VARIABLE COSTS		
Water usage charge	On allocation	754
	Off allocation	304
	Total Water Usage Costs	1,058
	Total Gross Margin	**104,083**

Overheads		
Administration Expenses		$4,086
- Bank Charges		$120
- Insurance		$3,774
- Workers compensation		$1,779
Loan repayments		$6,115
Labour		$17,788
Fuel and Oil		$3,731
Electricity (not including pumping costs)		$900
Repairs and Maintenance		
- Plant and equipment	3%	$3,921
- Structures	1%	$238
Depreciation		
- tractor 1	57 KW PTO (76 HP) & 63 KV	$3,790
- tractor 2	74 KW PTO (94 HP) & 83 KV	$5,051
- Other plant and equipment		$12,768
- Structures		$1,250
Rates		
- Land		$1,663
- Water entitlement (allocation) charge		$1,731
Other Overheads		$0
Total overhead costs (excluding interest)		**$ 68,705**

NET FARM INCOME	**35,379**

Depreciation	
Depreciation - machinery	21,608
Depreciation - structures	1,250
Total Depreciation	**$ 22,858**

Interest payments		
Loan 1	10.50%	**6,100**
Loan 2	10.50%	-
Overdraft	10.50%	-
0	10.50%	-
Total Interest		**$ 6,100**

Additional financial assumptions for representative farms

- interest rate 10.5%
- debt/ha $145
- tractors are 6 years old and hay equipment 8 years old (no data is available on machinery age in the Valley, so this is an assumption)
- depreciation on other farm machinery & irrigation equipment is 5% per annum
- tractor time spent on full production lucerne- 8 hours/ha/year
- tractor time spent on establishment lucerne- 4.6 hours/ha/year
- tractor time spent on dryland wheat- 1.2 hours/ha/year
- Nodes 20, 21 & 22 use a 57 KW PTO (76 HP) / 63 KW engine (86 HP) tractor, Node 23 uses a 74 KW PTO (94 HP) / 83 KW engine (110 HP) tractor.

Economic assessment of water charges in the Lachlan Valley

Report to the

Department of Land and Water Conservation

February 2001

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NSW Agriculture

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Acknowledgments

The contribution of the following people to this study is gratefully acknowledged.

- Members of the Socio-Economic Sub Committee of the Lachlan River Management Committee and members of various Local Consensus Data groups in the catchment for their contribution in eliciting the representative farm data as part of NSW Agriculture's work on the water reforms.

- Ian Smith, Irrigation Officer, NSW Agriculture, Forbes.

- Rob Young, Program Leader, Economic Resource Policy, NSW Agriculture, Orange.

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1. Introduction

1.1 Background

In the 1995 water reform package, the NSW Government endorsed its commitment to the principles of full cost recovery pricing as agreed to by Council of Australian Governments (COAG). The package resulted in the introduction of interim rural water charges for NSW irrigators in the 1995-96 season and referral of the rural water pricing issue to the Independent Pricing and Regulatory Tribunal (IPART). IPART subsequently undertook a major inquiry into bulk water pricing in NSW in 1996 and has made bulk water price determinations for each irrigation season since then.

IPART's last determination was released in September 2000 in which it set prices for the 2000-01 irrigation season[3]. In that determination, IPART noted that DLWC had made significant progress in implementing the Tribunals recommendations whilst also creating a separate commercial water business, State Water. However, IPART decided that water prices could not be confidently determined for years beyond 2000-01 with available data sets. As a consequence, the expiry date for the latest determination remains open to allow DLWC time to compile the required information to establish longer-term price paths.

An important consideration in the IPART process is the impact of price increases on users. DLWC was concerned about the nature of these impacts and contracted NSW Agriculture to undertake an evaluation of their significance. The Lachlan and Peel Valley were selected as two case study catchments. This report focuses on the Lachlan Valley and will be used by DLWC in the price determination process.

1.2 Objectives

The objective of this is study is to assess the impact of increased water charges on irrigators in the regulated river section of the Lachlan Valley. The terms of reference for the study are built around describing these impacts by addressing the following three areas:

i) The importance of water to enterprise costs as well as its importance to total farm costs;

ii) The adjustment responses irrigators are likely to make in response to changes in water charges; and

iii) The impact of increasing water charges on the viability and profitability of farms.

1.3 Approach

To assess the impact of water price increases on the irrigation sector some knowledge of irrigation farming systems within the selected catchment is required. NSW Agriculture has developed its understanding of these systems in the Lachlan catchment and has recently been involved in the development of representative whole farm models of different irrigation farming systems. These models have been developed primarily to evaluate the impact of water management options (eg. environmental flow rules) for Water Management Committees but can also be applied to water pricing issues.

[3] Water prices for the 2000-01 period are actually based on IPART's 1998 determination in which it projected prices out to 2000-01 to illustrate NSW progress towards COAG's target of full cost recovery.

The regulated section of the Lachlan catchment was broken down into five zones consistent with the nature of irrigated agricultural systems and the availability of hydrology data from the DLWC. NSW Agriculture met with a group of practicing farmers to identify the key characteristics and practices of representative farms in these zones. Representative farms identified have been used to analyse the importance of water to enterprise and farm costs (objective 1) and the viability and profitability of farms (objective 3) under average climatic conditions and allocation availability.

The type of adjustment responses that farmers would make to increased water prices (objective 2) can influence the magnitude of effects on the profitability of farms. The types of adjustment options likely to be taken by farmers to price increases were assessed through an existing economic model of irrigated agriculture in the Lachlan Valley. The economic model is also on a zone basis and takes into account variations in crop yields, variable costs, crop water requirements, irrigation efficiencies, soil types and irrigation layouts in each of these zones.

2. The Lachlan Valley

The Lachlan River Valley is located in Central Western NSW and covers an area of 84,700 square kms (DLWC, 1996). The Lachlan River begins on the slopes of the Great Dividing Range east of Gunning and flows north-west to Forbes and Lake Cargelligo through the Central Western Slopes and Plains. From Lake Cargelligo, the river flows south-west to the Great Cumbung Swamp where it occasionally joins the Murrumbidgee River (see Figure 1). The major water storages in the valley are Wyangala and Carcoar dams.

The Lachlan Valley is a significant agricultural area and much of the irrigation in the region is by licensed diverters from the Lachlan River. The only exception is the Jemalong Irrigation District which is a significant irrigation scheme lying to the west of Forbes. The Lachlan Valley has a licensed water entitlement of 665 GL (50 GL high security and 615 GL general security) although overall usage is usually around just 40-50 per cent of this. While the annual average allocation for general security licences has been in the vicinity of 80 percent over recent years (LIRAC, 1997), this is likely to decline as currently inactive licences are activated within the constraints of the Murray Darling Basin Commission (MDBC) Cap. The long-term cap diversion target for the Lachlan is 254 GL, just 40 per cent of licensed entitlement.

Crops grown in the Lachlan Valley are as diverse as the climatic and geographic conditions which characterise the catchment. In the higher eastern area, upstream of the major storages, irrigated crops are dominated by horticulture and viticulture with some lucerne production in association with grazing enterprises. In the middle reaches of the Lachlan, the dominant users of irrigation water include canola, lucerne, maize, soybeans and horticulture as well as winter crops. The lower reaches of the valley are dominated by summer crops such as maize and cotton; however, horticultural crops including citrus, viticulture, potatoes and others are also produced on suitable soils. This lower section of the valley is currently undergoing a rapid expansion in irrigated cropping (LIRAC, 1999).

The areas of crops and pastures irrigated from regulated supplies in the Lachlan catchment are shown in Figure 2 .The areas relate to the 1999/2000 season and are taken from the crop return card data collected by DLWC at Forbes. The major crops are winter cereals, oil seeds and lucerne, each occupying around 17,000 - 20,000 hectares, and winter pasture and summer cereals with around 10,000 hectares each. There is about 5,000 hectares of summer pasture, around 2,000 hectares of vegetables and 1500 hectares of winegrapes. The irrigation sector is an important contributor to the local economy with annual irrigated production valued at $149 million (Donovan, 1998).

The main features of irrigated agriculture in the Lachlan Valley can be best described with reference to five principal production zones moving from east to west (Figure 1). Soil types have been classified as either being light soils (loams, alluvial, self-mulching) or heavy soils (clays). The main irrigation technologies are surface irrigation (landformed and non-landformed), spray and trickle irrigation systems. The characteristics of these production zones are briefly outlined below.

Figure 1: Lachlan Catchment – Production Zones

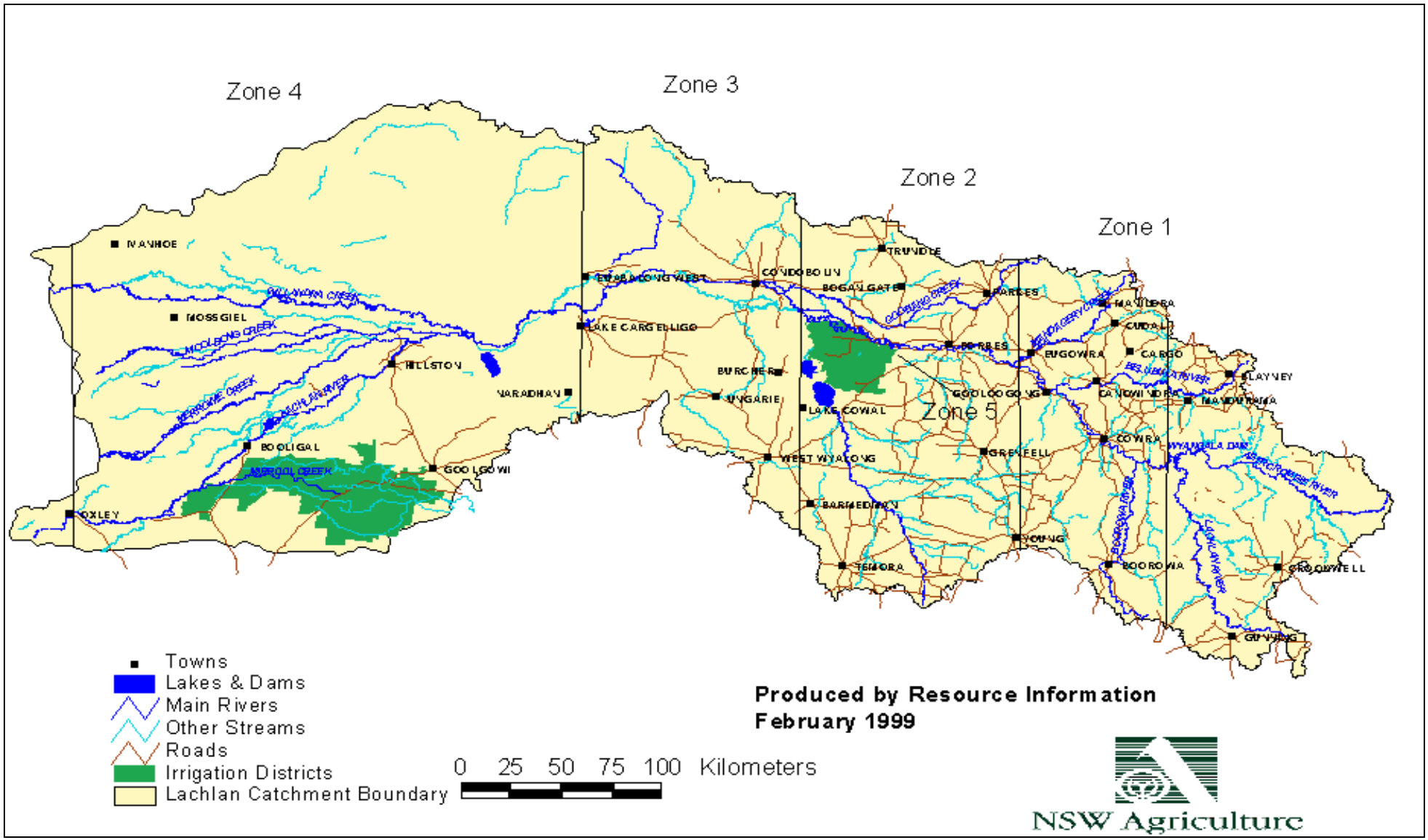
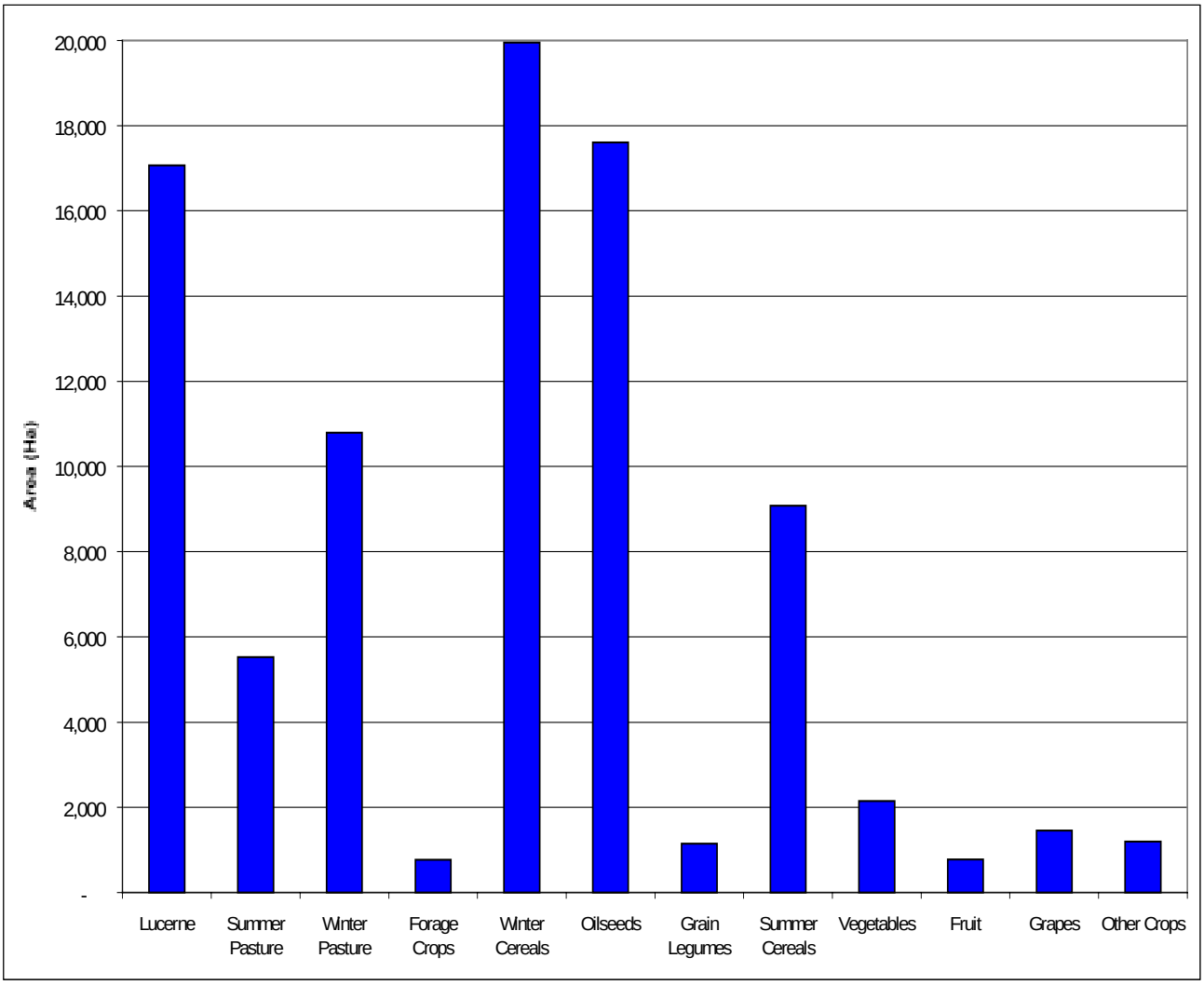


Figure 2: Total area irrigated (Ha) in the Lachlan Valley



Source: Estimated from crop return card data collected by DLWC, 2001

Zone 1: Wyangala Dam to Payten's Bridge near Eugowra (including the Belubula River);

The main enterprises in this zone include vegetables (asparagus, tomatoes, sweet corn), winegrapes and lucerne (seed, hay and pasture). Spray irrigation is the dominant irrigation system. A mixture of soil types exists including deep alluvial, light red and loam soils. The licensed entitlement is around 82,000 megalitres with 11,000 hectares laid out to irrigation. It has the highest rainfall of any of the zones and the lowest temperature maximums. The mean annual rainfall for Cowra is 611 millimetres.

Zone 2: Payten's Bridge to Island Creek off-take (above Condobolin);

In Zone 2, the main enterprises are wheat, canola, maize, lucerne (seed, hay and pasture), sub-clover and deciduous fruits (apples, peaches). Flood irrigation is dominant irrigation method. Deep alluvial soils dominate the zone. The licensed entitlement for Zone 2 is around 107,000 megalitres with 19,000 hectares laid out to irrigation. The mean annual rainfall for Forbes is 524 millimetres.

Zone 3: Island Creek off-take to Lake Cargelligo;

The main enterprises in Zone 3 are wheat, canola, maize, lucerne (seed, hay and pasture) and sub-clover. Flood irrigation is dominant in this zone and, as in Zones 2 and 4, most irrigation blocks are landformed. The main soil types in this zone are grey clays and deep alluvial soils. The licensed entitlement for region 3 is around 145,000 megalitres with 15,000 hectares laid out to irrigation. The mean annual rainfall for Lake Cargelligo is 425 millimetres.

Zone 4: Lake Cargelligo to Oxley;

In Zone 4, the main enterprises are wheat, canola, maize, lucerne (seed, hay and pasture), sub-clover and cotton. Flood irrigation is dominant irrigation method. The main soil types in this zone are clays, loams and alluvials. The licensed entitlement for Zone 4 is around 206,000 megalitres, with 56,000 hectares laid out to irrigation. It has the lowest rainfall of any of the zones and the highest temperature maximums. The mean annual rainfall for Hillston is 361 millimetres. There has been a significant increase in irrigated agricultural output in Zone 4 in recent years, particularly in cotton production.

Zone 5: Jemalong Irrigation Area.

The main enterprises in Zone 5 are again wheat, canola, maize, lucerne (seed, hay and pasture) and sub-clover. Flood irrigation is dominant in this zone, with the majority of irrigation country landformed. The licensed entitlement for Zone 5 is around 80,000 megalitres with 42,000 hectares laid out to irrigation. The mean annual rainfall for the Jemalong Irrigation Area is similar to that of Lake Cargelligo.

3. Methodology

This study adopts a representative farm modelling approach to the evaluation of water price increases. The approach uses a standard whole farm budgeting framework to assess the impact of water price increases on farm profitability. Where there is high degree of homogeneity amongst irrigation farms in terms of allocations, irrigation systems, enterprise areas and productivity, a single agricultural model of the region or a single representative farm may be adequate. In the case of the Lachlan there are significant differences between farms in terms of these characteristics so a more disaggregated approach has been adopted.

Under the water reforms, NSW Agriculture has been involved in the development of several whole farm models to represent the key characteristics of irrigation farming in the zones outlined in the previous section. Data on the features of representative farms were collected using a local consensus data (LCD) approach. This involved officers of NSW Agriculture and members of the Water Management Committees meeting with a group of practicing farmers to identify key characteristics and practices of typical farms in these zones.

These representative farm models have been developed within a spreadsheet environment and attempt to capture the nature of irrigation farming in different zones in the Lachlan Valley. The models are set out as whole farm budgets with key farming decisions based on information elicited from irrigators and technical experts. Consequently, the representative farm models differ from formal optimisation models such as linear and dynamic programming models in that they are based on key decision rules rather than profit maximisation objectives.

The range of irrigated farming systems identified by the socio-economic sub committee of the Lachlan River Management Committee (LRMC), and later endorsed by the various LCD groups in relevant zones, are shown in Table 1. The highlighted enterprises shown are those farm types selected for representative farm modelling under existing water reform work for the LRMC. Since this work is still in progress, only the six completed representative farms out of a total of seven (excluding the graziers / water traders in Zone 4) have been used in this analysis. The main physical characteristics of these farms in terms of property sizes, water entitlement and usage and a breakdown of irrigated and dryland enterprise is given in Table 2.

The adjustment responses that farmers would make to increased water prices, and the related elasticity of demand for water, is a key consideration in estimating economic effects of water price changes. The types of responses likely to be made by irrigators were assessed through NSW Agriculture's existing economic model of irrigated agriculture in the Lachlan Valley. The economic model is also on a zone basis and takes into account variations in crop yields, variable costs, crop water requirements, irrigation efficiencies, soil types and irrigation layouts in each of these zones. Major inputs into the development of the model came from NSW Agriculture technical staff including Irrigation Officers, District Agronomists and Livestock Officers, DLWC irrigated crop data and water usage information and work undertaken through the Jemalong Land and Water Management Planning process. A number of people have been involved in its development[4].

[4] An existing economic model of the Jemalong area was initially compiled by Randall Jones and Anthea M'cClintock, formerly of the Economic Services Unit of NSW Agriculture. The larger LP model of the Lachlan was extended by Randall Jones, Jason Crean and Margot Fagan and has been further revised by Rohan Jayasuriya and Jason Crean. Ian Smith, Irrigation Officer, Forbes has provided substantial technical input.

Table 1: Enterprises in different zones of the Lachlan Valley

Zone	Number of Licences	Enterprises	Number of Farms
Zone 1	307	**lucerne, grazing & winter crops (small farms)**	120
		sweet corn combined with lucerne & mixed farming	20
		horticulture (fresh vegetables / vines)	5
Zone 2	412	**lucerne, grazing & winter crops (large farms)**	150
		orchards	15
		dairy	10
Zone 3	320	**grazing / winter crops (small & large farms 50% each)**	100
		graziers / water traders	50
		summer crops	10
Zone 4	340	**graziers / water traders**	100
		cotton / maize & summer crops	30
		horticulture (citrus / vines / fresh vegetables)	10
Zone 5	1	lucerne & mixed farming	45
		summer crops	30
		grazing / winter crops	30

The economic model of the Lachlan Valley is linear programming based and attempts to maximise regional gross margin (M) according to the objective:

$$M = \sum_{j=1}^{n} (c_j - a_{ij}.x_j.p_i), \qquad (j = 1,.....n)$$

Where:

c_j denotes all the revenue from activities j;
x_j is the magnitude of activity j;
a_{ij} is the amount of resource i used per unit of activity j;
p_i is the cost of resource i; and
n is the number of j activities.

subject to: $\sum_{j=1}^{n} a_{ij}.x_j \le a_i \quad (i = 1,.....,m)$

The model attempts to maximise returns from irrigated agriculture in the light of land and water resource constraints and enterprise costs (part of which are directly associated with the cost of water) and returns. Consequently, the model is useful in looking at optimal responses to changes in variables such as water prices. The results of this part of analysis are subsequently used in representative farm modelling to evaluate water price increases.

Table 2: Description of representative farms used in the analysis

	Zone 1	**Zone 2**	**Zone 3** Small Farm	**Zone 3** Large Farm	**Zone 4**	**Zone 5**
Key physical characteristics						
Total farm size (Ha)	304	800	1000	5000	7500	2000
Water entitlement (ML)	600	1000	972	972	4000[5]	1400
Average water use[6] (ML)	454	509	731	525	4838	1353
Irrigated enterprises (Ha)						
Irrigated Wheat	15	40	75	20	60	50
Irrigated Oats			25	20		
Irrigated Canola	19	20				50
Irrigated Cotton					250	
Irrigated Maize					180	100
Irrigated Lucerne Hay	76	80	50			
Irrigated Perennial Pasture					60	100
Irrigated Annual Pasture		20	50	160		50
Dryland enterprises (Ha)						
Wheat	61	160	200	1000	300	300
Oats				200		100
Canola	19	160	100	300		250
Lucerne Hay (establishment)	19	20				
Improved / Perennial Pasture	95	280	400	2000	5900	800
Fallow / developing / non-arable		20	100	1300	750	200
Number of Sheep	700	1500	1200	3200	3000	1700
Number of Cattle		50	40	200	50	150

[5] Average water use exceeds the surface water entitlement because this representative farm also holds a 2000ML groundwater base entitlement and a 2000ML conjunctive use entitlement. Surface water supplies are utilised initially by the farm with groundwater used only to supplement surface water availability.

[6] Calculated through model runs for the last 30 year average rainfall.

4. Assessment of bulk water price increases

4.1 Pricing scenarios

The pricing scenarios for general security irrigators have been provided by DLWC and are shown below. These are estimated prices and therefore may change in the final cost determination. Jemalong Irrigation Limited receives a discount on fixed entitlement charges but has the same usage price as river pumpers.

Table 3: Bulk water prices for Lachlan irrigators

	1999/2000	2000/2001	2001/2002	2002/2003	2003/2004
Lachlan River Pumpers					
Entitlement charge ($/ML ent)	3.07	3.56	4.04	4.53	5.01
Usage charge ($/ML use)	3.80	4.45	5.11	5.76	6.42
Jemalong Irrigation District					
Entitlement charge ($/ML ent)	2.27	2.63	2.99	3.35	3.71
Usage charge ($/ML use)	3.80	4.45	5.11	5.76	6.42

Source: Natural Resource Pricing Unit - DLWC, 2000

Previous submissions from irrigator groups to the IPART Inquiry into Bulk Water Pricing has raised concerns about the impact of fixed entitlement charges. One of the concerns has been in respect to the significance of fixed charges at times of low water availability. Fixed entitlement charges become more significant as utilisation of entitlement falls. Consequently, the balance between variable and fixed components of water charges has a differential effect on water users depending on their level of entitlement utilisation. The costs of water to less active irrigators increases as the reliance of cost recovery moves away from water usage charges towards fixed entitlement charges and vice versa.

The relatively low level of utilisation of entitlement in the Lachlan Valley suggests that effective water prices (charges per ML of water actually used) paid by irrigators are not fully reflected in Table 3. The effective prices per ML used will differ for each of the representative farms depending upon the utilisation of entitlement. The analysis presented in this report captures these effects by considering water use and entitlement levels for each of the farms.

The analysis undertaken in the following sections assesses only the importance and impact of bulk water prices. It excludes the costs of delivering water to the farm (either in the form of pumping costs or scheme delivery charges). These costs can be significant depending on the irrigation system used. For example, spray irrigators in Zone 1 have pumping costs in excess of $40 per ML. These costs have been held constant in all analyses so that effect of bulk water charges can be isolated. The following analysis is based on general security enterprises only. Enterprises requiring high security water are not included in the six representative farms modelled.

4.2 Relative importance of water to farm costs

The importance of water to farm costs is analysed using the six representative farms identified in Section 3. Water use for each enterprise is based on theoretical crop water requirements using average monthly rainfall over the past 30 years. The importance of water to farm costs is expressed in terms of the contribution of water to enterprise variable costs and total farm costs. In each section, water charges in the year 1999/2000 and 2003/2004 are used to provide an assessment of the current and future importance of water costs.

4.2.1 Contribution of water usage costs to enterprise costs

The importance of water usage costs to enterprise costs is expressed in terms of the contribution of bulk water usage charges to the variable costs for the enterprises grown on the representative farms. The water usage cost for each enterprise is derived by multiplying the average water use of each enterprise by the usage price of water for the 1999/2000 and 2003/2004 years.

Enterprise variable costs are direct production costs and include items like seed, fertiliser, chemicals, harvest costs and livestock variable costs such as veterinary, replacement stock and selling costs. These costs were based on budgets published by NSW Agriculture but modified by the irrigator members of the LCD groups to better reflect local practices.

The relative importance of water bulk costs to the costs of key enterprises was found to range between 1-6 per cent for 1999/2000 prices and 2-10 per cent for 2003/2004 prices (see Table 4). Full details of the results and analysis can be found in Appendix 1. It can be generally concluded that bulk water prices are a reasonably small contributor to enterprise costs, although that contribution is rising under the projected water price paths.

4.2.2 Contribution to total farm costs

Total water costs were calculated by summing water usage costs for the whole farm with fixed water costs (entitlement charges). Farm variable costs were derived for each farm and added to farm operating overheads to calculate total farm costs for the representative farms. The pricing scenarios are again based on the projected levels in 1999/2000 and 2003/2004. Full details of the results and analysis can be found in Appendix 2. A summary of the relative contribution of total water charges to farm costs are provided in Figure 3. The contribution of water charges to farm costs ranged from 1–3 per cent across six representative farms for 1999/2000 and 2-5 per cent for 2003/2004.

4.2.3 Summary

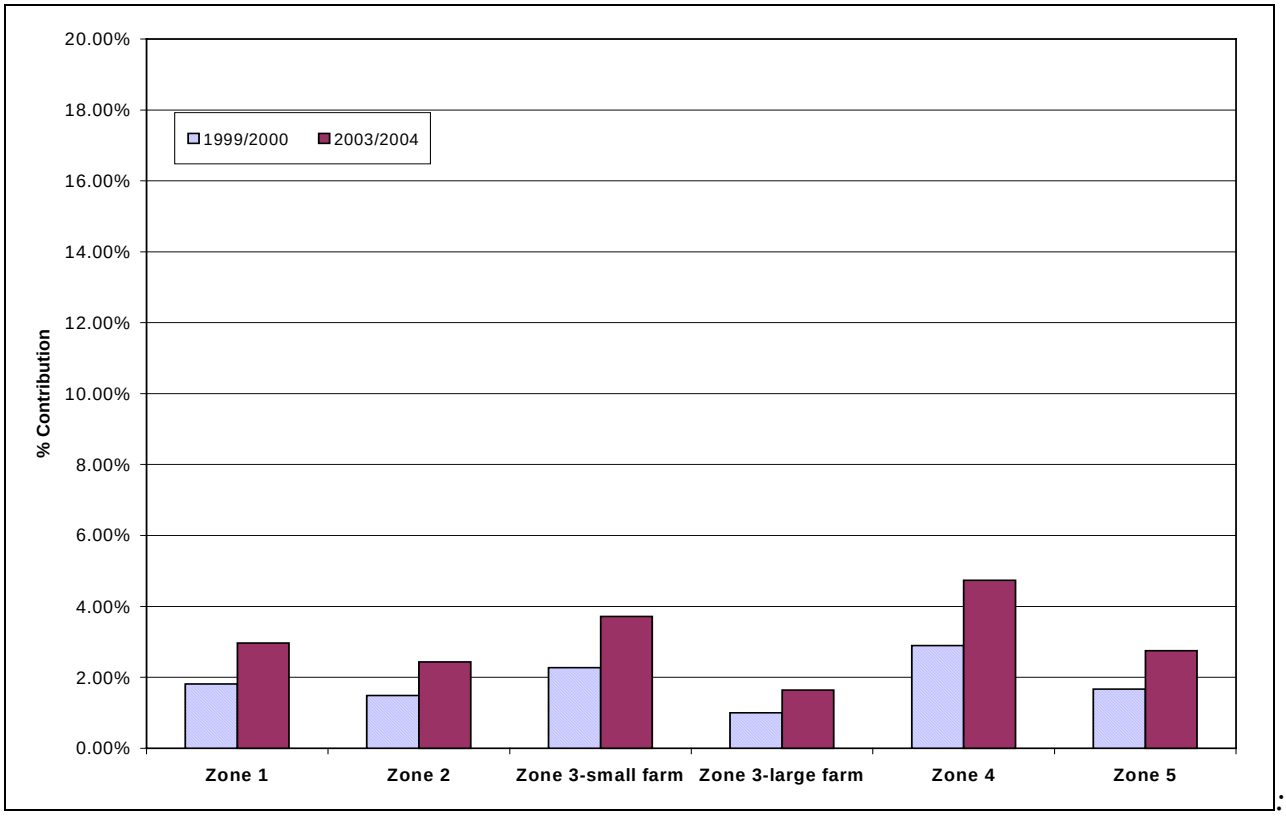
The results presented from this analysis indicate that the projected bulk water prices for 1999/2000 and 2003/2004 are a reasonably small contributor to costs at both an enterprise and total farm level. The results are consistent with general comments made in a number of previous reports on the implementation of water reforms. However, the price trends estimated indicate that bulk water prices will increase as a proportion of farm costs in the future under projected water price paths. This is largely because of the rate of price increases far exceed the rate of inflation generally effecting other farm inputs. The significance of these price changes on farm viability is discussed in the next section.

Table 4: Contribution of water usage costs to enterprise variable costs

Enterprise	**Year**	**Zone 1**	**Zone 2**	**Zone 3** Small Farm	**Zone 3** Large Farm	**Zone 4**	**Zone 5**
Wheat	1999-2000	1.38%	1.74%	2.49%	2.49%	2.71%	2.46%
	2003-2004	2.32%	2.90%	4.14%	4.14%	4.49%	4.09%
Oats	1999-2000			6.00%	6.00%		
	2003-2004			10.00%	10.00%		
Canola	1999-2000	1.27%	1.50%				2.64%
	2003-2004	2.13%	2.51%				4.37%
Cotton	1999-2000					1.72%	
	2003-2004					2.88%	
Maize	1999-2000					3.48%	3.27%
	2003-2004					5.74%	5.40%
Lucerne Hay	1999-2000	1.73%	1.80%	2.42%			
	2003-2004	2.89%	3.01%	4.02%			
Perennial pasture	1999-2000					3.84%	0.96%
	2003-2004					6.33%	1.61%
Annual pasture	1999-2000		2.37%	4.93%	2.69%		2.06%
	2003-2004		3.94%	8.05%	4.47%		3.44%

Note : Enterprise variable cost for perennial and annual pastures is derived through the sheep and cattle enterprises, which are supported by these pasture enterprises.

Figure 3: Contribution of total water charges to total farm costs



4.3 Impact of increasing water charges on the profitability of farms and likely adjustment responses

4.3.1 Adjustment responses and the elasticity of demand for water

A major determinant of the impact of water charges on the profitability of irrigation farms relates to the types of adjustment responses that irrigators would adopt to water price increases. Some of the adjustment responses include:

i) reducing water use on current enterprises – the feasibility of this option would depend on the marginal value derived from each enterprise at different water application rates relative to water prices;

ii) changing enterprise mix – this option may be a profitable response if the returns per ML from some of the enterprises are below final water prices;

iii) substitution of alternative water sources – this would depend on the relative charges and pumping costs of existing water sources relative to alternative supplies;

iv) improvements in irrigation efficiency – a significant price increase may justify investment in water saving technology although this is more commonly a longer term response to water scarcity; and

v) water trading – could be profitable where water prices resulted in some enterprises being less profitable than the net return received by transferring water to other users.

The adoption of any of these adjustment strategies is closely related to the concept of elasticity of demand. The price elasticity of demand for water is defined as the percentage change in quantity of water demanded for a one per cent change in its price. Demand is said to be elastic when the elasticity is greater than one (quantity changes proportionally more than price) and inelastic when the elasticity is less than one (quantity changes proportionally less than price). The demand for water is a derived demand based on the value of water as an input into agricultural production. As a consequence, the value of water is dependent on the profitability of the crops to which it is applied.

The sensitivity of water demand is a key issue in looking at water charges. If water demand is found to be inelastic, indicating that feasible adjustment options to higher water prices are limited, then the burden of these price rises fall directly on farm incomes. If demand is found to be elastic, indicating some potential for adjustment, impacts on farm incomes will be less severe as farmers modify their production systems to mitigate impacts.

A number of studies have estimated the demand for irrigation water. Some examples include Jones and Fagan (1996), Collins, Hall and Scoccimaro (1996), Hall, Poulter and Curtotti (1994), Read, Sturgess and Associates (1991) and Briggs-Clarke, Menz, Collins and Firth (1986). These studies have largely relied on the use of short run models[7] and have focused on the southern portion of the Murray-Darling Basin. Collins et al (1996) found that irrigation water demand is highly inelastic in the Southern Murray Darling Basin over water delivery prices consistent with prevailing temporary transferable water entitlement prices of $20-30 per megalitre. Jones and Fagan (1996) also found that water demand remained inelastic for the MIA up to $45 per megalitre. These results suggest that increases in water prices within a reasonable range is unlikely to greatly effect water use or cropping areas, but are more likely to impact on farmer incomes and possibly farm viability.

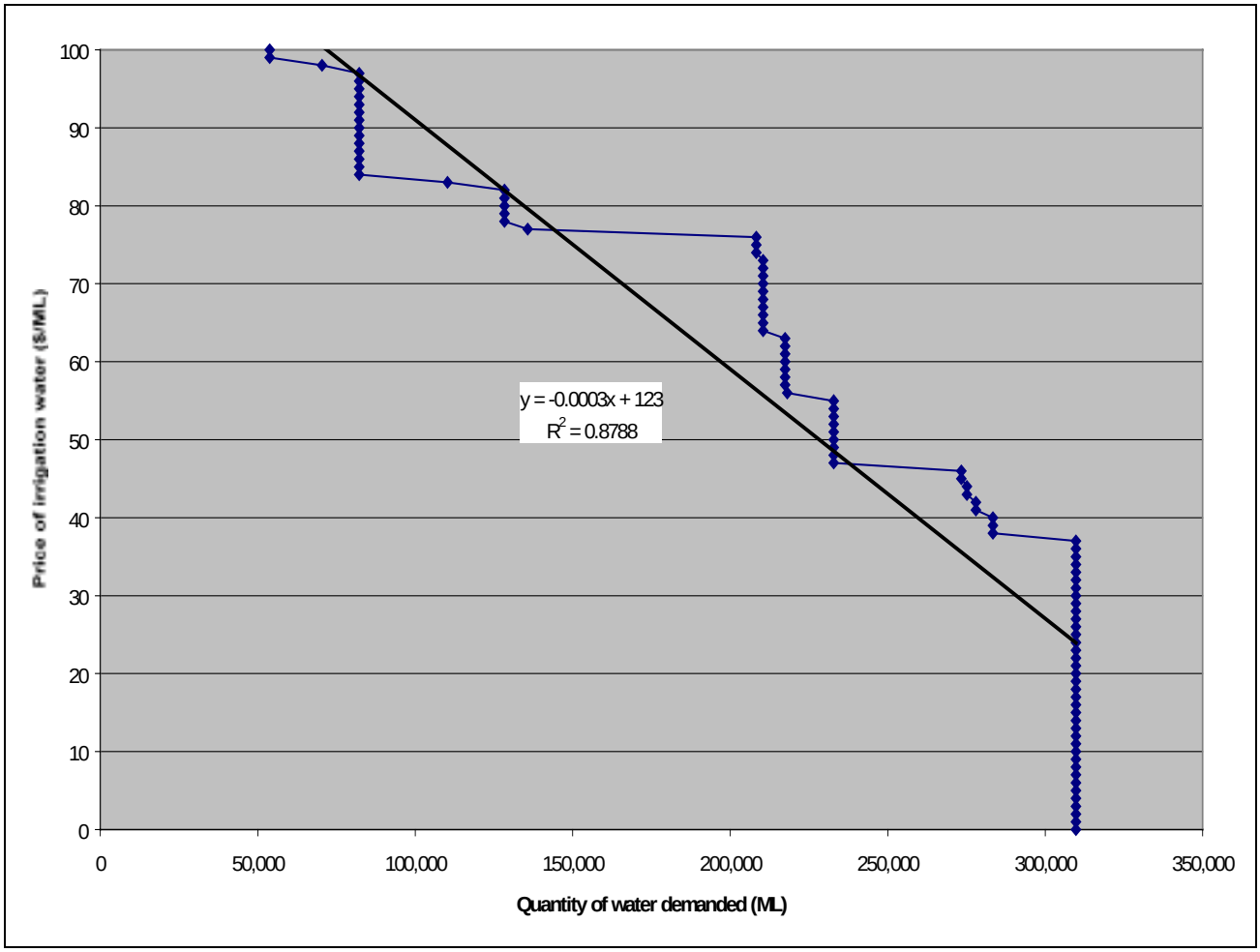
There have been no formal studies undertaken in the Lachlan Valley on the elasticity of demand for water. However, as part of this project, NSW Agriculture estimated a derived demand function for water in the Lachlan on the basis of its existing economic model of irrigated agriculture. The demand for irrigation water is determined by varying the price of water in the model and recording the quantity of water consumed[8]. An aggregated demand curve for water in the Lachlan Valley is presented in Figure 4. The demand curve represents the marginal value of water and is derived from the range of irrigation activities in the Lachlan.

The results of the analysis indicate that irrigation demand is inelastic over $0-$35 price range, indicating that the proposed water price increases assessed in this study would not effect water consumption. The implication of this finding is that it would be optimal for farmers to simply absorb the costs of increased water prices rather than making any adjustments to their farm operations. Additional work with NSW Agriculture's regional economic model showed that price increases failed to alter current enterprise mix across the five production zones further demonstrating that increased water costs are likely to be simply borne by irrigators with little effect on either enterprise mix or water use. The impact of water price changes on farm profitability is assessed in the next section on the basis of this finding.

Figure 4: Aggregated short term demand for water in the Lachlan Valley

[7] Short run models are broadly defined as those models which are constrained to a time period that does not allow for all factors of production to be varied. For example, short run models commonly do not enable farm capital investment.

[8] The approach adopted draws on the methodology employed by Jones and Fagan (1996) in estimating demand functions in the Murrumbidgee and Murray Valley.



4.3.2 Analysis of the impact of increasing water charges on farm profitability

If demand for water is inelastic, irrigators will continue with current farm operations and bear the increased water cost through higher variable costs and lower gross margins. The following analysis assumes no change in enterprise combinations and that increased water charges are simply reflected in lower farm profits.

The impacts of increases in bulk water charges on farm profitability were assessed for the six representative farms outlined in Section 3. Impacts were evaluated between the 1999/2000 water prices and the 2003/2004 water prices provided by DLWC. Impacts were assessed in terms of whole farm gross margin, net farm income, and business return. Definitions of these financial indicators are as follows:

- Whole farm gross margin – sum of individual enterprise gross margins (enterprise income less enterprise variable costs) received from all farm enterprises;
- Net farm income – whole farm gross margin less overhead costs (overhead costs include depreciation, administration, permanent labour and rates but exclude finance costs like interest and rent on leases);
- Farm business return – net farm income less imputed cost of operator's labour and finance costs (measures overall farm profit)

Effects on whole farm gross margin and net farm income essentially measure the impacts on the income generation capacity of the representative farms. Whole farm gross margin aggregates the

contribution of each farm activity and gives an indication of returns prior to the consideration of overheads or fixed costs of the farm. Net farm income is a measure of farm profit and measures the return to the operator for their labour and management and the return to all capital invested in the farm whether it is borrowed or not. Because net farm income excludes finance costs, comparisons of results are not complicated by differences in the level of indebtedness peculiar to particular farms. Farm business return deducts an imputed value for the operator's labour and the cost of finance. A positive business return represents an increase in the owner's equity or net worth.

The results of the analysis are presented in Table 5. The impact of proposed water usage charges is reflected in a decrease in farm gross margins by between 0.6 and 2.9 per cent. The direct result of increased water fixed cost is an increase in total operating overheads by between 1.3 and 3.8 per cent. When the total water price (both usage and fixed) increase is considered, the impact is a reduction in net income of between $2,354 and $20,436 per farm. This is an average reduction in net farm income of around 8.3 per cent across all representative farms evaluated. The percentage change in business returns, for the majority of the representative farms, appear large because estimated returns are either low or negative to begin with. Nevertheless, they do suggest that water price increases for some farms will place additional pressures on farm viability.

Table 5: Impact of water price increases on farm profitability

Profitability Indicators	**Zone 1**	**Zone 2**	**Zone 3** Small Farm	**Zone 3** Large Farm	**Zone 4**	**Zone 5**
1999/2000 water prices						
Total farm GM	$93,692	$162,429	$112,014	$231,118	$444,570	$160,076
Total operating overheads	$54,446	$99,153	$60,253	$140,629	$203,726	$131,327
Net farm income	$39,247	$63,276	$51,761	$90,489	$240,844	$28,750
Business return	-$3,303	$8,576	$13,661	$7,989	$167,494	-$3,000
2003/2004 water prices						
Total farm GM	$92,502	$161,096	$110,098	$229,742	$431,894	$156,531
Total operating overheads	$55,610	$101,093	$62,139	$142,515	$211,486	$133,343
Net farm income	$36,893	$60,003	$47,959	$87,227	$220,408	$23,188
Business return	-$5,657	$5,303	$9,859	$4,727	$147,058	-$8,562
Relative impact (%)						
Total farm GM	-1.3%	-0.8%	-1.7%	-0.6%	-2.9%	-2.2%
Total operating overheads	2.1%	2.0%	3.1%	1.3%	3.8%	1.5%
Net farm income	-6.0%	-5.2%	-7.3%	-3.6%	-8.5%	-19.3%
Business return	-71.3%	-38.2%	-27.8%	-40.8%	-12.2%	-185.4%

5. Summary and Conclusions

This study used a combination of representative farm modeling and linear programming (LP) to

assess the contribution of water charges to farm costs and the implications of proposed price increases on both farm profitability and enterprise selection. For the purpose of the analysis, the regulated section of the Lachlan was broken down into five zones consistent with the nature of irrigated agricultural systems and the availability of hydrology data from the DLWC.

Representative farm models were used to analyse the importance of water to enterprise and farm costs and the viability and profitability of farms under average climatic conditions and allocation availability. NSW Agriculture's existing economic model of irrigated agriculture in the Lachlan catchment was used to look at the types of adjustment responses irrigators might take in response to changes in water charges and to provide information on the nature of the elasticity of demand for water in the Lachlan Valley.

The results from the first part of the analysis indicated that the projected bulk water prices for 1999/2000 and 2003/2004 are a reasonably small contributor to costs at both an enterprise and total farm level. The results are consistent with general comments made in a number of previous reports on the implementation of water reforms. However, the price trends estimated indicate that bulk water prices will increase significantly as a proportion of farm costs in the future under projected water price paths. This is largely because of the rate of price increases far exceed the rate of inflation generally effecting other farm inputs.

The second part of the analysis considered the impacts of proposed price increases on the viability of farms in the Lachlan Valley. The elasticity of demand for water was discussed as an important factor in determining the nature of the impacts from higher water prices. Demand for water in the Lachlan Valley was found to be inelastic over a $0-$35 price range and it was concluded that most farms would simply absorb the costs of increased water prices rather than making any short term adjustments to their farm operations.

The impacts on farm profitability and viability were evaluated for proposed price increases between 1999/2000 and 2003/2004 supplied by DLWC. Whole farm gross margins were found to fall by between 0.6 and 2.9 per cent under proposed increases to water usage charges. When total water charges were considered (both usage and fixed), net farm incomes fell between $2,354 and $20,436 per farm or around a 8.3 per cent across all representative farms evaluated.

Whilst many farms may be capable of absorbing these impacts, price increases will further exacerbate the financial difficulties faced by some farms. Water charge increases, along with other water reform outcomes, are likely to lead to continued adjustment pressure on irrigation farmers. In the longer term, irrigation farmers in the Lachlan Valley, particularly those which are already only marginally viable, will need to continue to improve productivity and the efficiency of their production systems to meet these on-going challenges.

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Appendix 1: Contribution of water to enterprise variable costs

Table 1: 1999/2000 prices

Enterprise	Enterprise costs (per Ha)	Zone 1	Zone 2	Zone 3 Small Farm	Zone 3 Large Farm	Zone 4	Zone 5
Wheat	Water usage cost	$5.24	$5.85	$10.80	$10.80	$11.46	$10.80
	Enterprise variable cost	$379	$336	$433	$433	$424	$439
	Relative importance	**1.38%**	**1.74%**	**2.49%**	**2.49%**	**2.71%**	**2.46%**
Oats	Water usage cost			$10.80	$10.80		
	Enterprise variable cost			$172	$172		
	Relative importance			**6%**	**6%**		
Canola	Water usage cost	$5.48	$5.79				$10.37
	Enterprise variable cost	$432	$386				$394
	Relative importance	**1.27%**	**1.50%**				**2.64%**
Cotton	Water usage cost					$39.54	
	Enterprise variable cost					$2,293	
	Relative importance					**1.72%**	
Maize	Water usage cost					$29.93	$29.27
	Enterprise variable cost					$861	$895
	Relative importance					**3.48%**	**3.27%**
Lucerne Hay	Water usage cost	$20.31	$17.81	$24.21			
	Enterprise variable cost	$1,175	$989	$1,002			
	Relative importance	**1.73%**	**1.80%**	**2.42%**			
Perennial Pasture	Water usage cost					$35.58	$6.69
	Enterprise variable cost					$926	$696
	Relative importance					**3.84%**	**0.96%**
Annual Pasture	Water usage cost		$7.93	$9.77	$9.77		$9.77
	Enterprise variable cost		$334	$198	$363		$474
	Relative importance		**2.37%**	**4.93%**	**2.69%**		**2.06%**

Note : Enterprise variable cost for perennial and annual pastures is derived through the sheep and cattle enterprises, which are attached to these pasture enterprises.

Appendix 1 (Continued)

Table 2: 2003/2004 prices

Enterprise	Enterprise costs (per Ha)	Zone 1	Zone 2	Zone 3 Small Farm	Zone 3 Large Farm	Zone 4	Zone 5
Wheat	Water usage cost	$8.86	$9.88	$18.25	$18.25	$19.36	$18.25
	Enterprise variable cost	$382	$340	$441	$441	$432	$446
	Relative importance	**2.32%**	**2.90%**	**4.14%**	**4.14%**	**4.49%**	**4.09%**
Oats	Water usage cost			$18.25	$18.25		
	Enterprise variable cost			179	179		
	Relative importance			**10%**	**10%**		
Canola	Water usage cost	$9.26	$9.79				$17.53
	Enterprise variable cost	$435	$390				$401
	Relative importance	**2.13%**	**2.51%**				**4.37%**
Cotton	Water usage cost					$66.80	
	Enterprise variable cost					2321	
	Relative importance					**2.88%**	
Maize	Water usage cost					$50.56	$49.45
	Enterprise variable cost					$881	$915
	Relative importance					**5.74%**	**5.40%**
Lucerne	Water usage cost	$34.32	$30.09	$40.91			
Hay	Enterprise variable cost	$1,189	$1,001	$1,019			
	Relative importance	**2.89%**	**3.01%**	**4.02%**			
Perennial	Water usage cost					$60.11	$11.30
Pasture	Enterprise variable cost					$950	$701
	Relative importance					**6.33%**	**1.61%**
Annual	Water usage cost		$13.40	$16.51	$16.51		$16.51
Pasture	Enterprise variable cost		$340	$205	$370		$479
	Relative importance		**3.94%**	**8.05%**	**4.47%**		**3.44%**

Note : Enterprise variable cost for perennial and annual pastures is derived through the sheep and cattle enterprises, which are attached to these pasture enterprises.

Appendix 2: Contribution of water to total farm costs

Table 1: 1999/2000 prices

	Zone 1	**Zone 2**	**Zone 3** Small Farm	**Zone 3** Large Farm	**Zone 4**	**Zone 5**
A. Water Cost						
water usage						
total water use[9] (ML)	454	509	731	525	4,838	1,353
$ / ML)	$3.80	$3.80	$3.80	$3.80	$3.80	$3.80
total	$1,726	$1,933	$2,779	$1,996	$18,386	$5,143
water fixed						
entitlement (ML)	600	1000	972	972	4000	1400
$ / ML)	$3.07	$3.07	$3.07	$3.07	$3.07	$2.27
total	$1,842	$3,070	$2,984	$2,984	$12,280	$3,178
Total water costs (excl. pumping)	$3,568	$5,003	$5,763	$4,980	$30,666	$8,321
B. Farm Costs						
Farm variable costs	$143,001	$236,822	$193,325	$359,004	$854,880	$367,946
Farm overhead costs	$54,446	$99,153	$60,253	$140,629	$203,726	$131,327
Total farm costs	$197,446	$335,975	$253,577	$499,633	$1,058,606	$499,273
C. Total water costs as % of total farm costs	**1.81%**	**1.49%**	**2.27%**	**1.00%**	**2.90%**	**1.67%**

[9] Calculated through model runs for the last 30 year average rainfall

Appendix 2 (Continued)

Table 2: 2003/2004 prices

	Zone 1	**Zone 2**	**Zone 3** Small Farm	**Zone 3** Large Farm	**Zone 4**	**Zone 5**
A. Water Cost						
water usage						
total water use[10] (ML)	454	509	731	525	4,838	1,353
$ / ML)	$6.42	$6.42	$6.42	$6.42	$6.42	$6.42
total	$2,917	$3,266	$4,696	$3,372	$31,062	$8,689
water fixed						
entitlement (ML)	600	1000	972	972	4000	1400
$ / ML)	$5.01	$5.01	$5.01	$5.01	$5.01	$3.71
total	$3,006	$5,010	$4,870	$4,870	$20,040	$5,194
Total water costs (excl. pumping)	$5,923	$8,276	$9,565	$8,241	$51,102	$13,883
B. Farm Costs						
Farm variable costs	$144,191	$238,155	$195,241	$360,380	$867,556	$371,492
Farm overhead costs	$55,610	$101,093	$62,139	$142,515	$211,486	$133,343
Total farm costs	$199,801	$339,248	$257,379	$502,895	$1,079,042	$504,835
C. Total water costs as % of total farm costs	**2.96%**	**2.44%**	**3.72%**	**1.64%**	**4.74%**	**2.75%**

[10] Calculated through model runs for the last 30 year average rainfall

Appendix 3: Data used in the LP solution process

Lachlan Crop and Pasture Yields

	Zone 1							Zone 2								Zone 3							
	Light soils				Heavy soils			Light soils				Heavy soils				Light soils				Heavy soils			
	Surface	Spray	Trickle	Dryland	Surface	Spray	Dryland	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland
Asparagus		4.00		-		4.00	-																
Tomato		60.00		-		60.00	-																
Sweet corn		10.00		-		10.00	-																
Wine grapes			15.00	-																			
Apples										3.000	-												
Wheat								4.50	5.20		2.48	4.08	5.08		3.00	3.60	4.60		1.80	3.60	4.00		1.08
Canola								2.80	3.80		1.68	2.58	3.08		2.00	2.20	2.80		1.20	2.20	2.80		1.28
Oats		3.00		2.00		3.00	2.80																
Cotton																	6.60		-		6.60		-
Maize								10.80	11.80		-	9.08	11.08		-	7.00	9.00		-	7.80	9.00		-
Sorghum																							
Lucerne seed		8.58		-		0.40	-	0.30	0.50		-	0.28	8.58		-								
Lucerne hay		13.58		5.00		12.60	5.80	12.80	12.50	12.58	5.08	10.08	13.58		5.00	10.00	12.00		2.80	10.80	12.00		3.08
Lucerne pasture																							
– spring		103.00		35.02		62.42	14.80	79.81	93.66		31.84	53.68	74.93		12.73	55.73	65.56		22.29	44.58	52.45		8.91
– summer		148.98		11.98		112.76	9.56	106.94	126.17		10.68	87.15	102.53		8.71	76.26	89.72		7.62	61.01	71.77		6.10
– autumn		79.27		13.48		60.40	10.77	61.26	72.06		12.26	49.08	57.64		9.79	42.88	50.44		8.58	34.30	40.35		6.86
– winter		54.04		34.96		43.67	19.63	42.37	49.85		31.78	33.98	39.98		16.94	29.66	34.90		22.35	23.73	27.92		11.06
Perennial pasture																							
– spring		76.69		32.68		76.89	35.71	59.42	69.90		29.71	54.18	68.99		32.46	41.59	48.93		20.80	37.87	42.69		22.72
– summer		68.48		15.04		68.46	13.12	66.36	80.42		13.67	58.64	78.17		11.93	47.65	56.29		9.57	41.75	49.12		8.35
– autumn		45.34		9.64		45.34	11.10	35.84	41.22		8.76	33.63	36.96		18.09	24.53	28.85		6.13	23.94	25.17		7.06
– winter		23.78		14.40		22.70	15.85	17.54	20.84		13.16	18.01	18.01		14.41	12.26	14.45		9.21	12.81	12.81		10.09
Sub-clover																							
– spring	54.07			35.02	44.69		23.53	42.45	49.15		31.84	28.52	48.63		21.39	33.96	39.32		25.47	22.82	32.58		17.11
– summer																							
– autumn	35.26			7.61	24.75		3.21	27.68	32.85		6.92	11.68	22.58		2.92	22.14	25.64		5.54	9.34	18.08		2.34
– winter	60.03			26.40	46.72		15.87	40.89	55.30		24.07	27.48	42.47		13.70	38.47	44.24		19.26	21.92	33.98		10.96

	Zone 6								Jerralong							
	Light soils				Heavy soils				Light soils				Heavy soils			
	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland	NLF	LF	Spray	Dryland
Asparagus																
Tomato																
Sweet corn																
Wine grapes																
Apples																
Wheat	4.08	5.08	5.00	1.60	4.00	5.80	5.80	1.80	4.50	5.20	5.28	2.48	4.08	5.00	5.20	3.00
Canola	2.48	3.08		1.00	2.30	3.80		1.80	2.80	3.80		1.68	2.58	3.00		2.00
Oats																
Cotton		8.58		-		6.60		-								
Maize	9.08	9.58		-		10.80		-	10.80	11.80		-	10.08	11.00		-
Sorghum	7.08	8.08		2.50	7.00	9.80		2.50								
Lucerne seed									0.30	0.50		-	8.28	8.50		-
Lucerne hay		13.08		2.50		12.80		2.50	12.80	12.50	12.58	5.08	10.08	13.50	9.00	5.00
Lucerne pasture																
– spring	59.71	76.25		23.66	47.77	66.20		9.55	79.81	93.66		31.84	53.68	74.93		12.73
– summer	91.71	98.13		8.17	66.36	76.90		6.53	106.94	126.17		10.68	87.15	102.53		8.71
– autumn	46.94	64.06		9.19	36.75	43.33		7.34	61.26	72.06		12.26	49.08	57.64		9.79
– winter	31.78	37.38		23.64	25.43	29.91		12.71	42.37	49.85		31.78	33.98	39.98		16.94
Perennial pasture																
– spring	44.57	52.43		22.25	40.56	45.74		24.35	59.42	69.90	69.98	29.71	54.18	68.99	68.90	32.46
– summer	51.27	68.32		18.25	44.73	52.63		8.95	66.36	80.42	80.42	13.67	58.64	78.17	88.42	11.93
– autumn	26.28	38.92		6.57	25.22	26.97		7.57	35.84	41.22	41.22	8.76	33.63	36.96	41.22	10.09
– winter	13.16	15.48		9.67	13.51	13.51		10.81	17.54	20.84	20.84	13.16	18.01	18.01	28.64	14.41
Sub-clover																
– spring	38.08	41.78	41.78	27.06	24.24	34.54	34.54	15.16	42.45	49.15		31.84	28.52	48.63		21.39
– summer																
– autumn	23.53	27.24	27.24	5.69	9.93	19.13	19.13	2.48	27.68	32.85		6.92	11.68	22.58		2.92
– winter	46.08	47.01	47.01	28.46	23.29	36.10	36.10	11.85	40.89	55.30		24.07	27.48	42.47		13.70

Appendix 3 Continued

Lachlan Crop Evapo-transpiration Requirements (ML/ha)

	Zone 1								Zone 2													
Month	Asparagus	Tomatoes	Sweet corn	Oats	Wine-grapes	Wheat	Canola	Maize	Lucerne seed	Lucerne hay	Lucerne pasture	Perennial pasture	Sub-clover	Apples	Wheat	Canola	Maize	Lucerne seed	Lucerne hay	Lucerne pasture	Perennial pasture	Sub-clover
July				0.5		0.5	0.21								0.25	0.2						
August				0.67		0.67	0.45								0.51	0.46						
September				0.8		0.8	0.67		0.44	0.44	0.33	0.2475			0.79	0.79		0.52	0.52	0.39	0.2925	
October				0.4	0.42	0.4	0.91		0.93	0.93	0.9	0.675		0.54	0.91	1.04		1.05	1.05	1.03	0.7725	
November		0.64	0.62	0.8	0.79	0.8	0.24	0.62	1.52	1.52	0.8	0.6		1.21	0.43	0.26	0.68	1.67	1.67	0.88	0.66	
December	0.89	1.58	1.4		1.05			1.4	1.45	1.45	1.22	0.915		2.12			1.69	1.76	1.76	1.49	1.1175	
January	1.09	1.9	1.82		1.09			1.82	1.49	1.49	1.24	0.93		2.39			2.23	1.81	1.81	1.53	1.1475	
February	0.97	1.05	1.26		0.95			1.26	1.4	1.4	0.92	0.69	0.67	2.21			1.63	1.82	1.82	1.19	0.8925	0.88
March	0.74				0.74				1.21	1.21	0.98	0.735	0.98	1.59				1.55	1.55	1.26	0.945	1.26
April					0.42								0.27	0.89								0.35
May				0.11	0.18	0.11	0.04								0.04	0.04						
June				0.26		0.26	0.13								0.11	0.13						
Total	3.69	5.17	5.1	3.54	5.64	3.54	2.65	5.1	8.44	8.44	6.39	4.7925	1.92	10.95	3.04	2.92	6.23	10.18	10.18	7.77	5.8275	2.49

	Zone 3							Zone 4									Jemalong							
Month	Wheat	Canola	Maize	Lucerne hay	Lucerne pasture	Perennial pasture	Sub-clover	Wheat	Canola	Cotton	Maize	Sorghum	Lucerne hay	Lucerne pasture	Perennial pasture	Sub-clover	Wheat	Canola	Maize	Lucerne seed	Lucerne hay	Lucerne pasture	Perennial pasture	Sub-clover
July	0.27	0.22						0.27	0.22								0.27	0.22						
August	0.58	0.53						0.58	0.53								0.58	0.53						
September	0.99	0.99		0.65	0.49	0.3675		0.99	0.99				0.65	0.49	0.3675		0.99	0.99		0.65	0.65	0.49	0.3675	
October	1.2	1.38		1.39	1.37	1.0275		1.2	1.38	0.38		0.6	1.39	1.37	1.0275		1.2	1.38		1.39	1.39	1.37	1.0275	
November	0.57	0.35	0.87	2.15	1.13	0.8475		0.57	0.35	1.09	0.87	1.23	2.15	1.13	0.8475		0.57	0.35	0.87	2.15	2.15	1.13	0.8475	
December			1.86	1.93	1.64	1.23				2.13	1.86	1.14	1.93	1.64	1.23				1.86	1.93	1.93	1.64	1.23	
January			2.49	2.03	1.7	1.275				2.56	2.49	1.22	2.03	1.7	1.275				2.49	2.03	2.03	1.7	1.275	
February			1.78	1.98	1.3	0.975	0.96			2.29	1.78	1.44	1.98	1.3	0.975	0.96			1.78	1.98	1.98	1.3	0.975	0.96
March				1.69	1.33	0.9975	1.38			1.41			1.69	1.33	0.9975	1.38				1.69	1.69	1.33	0.9975	1.38
April							0.35			0.44						0.35								0.35
May	0.04	0.04						0.04	0.04								0.04	0.04						
June	0.11	0.13						0.11	0.13								0.11	0.13						
Total	3.76	3.64	7	11.82	8.96	6.72	2.69	3.76	3.64	10.3	7	5.63	11.82	8.96	6.72	2.69	3.76	3.64	7	11.82	11.82	8.96	6.72	2.69

Irrigation Efficiency		
	Light	Heavy
NLF	70%	65%
LF	80%	80%
Spray	75%	75%
Trickle	90%	90%

Water cost for 1999/2000	
Zone 1	$47.20
Zone 2	$14.96
Zone 3	$13.10
Zone 4	$11.24
Zone 5	$10.57

Returns from Enterprises					
Asparagus ($/tonne)	7,000.00	Wheat ($/tonne)	145.00	Sorghum ($/tonne)	115.00
Tomato ($/tonne)	102.50	Canola ($/tonne)	310.00	Lucerne seed ($/tonne)	3,330.00
Sweet corn ($/tonne)	120.50	Oats ($/tonne)	120.00	Lucerne hay ($/tonne)	140.00
Winegrapes ($/tonne)	450.00	Cotton ($/bale)	490.00	Make lucerne pasture hay ($/bale)	1.10
Apples ($/bushell)	13.76	Maize ($/tonne)	160.00	XDH ($/hd)	40.00