3. EXECUTIVE SUMMARY

3.1 INTRODUCTION

Water management is one of the most challenging issues facing Western Australians today. Changing climatic and rainfall patterns, coupled with the rapid growth of the State’s population, have created an urgent need to plan effectively for future water demand and to balance a growing demand for water with the public’s expectations for a quality and resilient environment.

Water use across the State doubled between 1985 and 2000, and currently consumption is running ahead of predictions that it will double again by 2020. Despite this, Western Australia is in a favourable position to learn from the successes and the failures of other jurisdictions that have already had to contend with heavy pressure on their water resources.

Figure 1. Water Use by Use Group in WA in 2000

The irrigated agricultural sector accounts for approximately 40 per cent of Western Australia’s total water demand (Figure 1). This proportion is less than that encountered in other states, where typically irrigated agriculture accounts for 70 to 80 per cent of total water use.

The 2003 State Water Strategy set out an integrated set of recommendations designed to address the State’s water issues. One of these recommendations was for a whole-of-government review of irrigation activities. The findings and recommendations of this review are presented in this report.

3.2 IRRIGATION REVIEW TERMS OF REFERENCE

The Terms of Reference for the review, approved in December 2003 by the Premier’s Water Resources Cabinet Sub-Committee, are as follows:

- Establish the amount of irrigation water supplied and used within Western Australia together with the economic and social benefits generated by such usage.
- Considering factors such as water availability, environmental impact, climate change, etc., identify the likely future forms, scale, locations, water needs and economic benefits of irrigated agriculture in Western Australia.
- Identify opportunities for improving the efficiency with which irrigation water is delivered and used together with the associated costs, benefits and beneficiaries thereof.
- Identify constraints (including but not limited to government policies and priorities) to improving the efficiency with which water is delivered and used. Explore the possibility and appropriateness of forming collaborative links between all levels of government, industry, researchers and the community.
- Review the potential for water trading to improve the efficiency with which water is delivered and used; identify policy and other constraints to water trading and if appropriate, recommend actions needed to facilitate water trading.
3.3  Irrigation Review Stakeholder Consultation

Eight months of stakeholder consultation was carried out between March and November 2004. During this time, the Irrigation Review team received 50 submissions on behalf of 58 organisations and individuals including government agencies, agribusiness operations and consultancies, irrigation cooperatives, industry bodies and banks. Key irrigation issues, as well as a wide range of relevant water resource management issues, were raised and discussed. A detailed list of issues and submission comments is provided in Appendix 2.

3.4  Overview of Irrigated Agriculture in Western Australia

The irrigated agriculture sector accounts for 40 per cent of the State’s total water consumption. The sector includes horticulture (mainly fruit, vegetables and viticulture), the State’s fastest growing primary production sector. Irrigated agriculture also includes the sugar, cotton and dairy industries.

The combined annual value of product produced by Western Australia’s irrigated agriculture industries is approximately $800-900 million, or about 13 per cent of the State’s Gross Value of Agricultural Production (GVAP) of $6.2 billion. The four irrigation supply schemes in Western Australia are:

- South West Irrigation Area (Harvey Water);
- Ord Irrigation Area;
- Carnarvon Irrigation Area; and
- Preston Irrigation Area.

Around 64 per cent of water allocated to irrigated agriculture is consumed within the first three schemes. Most of the remainder of the State’s irrigation is self-supplied, mainly through the pumping of groundwater and to a lesser extent through the diversion of surface water in the high rainfall areas of the South West region. Groundwater is a significant source of irrigation water in all but the Kimberley region. However, extensive unallocated reserves of groundwater with potential for future use in irrigation exist in the West Kimberley.

It is estimated that currently 520,000 megalitres of water are used by irrigation industries in Western Australia. Around 180,000 megalitres are used for irrigated cropping in the Kimberley and Gascoyne regions, and 340,000 megalitres are used in the south of the State. Fifty-five per cent of the State’s irrigation water is directed to horticulture which generates a relatively high value of product per unit of water used. This pattern of use is dramatically different from the eastern states where only five per cent is used on horticulture.

A significant quantity of additional water is released for agriculture in irrigation scheme areas but lost due to leakage and evaporation from open distribution channels and on-farm delivery systems.

Brennan (2004) examined growth trends in irrigated agricultural production across a range of sectors and determined that water demand, particularly in the south west, will be driven by growth in horticultural products. Horticultural production within Western Australia has grown at around five per cent per annum for vegetables and 10 per cent for fruit, driven largely by export demand. Recently this growth rate has slowed due largely to an unfavourable exchange rate and increased international competition. Nevertheless, the good standing of horticultural production in the State (“clean and green”) together with a reputation as a reliable high quality supplier, are expected to continue to deliver healthy growth.

Vegetable exports from the southern regions of the State are estimated to increase over 10 years by between 28 per cent and 64 per cent. Fruit exports are estimated to grow over the same period by between 62 per cent and 160 per cent. Water demand for cotton production could increase significantly should large-scale production eventuate in the West Kimberley, where studies have shown water and land resources will support a significant sustainable modern industry.

The manner in which growth in production impacts upon demand for irrigation water is complex. The value placed on water, the ability to trade water and improvements in the efficiency with which water is applied can all have a considerable impact as well. Hence, even if the above growth in production occurs, projected demand for irrigation water lies within a broad range. Ultimately, the future demand for irrigation water will depend upon the extent to which the recommendations of this report are implemented, the impact that they will have upon water trading and the consequent value assumed by water.
3.5 FINDINGS AND RECOMMENDATIONS

The findings and the recommendations by the Steering Committee are summarized under three broad categories, water use issues, policy and management issues, and governance issues.

3.5.1 WATER USE ISSUES

3.5.1.1 PLANNING AND DEVELOPMENT

A. The State-Wide Picture

Currently 50,000 hectares of land are under irrigation in Western Australia. The State also has an extensive amount of additional land which is suitable for irrigated agriculture. The main constraints to growth in irrigation in Western Australia are the availability of suitable water in quantity, and the access to suitable export markets for horticultural and other products (Table 1).

Table 1. Summary of Land Capability Estimates for Irrigated Agriculture by Region Assessed in Irrigation Review

<table>
<thead>
<tr>
<th>Region</th>
<th>Capable Land Area (Ha)</th>
<th>Current Area Irrigated (Ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metropolitan</td>
<td>155,200</td>
<td>5,620</td>
</tr>
<tr>
<td>Peel-Harvey</td>
<td>141,100</td>
<td>10,426</td>
</tr>
<tr>
<td>Whicher</td>
<td>153,900</td>
<td>5,331</td>
</tr>
<tr>
<td>Preston-Warren-Blackwood</td>
<td>504,100</td>
<td>5,966</td>
</tr>
<tr>
<td>Great Southern</td>
<td>2,309,100</td>
<td>3,212</td>
</tr>
<tr>
<td>Gingin</td>
<td>615,900</td>
<td>3,206</td>
</tr>
<tr>
<td>Mid-West</td>
<td>1,299,600</td>
<td>721</td>
</tr>
<tr>
<td>Gascoyne</td>
<td>17,600</td>
<td>950</td>
</tr>
<tr>
<td>West Kimberley</td>
<td>5,174,300</td>
<td>942</td>
</tr>
<tr>
<td>East Kimberley</td>
<td>59,000</td>
<td>9,878</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>10,429,800</strong></td>
<td><strong>46,252</strong></td>
</tr>
</tbody>
</table>

Source: Department of Agriculture WA 2004; ABS 2003

Of all the zones assessed in this review, the West Kimberley, with more than five million hectares, has the largest area of soils potentially capable of supporting irrigation (Wright 2004). Both the West Kimberley area and the Ord Stage 2 development have sufficient land and water available to equal or exceed the area currently irrigated throughout the State. This emphasizes the potential for future expansion of irrigated agriculture in the north of the State. It also highlights the need for further research into the economic, ecological and social opportunities and impacts of irrigated agriculture in these areas.

The Kimberley Case Study Summary, presented in Section 3.6.3, shows the potential for expanding irrigation in the north of the State, and establishes the need for a proper assessment of sustainability.

The economic value of water (within irrigation production systems) is high for most horticultural production, with the value of water for vegetables being in the range $2,500 to $13,500 per megalitre for typical crops and averaging $7,600 per megalitre in southern regions of the State (Brennan 2004). For fruit production in southern regions the value for water ranges from $3,000 to $9,000 per megalitre for typical crops. In contrast, the value for water for irrigated dairy production is around $300 to $600 per megalitre for typical dairy farms, with highly productive farms achieving up to $1,500 per megalitre. For irrigated beef production, the value for water is almost zero (Brennan 2004).

Larger scale production (irrigated area more than 200 hectares in one holding) is constrained in the south of the State by smaller holdings and lot sizes, and high land values exacerbated in some cases by proximity to rapidly expanding residential areas. In the south of the State, future growth in the area under irrigation as well as in the value of product produced by the industry will require land use planning issues to be resolved, more secure water entitlements, and the better definition of available water resources and environmental water requirements.

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1 Current area irrigated is as reported by ABS (2003) for 2001 census year.

2 For vegetables, Brennan (2004) modelled potato, carrot and cauliflower production in the South West, and for fruit modelled orchard fruit apples, plums and oranges.
B. The Need for Horticultural Precincts

Traditionally, horticultural enterprises located on the fringes of cities have been important sources of fresh fruit and vegetables. Examples with relevance to Perth include areas such as Wanneroo, Spearwood and Osborne Park.

As the urban population grows, the consequent expansion of the suburbs starts to impinge on horticulture with a number of serious consequences. Land values rise, making expansion expensive and difficult. Holdings become fragmented, thereby increasing operating costs. Restrictions are placed upon the activities of farms operating close to domestic dwellings to prevent them from becoming a nuisance. In extreme cases horticulture disappears entirely because all the land has been rezoned for urban use.

Current planning policies support the identification and establishment of horticultural precincts; however, existing planning practices do not reflect these policies. The Steering Committee believes that the existence of horticultural areas located reasonably close to Perth is beneficial to the community and State’s economy. Accordingly, it recommends that the Department for Planning and Infrastructure, in concert with other relevant authorities, place greater emphasis on the identification and zoning of horticultural precincts.

The area immediately to the north of Wanneroo is regarded as a priority for such a development. The creation of a precinct on a greenfield site will permit suitable consideration to be given to environmental impacts, buffer zones, optimum lot sizes, water allocations, services and infrastructure, and possibly to the reuse of recycled water sourced from nearby suburban areas.

The possible relocation of producers from areas of the Gnangara Mound and the importance of this in relieving the stress upon the mound is discussed subsequently in this section.

C. Recommendations for Planning and Development:

• Identify and delineate areas with suitable land, water and infrastructure to facilitate future growth in irrigated agriculture.
• Give consideration to the impact of urbanization when planning for irrigated agriculture.
• Undertake a state-wide review of the potential impacts of climate change on irrigated agriculture both now and into the future.
• Incorporate climate change risk assessments into all Water Resource Management Plans.
• Further integrate water and land use planning by preparing guidelines for the planning of sustainable horticultural precincts.
• Require the Western Australian Planning Commission (WAPC) to identify and protect Priority Agricultural Areas in the Perth region under the Metropolitan Region Scheme.
• Establish horticultural precincts at Gnangara and Myalup.
• Support a comprehensive review and assessment of the scope to expand irrigated agriculture in the West and East Kimberley areas.
• Where suitable land and water resources coincide, investigate the potential to create other horticultural precincts.

3.5.1.2 WATER USE EFFICIENCY

The two areas with significant scope to reduce water consumption are:

• Open channel distribution systems in irrigation areas; and
• On-farm distribution systems.

A. Irrigation Scheme Areas

Half of the irrigation water delivered to agriculture in Western Australia is used in the Ord Irrigation Area and South West Irrigation Area (Harvey Water) combined. Both areas mainly use open channel distribution and delivery systems, from which between 20 per cent and 30 per cent of water is lost through leakage and evaporation. The recent piping of the Waroona irrigation district by Harvey Water has resulted in water savings of around 3,600 megalitres per annum, and as a result Harvey Water proposes to pipe the rest of its area.

The South West Irrigation Area/Myalup Case Study Summary (presented in Section 3.6.4) presents both the opportunities to invest in efficiency improvements and the need for more integrated land use and water resources planning in this area.

The Steering Committee supports the investment in piping the South West Irrigation Area, subject to further consideration being given to the merits or otherwise of piping the Collie Irrigation District.
B. On-farm Irrigation Practices
Currently, a number of conditions exist which militate against on-farm water savings. These include:

• the ‘use it or lose it’ policy;
• the short-term nature of water entitlements (which acts as a disincentive to investment in more efficient irrigation systems);
• the absence of a financial incentive to save water (the cost of water is low and water trading which results in an economic value being placed on water is virtually non-existent); and
• the gifting of water and the absence of metering, which creates a perception of unlimited supply.

The Carnarvon Case Study Summary, which appears in Section 3.6.1, focuses on the high efficiency of the Carnarvon Irrigation Area and also upon the conditions which led to this.

C. Recommendations for Water Use Efficiency
• Implement efficient water trading systems, thereby assigning a realistic value to water and hence driving improvements in efficient water use.
• Examine and where appropriate invest in opportunities to reduce distribution losses in irrigated agricultural systems (e.g. piping the Harvey Water irrigation system, as per the 2004 ACIL Tasman report on the South West Irrigation Area).
• Benchmark irrigation systems at the farm and industry level to create an important driver for improving productivity and the efficiency of water use.
• Expand the Waterwise on the Farm training program.

3.5.2 Policy and Management Issues
Current water resource management practices do not encourage water use efficiency. The main problems with the current management system are:

• The lack of a clear strategic framework for water resource management which addresses governance, legislative reform, state-wide planning and the improved administration of water entitlements.
• Although water licences are usually renewed by the Department of Environment upon request, they are only issued for a maximum of 10 years. In agricultural terms, 10 years is a short time. Accordingly, both farmers and financiers are deterred from investing in long-term projects and/or systems designed to save water.
• Water entitlements need to be more flexible in order to provide irrigators with more options. The current form of water entitlement also inhibits water trading.
• Current water resource policies and practices (‘use it or lose it’, ‘first in time’ allocation, an ineffective titling system, linking water entitlements to land ownership, ‘hidden’ water title information and lack of monitoring) give rise to uncertainty and act as deterrents to an open and effective water market.
• Generally water is undervalued, and hence there is little incentive to use it efficiently. In some areas, however, irrigators provide their own self-supply facilities at considerable expense.
• The vast majority of water users are not metered. Greater knowledge of water use and of the availability and quality of water resources is needed. Metering will assist irrigators to use their water efficiently, and will enable water resources to be monitored and managed within sustainable yields, thereby providing increased security for all titleholders.
• Comprehensive water plans are needed for all groundwater and surface water systems used for irrigation, in order to identify sustainable yields and establish environmental water requirements.
• Land and water planning are largely divorced from each other: There is a need for land use planning to be integrated with the planning of water allocation.

The following recommendations are designed to stimulate the more efficient use of water as well as to encourage the onset of water trading carried out under a system which embodies the principles of the National Water Initiative. They will also align Western Australia with other states in embracing the National Water Initiative.

Recommendations for Policy and Management Issues
A. Nature of Water Entitlements
• Separate (or unbundle) the entitlement to access water from the approval to use water on a specific area of land.
• Discontinue the practice of allocating a water entitlement by reference to the purpose for which it is to be used (e.g. the irrigation of an area of a specific crop).
• Impose conditions relating to the use of water at particular locations as a separate instrument.
• Specify water entitlements as a share (converted to a volumetric allocation annually or periodically as actual supply conditions require) of the water resource available to consumptive users.
• Discontinue the practice of requiring access to land in order to hold or trade a water licence.
B. Security of Entitlement

- Grant perpetual water licences, subject to them also being specified as a share of the available resource. In the event that government is unwilling to adopt perpetual entitlements, licences should be granted for at least 40 years and made renewable at any time during the term subject to meeting the conditions of the licence.
- Abandon the 'use it or lose it' policy.
- Specify clearly the processes for making changes to the consumptive pool.
- Specify the various shares, including those allocated to the environment, public interest, domestic consumption and irrigation in comprehensive management plans.
- Adopt the risk allocation framework proposed in the National Water Initiative's Inter-governmental Agreement.
- Pay compensation to users for changes which are not contemplated in statutory plans and which result in reductions to their allocation. An appropriate basis for compensation is contained within the NWI framework.
- Make long-term increases in the consumptive pool which result from unanticipated changes to the plan available for use at the government's discretion (including the option of auctioning some or all of the extra water to new users).
- Adopt a 'Torrens-based' register of titles which incorporates the key features proposed in the *Land and Water Australia Water Titling Report*.

C. Allocation, Planning, Monitoring and Enforcement

- Accelerate the production of statutory-based management plans.
- Make statutory plans legally binding on both the water resource manager and water users.
- Amend the *RIWI Act 1914* and/or other regulations to permit the water resource manager to place an embargo on the issuing of new licences in order to allow completion of management plans. The embargo should be permitted only for a limited time specified in the statutory management plan or, if a plan is not in existence, in Regulations.
- Issue all licences on a competitive basis at a minimum reserve price. Consideration should be given to adopting the practice recommended by the Natural Resource Management Standing Committee of holding auctions over time with an appropriate proportion of the remaining resource being introduced on each occasion.
- Require all water use above a threshold of five megalitres per annum to be metered. The threshold should be reviewed regularly and adjusted as required.
- Implement enforcement procedures for non-compliance of licence conditions.
- Make the amount of water used by each licensee, and the conditions of its use, a matter of public record. Publish instances where licence conditions are breached together with any action taken as a consequence.
- Continue government agencies' current work on water conservation and use of recycled water.
- Maintain a public use reserve and, in cooperation with the Water Corporation, monitor this closely.

D. Facilitation of Water Trading

- Withdraw the water trading policy, Water and Rivers Commission 2001, *Statewide Policy No.6 - Transferable (Tradeable) Water Entitlements for Western Australia* and prepare a new policy for water trading which complies with the nationally agreed best practice guidelines for water markets and water trading. This will include but not be limited to:
  - Minimising transaction costs including the turnaround time for processing and approving trades by pre-testing in advance and then specifying conditions under which trades will receive automatic approval.
  - Unbundling water entitlements from use conditions will remove the necessity to consider the impact of water use in the assessment of an application to trade.
  - Requiring the water resource manager to facilitate the disclosure of information on water ownership and availability to the market.
  - Considering amending the legislative framework to allow individual irrigators to trade with water users outside their particular scheme. This assumes that a means of transporting water between both parties exists.

E. Water Resource Management Charges

- Reconsider the introduction of water resource management charges that recover the share of management costs attributable to water users. The basis of charging should be transparent and the money raised used for agreed purposes. The first step should be to recover costs associated with licensing and compliance.
- Establish mechanisms by which water users can both monitor the efficiency of water resource management service delivery and have an influence over service delivery standards.

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3.5.3 Governance Issues

Until recently, the portfolios of seven State Government Ministers impacted on water management and policy (Premier, Treasury, Government Enterprises, Environment, Planning, Agriculture, and State Development). With the exception of the Minister for Agriculture, these Ministers are all members of the Water Resources Cabinet Sub-Committee which coordinates water management across government.

The State Water Council (SWC), formerly the State Water Strategy Task Force (SWSTF) has been successful in coordinating projects and government responses to water issues. For this reason, it should continue to operate in its current form. An important new role for the SWSTF will be to oversee the preparation of a State Water Plan. This should be in a form that permits the future demand on the State’s water resources to be predicted and then managed strategically.

Given the importance of water in Western Australia, there is considerable support for the creation of a Department for Water Resources.

A separate, but important governance issue is the real potential for conflict of interest within the Department of Environment over matters relating to environmental water provisions. While water resource management has an important environmental component, water also has significant social, economic and cultural value which must be reflected in water management. Currently the Department of Environment has responsibility for both environmental protection and water resource management and allocation. There is a widespread perception that water resource management is currently dominated by environmental considerations. The Irrigation Review Steering Committee has identified broad support for these two roles to be split between separate agencies.

The following inter-related changes are recommended:

Recommendations for Governance Issues:

A. Government and Organisational Structure

• Create a new Ministry for Water Resources with responsibility for water resource management, water policy, strategy and planning and the water utilities. (The Steering Committee is pleased that its first recommendation has been partially implemented by the State Government’s recent decision to appoint a Minister for Water Resources with responsibilities for water resource management, water policy, strategy and planning, and water utilities.)

• Establish a new Department of Water Resources (DWR) by combining
  - the water resource management activities of the Department of Environment,
  - the State Water Strategy Unit, and
  - relevant functions within the Water Corporation
  into a single department that is completely separate from the DoE (See Figure 8).

• Structure the proposed DWR so that Operational Management and Strategy, and Policy and Planning are carried out in two distinct divisions with each function having its own management structure and dedicated budget.

• Use the SWC to oversee the implementation of these recommendations.

• Develop a State Water Plan and so establish a strategic framework within which the future demand on the State’s water resources can be determined and managed effectively.

B. Water Resources Stakeholder Reference Group

• Realign the Water Resources Stakeholder Reference Group as an advisory group to the Minister for Water Resources.

• Ensure that the members of the Water Resources Stakeholder Reference Group not only understand the views of their stakeholders, but also are knowledgeable about modern water management and the issues associated with water reform.

C. Water Resources Cabinet Sub-Committee

• Regularly review the need for the Water Resources Cabinet Sub-Committee.
Centrestar Pivot
Source: Harvey Water

Lake Argyle Main Dam
Source: Gabrielle O’Dwyer
D. Extension of Self-Management by Users
• Investigate how self-management might be applied to self-supply areas with a high density of irrigated agriculture. The final option may or may not involve creation of new cooperatives.
• Investigate appropriate mechanisms for community, industry and other stakeholder partnerships in water resource management, including a review of the role and effectiveness of water resource management committees in providing community, water user and industry input into the water allocation and planning process.

E. Operation of the Proposed Department of Water Resources
• Ensure that the DWR is funded to an appropriate level and that at all times at least equal emphasis is placed on strategic matters as is on operational issues.
• Establish within DWR a group of experts with the appropriate skill sets to evaluate and determine a long-term water strategy and plan for the State.
• Give a high priority to water resource planning within the DWR.
• Continue to work on the development of a positive, customer oriented and participative culture within the DWR.

F. Water Resource Management Capacity Building
• Develop and implement programs specifically aimed at building a competent water resource management capability within relevant government agencies, water resource management committees and stakeholder groups.

3.6 PAPERS - IRRIGATION AREAS

3.6.1 CARNARVON IRRIGATION AREA

3.6.1.1 BACKGROUND

The Carnarvon Irrigation Area is located near the mouth of the Gascoyne River, approximately 900 kilometres north of Perth. In the 1920s, plantations utilising riverbed aquifers were established on the banks of the Gascoyne River. The irrigation area now extends inland from the town of Carnarvon for approximately 19 kilometres.

Currently, Carnarvon has around 170 plantations and a total of 950 hectares of land under irrigation. Irrigated agriculture is responsible for 10-15 per cent of Carnarvon’s gross production and five-10 per cent of the Gascoyne Region. The Carnarvon Irrigation Area contributes 11 per cent of the value of Western Australia’s irrigated horticultural product.

Usually the Gascoyne River flows between February and August. River flows recharge the aquifers and are essential for the continuity of water supplies to Carnarvon for irrigation, public water supply and other purposes.

As aquifer recharge only occurs intermittently, and sometimes not for several years, water use must be managed carefully and new allocations for irrigation have been limited for many decades. Over pumping during dry spells can cause saline water to be pulled into an aquifer, damaging crops in the short-term and potentially damaging the aquifer for future use. Many irrigators in Basin A have access to self-supply as well as scheme water; and switch to scheme water provided by the Gascoyne Water Cooperative when self-supply is no longer possible. Carnarvon Scheme water is much more expensive than self-supply water and is the most expensive water provided for irrigation in the State.

For these reasons, irrigators have been actively involved in water management since the first advisory committee was established in the 1960s. Over the last 40 years growers, government and the Cooperative have worked together to progressively develop a set of “Rules of the River”. These rules include decision rules for sharing water during dry spells and for closing down bores before salinity problems occur.
### 3.6.1.2 What can we learn from the Carnarvon experience?

In the past, saline aquifers and inequity between growers during dry periods posed real threats to irrigation at Carnarvon. These were driving forces for the industry to both understand and become actively involved in the management of its water resources. Importantly, the contribution that irrigated agriculture makes to Carnarvon is recognised by the broader community, which strongly supports the sector’s continued existence.

Carnarvon water is scarce and growers pay the highest price for water delivered for irrigation. It is also no coincidence that based on output value per megalitre, Carnarvon is the most efficient irrigation area in Western Australia. A rough estimate prepared for the Steering Committee suggests that the Carnarvon Irrigation Area produces $6,333 per megalitre ($57 million GVAP from 9,000 megalitres of water), compared to the South West Irrigation Area at $1,157 per megalitre ($124 million GVAP from 107,207 megalitres) and the Ord River Irrigation Area at $272 per megalitre ($57 million GVAP from 209,000 megalitres).\(^4\) It should also be noted that figures for individual properties may be higher or lower.

The scarcity and relatively high cost of water, coupled with the good understanding that growers have of the impact on the aquifers of their actions have led to the widespread adoption of efficient irrigation techniques (e.g. the replacement of flood irrigation by dripper systems, mini-sprinklers and sub-surface tape).

Technological advances which allow computers, irrigation engineering and agronomics to be integrated to provide more sustainable and efficient farming systems are becoming increasingly important. The Martinez Open Hydroponic Technology (MOHT) approach is one example of this. MOHT uses sophisticated software and engineering to control all plant inputs, thereby maximising the available energy and providing optimal daily requirements for each phenological phase as the plant under irrigation matures and produces.

The adoption of this new technology has provided significant benefits to growers, who now have greater control over their on-farm water use and other inputs. This control has resulted in the increasing use of advanced fertigation techniques, while at the same time reducing water use. As a result, large gains in production and higher gross margins are starting to be achieved.

### 3.6.1.3 What does this mean for irrigated agriculture and water resource management state-wide?

The relevance of the Carnarvon case study to irrigated agriculture and water resource management across the State is that scarcity and price drive improvements in efficiency and control, which in turn drive improvements in productivity. These improvements are most rapid when water users understand the potential impacts of their water use and are actively involved in managing these impacts at the local level.

This case is covered in more detail in Appendix 3 Papers – Irrigation Areas and Districts, Carnarvon Irrigation Area, which was prepared for consideration by the Steering Committee.

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\(^4\) Estimates for Carnarvon and Ord River Irrigation Areas are calculated by the Department of Agriculture, Western Australia based on the ABS figures in December 2004. Estimates for the South West Irrigation Area are calculated on the basis of figures provided by Harvey Water in April 2005.
3.6.2 GNANGARA MOUND

3.6.2.1 BACKGROUND

The Gnangara Mound (the Mound) is a large groundwater resource located north of Perth, bounded by Gingin Brook and Moore River to the north, Ellen Brook to the east, the Swan River to the south and the Indian Ocean to the west. Pine plantations dominate the northern part of the Mound while much of the southern part is urbanised. Horticulture and other industries are prominent to the south around Wanneroo, and horticulture is dominant east and north-east of pine plantations in Chittering, Gin Gin and in Upper and Middle Swan.

The principal groundwater resources of the Mound, contained in the Superficial, Leederville and Yarragadee aquifers, are the most important water sources in Western Australia.

The Mound provides about 60 per cent of Perth's potable scheme water supply, and sustains a thriving horticulture industry that provides Perth with a significant proportion of its fresh vegetables. It is also a major source of water for home gardens, and supports valuable ecosystems including iconic cave systems at Yanchep and numerous wetlands and lakes on the coastal plain.

The Mound is under great stress from climate-induced declines in rainfall, together with the combined water demands for public supply, irrigation, forestry and the environment. Water levels are declining in many areas and some water users are also reporting a decline in water quality, including increasing salinity, iron and nitrates.

The problems on the Mound are not new. Numerous reviews, studies and committees have been commissioned to investigate and propose solutions to the problem that not only remains, but is increasing. Discussions on possible solutions have been marked by ongoing debates about the proportional contributions to the problem from public water supply, pine plantations, irrigation and a drying climate. The most significant action taken to date has been to shut down a number of Water Corporation bores in those areas of greatest concern.

3.6.2.2 WHAT CAN WE LEARN FROM THE GNANGARA EXPERIENCE?

Until recently, when the State Government provided $6 million of additional funding for metering water use on the Mound at the recommendation of the Steering Committee, there has been no commitment to widespread measurement of water use on the Mound. Only those using 500 megalitres per year or more are required to meter and report their consumption. The lack of information on water use has hindered attempts to manage the problems on the Mound. With a more innovative approach and better-integrated solutions the Steering Committee believes Gnangara could provide a model for approaching similar problems in the future.

Discussions between the Steering Committee and irrigators indicate that there is recognition of the need for action to take pressure off the Mound. Quantifying how much water needs to be saved and by whom is important. However, the absence of this knowledge should not prevent action to save water from being taken now. An adaptive management approach is required where objectives are set, actions planned and taken, and the effects monitored and evaluated. If necessary, sensible adjustments can then be made to the plans and future actions.

The integration of land use planning and water resource management is critical to resolving the problems on the Mound. Increasing urbanisation around Wanneroo is reducing the long-term security for irrigators and other intensive land users, which in turn reduces the incentive to invest in water-efficient technology. The lack of long-term security also impedes the investment required for capital-intensive integrated solutions such as reusing treated wastewater for irrigation.

The establishment of a new horticultural precinct to the north of Wanneroo on land currently occupied by pine plantations should be investigated. A new precinct should provide the necessary security for growers to relocate from existing areas where their future is uncertain and to invest in irrigation efficiency. The precinct will also provide the circumstances required for a treated wastewater scheme and also ensure the long-term supply of fresh produce to Perth.
An integrated solution to problems on the Mound would require:

- The creation of a new horticultural precinct on land currently occupied by pine plantations.
- Encouragement for ‘large horticultural enterprises’ and broiler/egg producers (which require large lot sizes) to transfer to the precinct. Intensive horticultural enterprises (e.g. nurseries, strawberry providers) can remain in existing areas to maintain diversity.
- The creation of buffers around wetlands and rezoning of other areas to ‘urban’. Urbanization will increase recharge and reduce nutrient and pesticide intrusion into the aquifer. Note: Much of the transport infrastructure needed to support urbanization is close by.
- Change of the controlled burning regime to facilitate groundwater recharge.
- Adjustment of water allocations to match the new land use patterns and if necessary further reduce water use in critical areas by ‘buying back’ water from irrigation for allocation to the environment or domestic use.
- Adopting an approach to water allocation which recognises the impacts that various allocations have on recharge. For example, until they are removed, pine plantations may need to be granted a water allocation.
- Providing ‘fit for use’ recycled water to the horticultural precinct to reduce the draw on groundwater. Secure access by growers to recycled water will be a prime requirement.
- Metering of all groundwater extraction to enable the condition of the aquifer to be monitored and managed; licence conditions to be enforced and water trading to be introduced.
- Establishing a statutory supervisory group to manage the implementation and resolve demarcation issues between departments.

3.6.2.3 **WHAT DOES THIS MEAN FOR IRRIGATED AGRICULTURE AND WATER RESOURCE MANAGEMENT STATE-WIDE?**

It is a simple but accurate adage that ‘you can’t manage what you don’t measure’; therefore, all significant licensed water extraction around the State should be metered and reported publicly.

A lack of long-term security of water, land or both will hinder investment in water efficiency and stifle water trading, thereby constraining productivity. Integration of land use planning and water resource management is important to the long-term security of irrigated agriculture and, therefore, to maximising productivity. While already documented in planning policies, this integration is not occurring in practice. The need for clear objectives or targets for water resource condition and the use of them as drivers for land use planning is critical. Such objectives need to be endorsed at high levels within government.

The integration of land use planning and water resource management is also critical to resolving water resource management problems. Authority to oversee the resolution of conflicts to achieve government objectives needs to be clearly established at high levels within the government.

This case is presented in greater detail in Appendix 3.2 Irrigation Areas and Districts, Gnangara Mound, which was prepared for consideration by the Steering Committee.

3.6.3 **KIMBERLEY REGION**

3.6.3.1 **BACKGROUND**

The state-wide review of land and water resource use by the Steering Committee confirms the widely held view that the Kimberley region has significant potential for additional irrigation development.

The Ord Stage 1 irrigation scheme at Kununurra contributes around $57 million in farm gate output to the State economy. Ord Stage 2, if implemented and fully developed, would increase the total area under irrigation in the East Kimberley to more than 50,000 hectares, which exceeds the area currently under irrigation for the whole State.

More than five million hectares of land suitable for irrigation have been identified in the West Kimberley. Detailed studies indicate that around 200,000 hectares of this land located near the Fitzroy River floodplains and the sandplain areas south of Broome are capable of immediate development.
Significant volumes of both groundwater and surface water are available in this region, and the climate is suitable for a range of crops, which includes sugar cane, cotton, tropical fruits, vegetables, pulse crops, seed and tree crops. The availability of suitable land and abundant water presents opportunities that are not available to most other regions of Australia.

The Ord Irrigation Scheme is managed and controlled by an irrigation cooperative. The cooperative is proving to be successful in managing the distribution of water as well as monitoring the environment.

Future large-scale irrigation developments need to be economically viable as well as environmentally sustainable. A preliminary comparison of the economics of investing in the East and West Kimberley shows that large-scale cotton production in the West Kimberley appears preferable to the full development of the Ord Stage 2. (See Appendix 3). Key drivers in this economic analysis are the world market for cotton, higher crop yields in the West Kimberley, and the availability of groundwater which permits self-supply operations, thereby causing the cost and time needed for development to be less than required for Ord Stage 2.

### 3.6.3.2 What can we learn from the Kimberley experience?

The irrigation industry in the Kimberley region will grow only if there is a high degree of certainty over the future availability of land and water. The growth in tourism and recreational pursuits on the lower Ord River have created an expectation in some quarters that the current river flows (which are in excess of the environmental allocation) will be maintained or even increased. Environmental water provisions for the lower Ord River should be based on clear criteria developed through best practice community consultation. The final agreed outcome must strike a balance between the economic, social and environmental needs of the region and be encapsulated in a binding document which sets out the proportions of the resource allocated to each purpose. Until this is done, the future of investment in the Ord will remain uncertain.

To ensure long-term sustainability and hence effective use of water resources, economic viability must be a key criterion for determining whether or not public funds are to be invested in the expansion of irrigation areas in the Kimberley region.

All new irrigation developments in the Kimberley must be economically, environmentally and socially sustainable. This requirement in turn has implications for the irrigation systems and farming methods to be used. The future performance demanded of both irrigation and farming systems should be incorporated into the guidelines for project assessment and also into the Kimberley Regional Sustainability Strategy which has yet to be developed.

Finally, to date much more emphasis has been given to the possible future development of Ord Stage 2 (East Kimberley) than to the West Kimberley. The Steering Committee believes that equal emphasis needs to be given to the potential of the West Kimberley, thereby ensuring that the future development of the whole region is optimised.

### 3.6.3.3 What does this mean for irrigated agriculture and water resource management state-wide?

Statutory water management plans, which are binding upon all parties including the resource manager, create greater certainty for the environment and users alike. They do this by defining the available water resource; by making provisions for the environment that are acceptable to government, communities and stakeholders; by establishing processes for the allocation of water entitlements and for sharing the risks of downturns in water availability; and by establishing ongoing rules for the re-allocation of entitlements through water trading or other means. More effort must be devoted to preparing water management plans for all regions of the State, including the Kimberley.

Given the assistance of the Western Australian government, irrigators and the community, the Northern Australian Irrigation Futures Project (Land and Water Australia and National Program for Sustainable Irrigation/CSIRO) will help to identify the requirements for large-scale sustainable irrigation development in the north of the State. While the opportunities for expanding irrigated agriculture across the rest of the State may not be of the same scale, the concept of developing sustainability indicators for other areas within Western Australia should be considered.

This case is presented in greater detail in Appendix 3.3 Irrigation Areas and Districts, Kimberley Region, which was prepared for consideration by the Steering Committee.
3.6.4 THE SOUTH WEST IRRIGATION AREA AND MYALUP

3.6.4.1 BACKGROUND

The South West Irrigation Area (SWIA), which is located just over 100 kilometres south of Perth, is comprised of 112,000 hectares of land in the shires of Waroona, Harvey and Dardanup. The irrigation area is 75 kilometres long, up to 15 kilometres wide and has a north/south orientation.

The water to supply the SWIA is sourced from hills catchment dams operated by the Water Corporation under licence from the Department of Environment. Harvey Water, the cooperative responsible for managing the SWIA, delivers water to members of the cooperative through gravity fed channels and pipelines.

Recently, Harvey Water replaced most of the open channels in the Waroona district with piping. This reduced distribution losses by about 3,600 megalitres per annum and provided more control for growers by delivering water under pressure.

Subsequently, Harvey Water put a proposal to the State Government for further investment in piping to free up 18 gigalitres of water currently lost through the open channel distribution network. The water saved by this initiative would be made available to the Integrated Water Supply Scheme for domestic use. An assessment of the options for improving irrigation water use efficiency within the SWIA was subsequently undertaken for the Irrigation Review by ACIL Tasman (2004).

The Steering Committee believes that investment into piping the areas with capable soils and other factors suitable for high value horticultural crops should be supported. It may not be appropriate to pipe some parts of the Collie Irrigation District where certain areas have soils not suited to high-value production.

There is also a need to consider the development of a horticultural precinct at Myalup. This would require the SWIA boundaries to be realigned to include the existing Myalup horticultural area and the Myalup pine plantation. Potentially this precinct would use water from the Harvey Diversion Drain. In addition there is potential for water to be traded into the Myalup area for use on higher-valued crops to some of those currently produced within the SWIA.

3.6.4.2 WHAT CAN WE LEARN FROM THE SOUTH WEST IRRIGATION AREA EXPERIENCE?

Developments such as the Myalup Horticultural Precinct will support significant increases in horticultural production, exports and employment. These outcomes will in turn be facilitated by the recommendations presented in this report.

The lack of a strategy covering all options available (including reducing water losses, realigning the SWIA boundaries and creating a Myalup Horticultural Precinct) in order to better use water, highlights the need for a more strategic approach to planning and management.

At present no single group is responsible for looking into issues such as land and water resource planning in the SWIA and/or the impact that major investments such as piping the Collie Irrigation District might have. As a consequence, opportunities such as buying back all Wellington Dam water from irrigators for domestic use are neither identified nor evaluated.

Currently individual cooperative members cannot trade water to entities and individuals external to the SWIA. All trades must take place through Harvey Water. Allowing individuals temporarily to trade their entitlements outside of the SWIA is likely to increase the economic value of water to irrigators and encourage further investment in activities which lead to improved on-farm water use efficiency. The Steering Committee supports this course of action.

3.6.4.3 WHAT DOES THIS MEAN FOR IRRIGATED AGRICULTURE AND WATER RESOURCE MANAGEMENT STATEWIDE?

The South West Irrigation Area/Myalup example highlights the need for an overarching strategic plan for the State’s water resources. Such a plan should identify the State’s major water resources, determine the likely future sectoral and regional demands for water, including those for the environment, and establish how the State intends to utilise its water resources for maximum community benefit.

This case is presented in greater detail in Appendix 3.4 Irrigation Areas and Districts, Harvey/Myalup Horticultural Precinct, which was prepared for consideration by the Steering Committee.
4. IMPLEMENTATION

The actions required to implement the Irrigation Review recommendations are:

• Create a new Ministry for Water Resources.
• Mandate the State Water Council to oversee the implementation of water reform.
• Implement a new Water Resources Management Act.
• Create a new Department for Water Resources.
• Legislate changes to the RIWI Act 1914.
• Make changes to water resource management policy and practices.
• Implement Case Study recommendations and priority water resource management initiatives.
• Implement initiatives related to Water Use Efficiency.

Reforms need to be implemented as a package and responsibility for implementing the plan should be vested in the State Water Council. It is also recommended that the Steering Committee be retained to assist with the implementation and to provide further advice as required.

The State Water Council should give priority to preparing a detailed cost estimate and schedule against which the implementation of the Steering Committee’s recommendations can be monitored.

Desirably, full implementation will be completed no later than June 2006.