APPENDIX 3. PAPERS - IRRIGATION AREAS AND DISTRICTS

3.1 CARNARVON IRRIGATION AREA

The Carnarvon irrigation district represents a model of using water efficiently and shifting water to higher-value usage. Groundwater usage for horticulture in the region began more than 80 years ago. For many years water was delivered through flood distribution methods. Now the irrigators in the region use some of the most up to date technologies including drip and micro sprinklers to minimise water losses and maximise economic returns per unit of water used. Water was sourced from irrigators’ own bores and a government managed scheme, with constant “run-ins” between government agencies and farmers over water allocation, water quality and river health. Currently the government irrigation supply is managed (and soon to be owned) by an irrigator-owned cooperative with full stakeholder consultation relating to allocations and river health issues.

3.1.1 BACKGROUND

The Carnarvon irrigation district produces $56 million of horticultural produce, supplying more than 60 per cent of Perth’s vegetable requirements in winter (GWC submission 2004).

The climate is semi-arid with an annual rainfall of 233 mm. Temperatures are high as is evaporative demand. Rainfall and river flows are either generated by summer tropical cyclone activity (January to March) or by mid-winter storms produced by cold front systems originating from the south-west (May to September).

Water supply for Carnarvon town and the Irrigation District is obtained from the Gascoyne River alluvial aquifer. This aquifer system comprises an upper alluvial aquifer (also known as the “first” or “top” water) which overlies the lower, older alluvial aquifer (the “second” or “lower” water). The upper alluvial aquifer is coarse grained and high yielding with a maximum thickness of 12 metres. By contrast, the lower alluvial aquifer is finer grained, geologically variable and more laterally extensive, with a thickness of between 51 metres and 65 metres. The two aquifers are generally separated by a clay horizon which is reported to be continuous over most of Basin A (GHD, 1993).

Recharge occurs during river flow events. The upper aquifer is directly recharged as soon as the river starts to flow while recharge to the lower aquifer is slower as it relies on leakage from the upper aquifer. Although most flow events will result in full recharge of the upper aquifer, the lower aquifer is unlikely to be fully recharged by short-lived flows.

The groundwater supply consists of public and private water supply areas for which the Department of Environment (with the function of the Water and Rivers Commission) licenses the allocation and use. The resources have been subdivided into:

- **Basin A**, where groundwater is abstracted by private bores; and

- **Basins B – L**, a public water supply area currently operated by the Water Corporation in accordance with a licence issued by the Department of Environment, where water is distributed by the Gascoyne Water Cooperative.

Groundwater abstraction from Basin A is from both the upper aquifer (riverbed sand) and the older alluvium, whereas abstractions in Basin B-L are predominantly from the older alluvium.
3.1.2 STRUCTURAL CHANGE

The way groundwater is allocated to users has changed significantly as a result of the privatisation of scheme supply (Basins B - L) and the implementation of the recommendations from the report Managing the Groundwater Resources of the Lower Gascoyne River (Carnarvon) WA Groundwater Management Study completed in January 2004.24

A dual cooperative structure similar to that of Harvey Water is proposed for Carnarvon, i.e.

- A Management Cooperative (GWC) which manages the cooperative’s assets and delivers water to irrigators who are also its shareholders.
- An Asset Cooperative (GWAMCO) which owns the assets and leases them to the Management Cooperative.

The dual cooperative structure was chosen for the benefits it gives shareholders in terms of asset protection, taxation and overall efficiencies. The process of privatising the irrigation scheme began in 1998 with the creation of the Carnarvon Business Unit by the Water Corporation. In 1999, the Carnarvon Irrigation Steering Committee (CISC) was formed with 12 grower members representing various water users including scheme users, mixed users and private bore only users. After much investigation and consultation the Gascoyne Water Cooperative was incorporated in August 2001. The cooperative then entered into a 12-month Operations and Management contract to run the irrigation distribution on behalf of the Water Corporation.

At the same time, the Department of Environment announced the abolition of the conjunctive allocation system. Growers previously held a conjunctive licence that gave them access to groundwater from Basin A and scheme water from Basins B – L, up to a combined limit of 72 megalitres per annum per property. Instead, growers will be issued with a groundwater licence to abstract water from Basin A only and will need to apply to the Gascoyne Water Cooperative to access the scheme supply. The 72 megalitres would now be applied only to private bores for each property with a prolongation into the riverbed (Basin A). Furthermore, this allocation is under review by the DoE.

Licences for the scheme distribution system allow it to take a bulk water entitlement of 5,000 megalitres and for this to be distributed equitably among the 176 growers. Grower meetings were held and the proposed allocation system demonstrated and discussed. The proposed system was based on the history of use over the previous five years. The new allocation of water entitlements was 1.5 times the average annual scheme use for all growers. This meant that growers would be allocated more water than they had ever taken from the scheme, with a minimum base entitlement set at five megalitres.

At this point GWC was managing the distribution system on behalf of the Water Corporation, effectively as a subcontractor. The next step is for the cooperative to acquire the “business” and distribution assets.

In September 2002, irrigators met and voted to form the Gascoyne Water Asset Management Cooperative (GMAMCO). The intention was to have the agreements signed and the business transferred by December 31, 2002. However, the Water Corporation’s construction of a dedicated town water supply main was delayed, resulting in the transfer being deferred to July 1, 2003.

On July 1, 2003 GWC commenced trading in its own right, leasing the assets, operating the business and raising revenue on behalf of its members (including raising funds held in trust, on behalf of the yet to be incorporated GWAMCO).

In February 2004, GWC was able to offer additional water entitlements. When the allocations were calculated initially, the actual scheme losses were unknown. GWC and the Water Corporation made conservative assumptions that 14 per cent was the upper bound for all calculations. After running the system for a year, GWC determined that the actual water losses were in the order of five to six per cent, i.e. well within the margin allowed in the bulk entitlement. It was also decided to release a proportion of the company allocation of 750 megalitres which had been reserved for new members.

As a result, in February 2004 GWC announced an additional share and water entitlement issuance. Every grower member of GWC was sent a letter explaining the issue, together with an application for additional water entitlements. At the same time, an application to dispose of unwanted shares and entitlements was also attached in case some shareholders had been issued with more water than they needed or wished. No member applied to dispose of any water entitlements; while some members, with properties in excess of 40 hectares, applied for as much as 200 megalitres as they had the opportunity to secure water for full development of their properties.

However, the transfer of assets has been delayed. The Minister for Government Enterprises and Minister for the Environment signed the Transfer Order in November 2004, but three Motions of Disallowance have been lodged by members of Parliament. The boards of both GWC and GWAMCO are deeply concerned that no prior consultation was initiated. The Chief Executive Officer and the board have received no official complaints about their management from any member of GWC or prospective member of GWAMCO and the latest operational return to the Economic Regulation Authority showed no written complaints from cooperative shareholders during the previous 12-month reporting period. At this stage the Transfer Order has been deferred for a period of three months to allow for more public consultation.

3.1.3 PROPOSED CHANGES TO OPERATION OF BASIN A

The water allocation from Basin A is 5,800 megalitres. Individual irrigators have an annual allocation of 72 megalitres. During periods of river flow, licensees in Basin A are provided with unrestricted access to both groundwater and surface water. During no-flow periods, licensees are restricted to their licensed annual entitlements. These operating rules and the individual licensed allocation are under review. The review will reassess the allocation on the basis of the irrigator’s “capacity to draw” (infrastructure and water quality) and increased knowledge of the aquifer.

3.1.4 GROWER WATER USAGE AND EFFICIENCY GAINS

The irrigators in this region use some of the most up to date technologies including drip and micro sprinklers to minimise water losses and maximise economic returns per unit of water used. However, as part of the development of the Lower Gascoyne Management Strategy, the Department of Environment engaged PIRSA Rural Solutions in June 2001 to investigate water use practices and determine best practice in water use efficiency. In the report25 several areas were identified where further on-farm improvements could be made including:

- **Soil:** Growers need to assess soil types across their properties and determine water management regimes for each soil/crop scenario.
- **System Design:** Most systems appear to be designed by experience not by any calculation. Without actual system testing it is not clear whether systems are operating to industry standards. All designs should be prepared by an accredited irrigation designer.
- **System Operation:** While some growers monitor system operations by monitoring pressures at pump or filters, very few actually test their systems to see if the correct pressure or discharge is achieved at the emitter (dripper or sprinkler).
- **Irrigation Management:** While some growers have used tensiometers, most irrigate by experience and crop appearance (crop stress). This method may indicate time to irrigate but not how much to apply. Knowledge of soil type, rooting depths and system application rate is required.

While some individual irrigators are advanced in running their irrigation systems and irrigating crops, there is potential for further improvements for more irrigators. These improvements will be mainly in small enhancements rather than dramatic changes (Table A3.1).

<table>
<thead>
<tr>
<th>Table A3.1. Irrigator Water Consumption at Carnarvon from 1999 to 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year</strong></td>
</tr>
<tr>
<td>Jan 99 to Dec 99</td>
</tr>
<tr>
<td>Jan 00 to Dec 00</td>
</tr>
<tr>
<td>Jan 01 to Dec 01</td>
</tr>
<tr>
<td>Jan 02 to Dec 02</td>
</tr>
<tr>
<td>Jan 03 to Dec 03</td>
</tr>
</tbody>
</table>

There are also opportunities for the GWC to improve delivery system efficiency. At the moment water from the GWC is pumped to the irrigators and then held in tanks on the individual farmer’s property. This amount of water is then re-pressurized by the farmer to ‘push’ it through the on-farm irrigation system (Table A3.2). This “double handling” is expensive in terms of power. It would be of great benefit if the system could be pressurized and the individual irrigator could use the delivery pressure to irrigate on demand with perhaps only a small booster pump in operation.

Table A3.2. Average Monthly Water Utilization (GL) by Carnarvon Irrigators 1999-2004

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheme</td>
<td>0.29</td>
<td>0.27</td>
<td>0.25</td>
<td>0.24</td>
<td>0.21</td>
<td>0.20</td>
<td>0.16</td>
<td>0.21</td>
<td>0.29</td>
<td>0.37</td>
<td>0.37</td>
<td>0.39</td>
<td>3.19</td>
</tr>
<tr>
<td>Bore</td>
<td>0.44</td>
<td>0.45</td>
<td>0.46</td>
<td>0.42</td>
<td>0.37</td>
<td>0.35</td>
<td>0.29</td>
<td>0.37</td>
<td>0.46</td>
<td>0.49</td>
<td>0.52</td>
<td>0.45</td>
<td>4.99</td>
</tr>
<tr>
<td>Total</td>
<td>0.73</td>
<td>0.72</td>
<td>0.71</td>
<td>0.66</td>
<td>0.57</td>
<td>0.55</td>
<td>0.45</td>
<td>0.58</td>
<td>0.75</td>
<td>0.86</td>
<td>0.89</td>
<td>0.84</td>
<td>8.18</td>
</tr>
</tbody>
</table>

Unfortunately, the scheme pipeline is not suitable for high-pressure operation. To overcome this barrier, the GWC proposes a long-term (10 years or longer) project to replace the current low-pressure pipes and broken pipes with higher specification pipes.

3.1.5 **Conclusion**

The Carnarvon irrigation district has gone through some dramatic charges over the past few years. The structural reform associated with the privatisation of the irrigation scheme has empowered the growers and community, giving them “ownership” and responsibility for the operation of the scheme (Table A3.3).

Table A3.3. Water Charges for Gascoyne Water

<table>
<thead>
<tr>
<th>Entity</th>
<th>Type of Charge</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset Cooperative</td>
<td>Fixed Charge</td>
<td>$1,900</td>
<td>n/a</td>
</tr>
<tr>
<td>Management Co-operative</td>
<td>Fixed Charge</td>
<td>7.6c/kilo litre</td>
<td>8.0c/kilo litre</td>
</tr>
<tr>
<td></td>
<td>Consumption</td>
<td>14.7c/kilo litre</td>
<td>15.0c/kilo litre</td>
</tr>
</tbody>
</table>

Whereas in the past the irrigators would ‘blame’ government agencies for any problems with the scheme and rivers, as operators they now appreciate a more balanced approach to arriving at a solution.

All parties involved in the privatisation, including irrigators, the Water Corporation, the Department of Environment and other State and local government departments and agencies are to be congratulated for how they have handled the process, especially the consultative phase and communication. This case represents a great outcome for the State.

The only disappointment is that the Transfer of Assets has been delayed because local politicians appear to have reacted to a single complaint without consulting with either the GWC or the Department of Environment to ascertain all sides to the issue.

The region produces high value horticultural produce from its water resource. Irrigators’ control of the distribution of water; increased adoption of irrigation “best practice” on-farm, coupled with market opportunities should see Carnarvon continue to thrive as an example of irrigated agriculture at its best.
3.2 GNANGARA MOUND

3.2.1 BACKGROUND

Gnangara Mound is the most important water source in Western Australia, generating and supporting significant wealth for Perth and the greater metropolitan area.

It provides more than 60 per cent of Perth’s water and supports a thriving horticulture industry which provides Perth with a significant proportion of its fresh vegetables and injects around $240 million, in value-added terms, into the local economy. The Mound also serves vital and valued eco-systems such as the iconic caves system at Yanchep and the numerous wetlands and lakes of the coastal plain.

However, the Mound is under stress due to a historic run of low rainfall, which is highly likely the result of permanent climate change. Extensive planting of pines has also significantly reduced recharge and exacerbated the stress. On the demand side, the Mound is also under great stress due to competing uses by agriculture, forestry, domestic water and the environment. All want to maintain their current access. This has resulted in:

- progressive and ongoing decline in water levels with impacts on wetlands, cave systems and abstraction infrastructure; and
- a decline in water quality with certain areas experiencing increased salinity, iron and nitrates.

The regulator’s response has been restrictive, including measures such as:

- shutting off public water supply bores in order to maintain environmental flows; and
- trying to ‘claw back’ water through administrative means, for example making it difficult to renew licences.

The Department of Environment has acted in a holding pattern attempting to quantify the behaviour of the Mound together with the extent of the water deficit. Until recently it was trying to do this without knowledge of usage (metering). Six million dollars have been provided for metering, but this does not seem to have resulted in the rapid deployment of meters.

Though coordinating committees and other structures have been formed, these have not been able to make the decisions necessary to ensure action to redress the current problems. This is symptomatic of many such coordinating mechanisms that seem to be designed to diffuse rather than focus responsibilities. This is of great concern as there is more than sufficient evidence to show the Mound is in deficit and water needs to be saved.

Quantifying how much needs to be saved is important, but 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 are planned and taken and the effects are monitored and evaluated to enable sensible adjustments to be made to plans and actions.

Solutions to the problems of the Gnangara Mound need to be more innovative and can be a model for approaches to similar problems in the future. It is proposed that an approach where land use planning and restructure be driven by the needs of water management. And that water management and allocation are used as drivers for restoring sustainability of the mound. An integrated approach, which integrates economic, social and environmental development, requires close collaboration from the responsible authorities and leadership at a high level to ensure cooperation is maintained and that difficult decisions are made in a timely and fair manner.

It is suggested that such a solution would need to implement the following actions:

- Replacing the pines with a horticultural precinct suited to “extensive horticulture” (requiring large areas to be viable) and broiler/egg production units, and retaining the more intensive horticultural enterprises (requiring smaller areas), such as nurseries and strawberry growing, to maintain diversity in existing rural living areas.
- Rezoning areas near the wetlands to urban (with suitable buffers) to reduce water use and protect environmentally sensitive areas. Urban areas tend to increase recharge and may help reduce the nutrient and pesticide inputs. Much of the urban and transport infrastructure already exists within a short distance.
• Implement management changes to the controlled burning regime to increase groundwater recharge.
• Rationalise water allocations to conform to land use re-allocation and further adjust allocations, as necessary, through strategic buy-back of water for potable or environmental usage.
• Consider an overall allocation approach that recognises the impacts of different land uses on recharge. For example, water required for forestry activities must be considered as part of development controls to ensure bottom line requirements such as environmental flows are met. The harvesting of pines needs to be fast-tracked near and around the over-allocated areas.
• Provision of ‘fit for use’ reclaimed water to horticultural areas to help achieve reuse targets, substituting reclaimed water for the abstraction of primary Mound water. Security of growers’ access to reclaimed water will be paramount.
• Upgrade of the existing regulatory regime to include rigorous monitoring of abstraction by all users so that management criteria can be established, orderly adjustments made through water trading and on-going aquifer condition better understood and managed.
• Establishment of a supervisory group at Cabinet level, to oversee project management, monitor implementation and resolve conflicts where they cannot be resolved at officer level.

3.2.2 Key Considerations

Balancing competing demands for groundwater from the Gnangara Mound to meet ecological, domestic/urban and agricultural requirements is the challenge for water allocation in the Wanneroo area. Environmental considerations, such as wetland protection, are fundamental to water allocation planning. Securing the future of horticultural production to supply fresh vegetables and fruit for the growing urban market is also essential. It is a further challenge for planning in areas of Perth, which have traditionally supported horticulture and other intensive agricultural activities, to balance competing demands for land use and minimise potential land use conflicts between agriculture and urban pursuits. These factors combine to provide an urgent need to consider options for the future of horticultural production in the northern metropolitan area.

Sound water and land use planning must be undertaken in unison if the needs of irrigated agriculture are to be met in a manner which secures horticultural production for the longer term (e.g. 50 to 100 years). A key recommendation of this proposal is the delineation of a Gnangara Horticultural Precinct, dedicated to irrigated vegetable and fruit production and complementary industries such as intensive poultry production. This is to be isolated from urban competition for water, and from areas zoned for land and environmental amenity. The zoning of land in this way is analogous to zoning land for ‘industrial’ purposes and thus not a new concept.

Implementation of this integrated water and land management approach will require significant coordination among the responsible agencies, including the Forest Products Commission, the Department of Environment, Department of Agriculture, Department for Planning and Infrastructure, and the City of Wanneroo.

Key aspects of the proposal include:
• Establishing large-scale market gardens and horticulture in the pines area north of Yanchep road, (e.g. horticultural precinct). Movement of the less intensive horticulture to the pines area and possibly retaining the more intensive businesses such as nurseries and high-value crops, such as strawberries, in the existing areas of Carabooda.
• Allowing rezoning of areas near the wetlands to urban usage to reduce water usage. This may require that water licences are sold to the government or transferred to the pines area. Urban areas will have better recharge, and nutrient and pesticide issues will be reduced. Much of the urban infrastructure required (roads, train lines and facilities) already exists nearby.
• Consideration of the need to change the controlled burning regimes to increase recharge.
• Consideration of the need to possibly buy back water from growers and other users.
• Recognition of the need to meter all users so water use issues in the Gnangara Mound can be better understood and managed.
3.2.3 Outcomes

This integrated proposal, if assessed as feasible and implemented accordingly in conjunction with the recommendations contained within the Irrigation Review report, will provide a number of advantages for the State. Development of a Gnangara Horticultural Precinct in the existing pines area will:

- Return the over-allocated Gnangara Mound to a more sustainable state.
- Secure land at scale and facilitate long-term investment in horticultural production in the north-east Wanneroo area.
- Secure water entitlements for irrigators in an area with comparatively less immediate environmental and social consequences, encouraging investment in horticultural development at scale.
- Increase recharge to the Gnangara Mound through the progressive removal of pine plantations in the north-eastern Wanneroo Shire pine plantation area.
- Provide a long-term use option for treated wastewater from the Alkimos and Beenup Wastewater Treatment Plants, utilising water recharged to the superficial aquifer by the treatment plants.
- Secure fresh vegetable and fruit supplies for the domestic Perth market and increase possibilities of increased export of Western Australian horticultural products.
- Enable establishment of horticultural ventures which permit economies of scale, within areas accessible to a large labour force (e.g. metropolitan Perth). New horticultural ventures with security of land and water tenure would invest in best available irrigation technologies and management practices, with associated high water use efficiencies.
- In the medium to longer term, potentially reduce demand for water in the immediate vicinities of the lakes areas around Nowergup and Carabooda areas.
- Provide an option for complementary intensive agricultural industries from within the Wanneroo Shire to be relocated to the new horticultural precinct. The poultry industry is the prime example of a complementary industry under pressure from urban development and associated lifestyle conflicts in Wanneroo. Security of land use tenure and protection from encroaching urban/lifestyle development would facilitate the relocation of such industries.
- Maximise buffer zones between the horticultural precinct and rural lifestyle and urban developments, thereby minimising land use conflict issues.
- Potentially allow for redevelopment of land currently used for horticulture in areas adjacent to urban/rural lifestyle developments in the Wanneroo Shire as irrigators choose to relocate to the Gnangara Horticultural Precinct.

3.2.4 Gnangara Horticultural Precinct

Figure A3.1 outlines the general location of current horticultural development within the Wanneroo Groundwater Area. This proposal recommends the delineation of an appropriate area of land within the current pine plantation areas, to become the Gnangara Horticultural Precinct. Figure A3.2 provides a guide to the possible location of this precinct.

The pines area is preferential to Nowergup/Carabooda as an option for horticultural precinct development. The Nowergup/Carabooda area currently has a mix of land uses, with some smaller lots and adjacent wetlands. Establishment of a dedicated horticultural precinct in the pines will prevent many of the potential land use conflict issues and environmental impacts which could arise within Nowergup/Carabooda. These issues are discussed below.
Figure A3.1  Current Location of Horticulture in Wanneroo

Source: Agri-business Research & Management 2004
Figure A3.2 Location of the Proposed Horticultural Precinct at Gnangara

Proposed area horticulture could be located
### 3.2.4.1 Water Issues

Fundamental to the potential success of this proposal is the security of water for irrigators. It is estimated that an increase of 5,000 to 10,000 megalitres per annum in recharge can result from the gradual thinning of the pines in the area in the short term (e.g. five to seven years), increasing to 40,000 megalitres per annum increased recharge in 25 years (Delroy and Anderson, 2004).

Approximate estimates of potential water savings from undertaking the changes recommended here have been provided by Delroy and Anderson (2004) and are provided in Table A3.4.

**Table A3.4. Summary of Short and Long Term Water Savings Resulting from the Integrated Planning Proposal**

<table>
<thead>
<tr>
<th>Action</th>
<th>Short Term Savings</th>
<th>Long Term Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 – 7 Years</td>
<td>25 Years</td>
</tr>
<tr>
<td></td>
<td>Gigalitres/annum</td>
<td>Gigalitres/annum</td>
</tr>
<tr>
<td>Pines (thinning &amp; eventual removal) Burning</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>(increase frequency of burning from 12 yrs to 3-4 yrs)</td>
<td>25</td>
<td>10</td>
</tr>
<tr>
<td>Water Corp Reduction in Pumping</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Horticulture Reduction in Pumping</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>65</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

Source: Delroy & Anderson 2004

It is conservatively estimated that an additional five to six gigalitres could be saved through the enforcement of metering on horticultural licensees.

Development of the horticultural precinct would also provide a potential purchaser (i.e. the horticulture industry) for reclaimed water from metropolitan Perth. Using reclaimed water to artificially recharge the superficial aquifer should assist in balancing the draw of water from the Mound and increase the volume of water available to other uses.

### 3.2.4.2 Land Use Conflict and Urban Development

A major risk for the horticultural industry and its performance in peri-urban areas is the encroachment of incompatible land uses that impinge on farm operations and create the impression that horticulture is a ‘temporary’ land use until it can be allocated for some other ‘higher value’ use. Pressures from within the industry do not help this situation. Retiring growers look to the increased capital value of their land to support their retirement. Lately an attitude has developed whereby urban development is encouraged in some quarters because it causes the relinquishment of water licences.

This proposed greenfields approach to horticultural development provides flexibility to planning and sends the signal that horticulture is there for the long-term. The new precinct site will enable high-value horticultural cropping through security of access to land and water. Larger operations will be encouraged to move to the dedicated precinct to obtain this security, which will be complemented by the confidence that long-term land use planning will not result in pressures from unplanned urban or semi-rural developments. Existing horticultural operations could continue at their current locations and relocate over time as desired.

The inclusion of poultry production (and possibly other intensive animal industries) as permitted land uses within the precinct could have positive outcomes for areas and communities in Wanneroo currently impacted by adjacent egg and broiler production farms. Feed supply facilities could also be relocated, where possible, to service intensive animal industries. This could have very positive implications for the City of Wanneroo where such industries are the source of significant employment but increase the risks of land use conflict and nuisance disputes.
3.2.4.3 Environmental Issues

Groundwater contamination issues related to the increased use of fertilisers and pesticides in the proposed horticultural precinct (the Mound’s recharge area) will need to be carefully considered and managed should this precinct eventuate, particularly in relation to nitrate contamination.

Existing horticultural areas around wetlands could be rezoned for urban use to reduce water use, improve recharge, and reduce environmental problems from nutrients and pesticides near the wetlands.

However, the development of the precinct as a greenfields site will provide the opportunity to strengthen regulation and plan appropriately for environmental values, locating horticulture and associated water demand in areas where least impact on the Gnangara Mound’s caves and wetlands will occur.

3.2.5 Recommendations

It is proposed that a joint working group with relevant knowledge and expertise be developed to progress this proposal. The working group should be convened by a member of the Irrigation Review Steering Committee who is independent of the agencies involved and report initially to the Steering Committee.

The outputs of the working group will be as follows:

- A draft Cabinet Minute for endorsement by the Water Resources Cabinet Sub-Committee for Cabinet endorsement. This is to outline the program (including stakeholder consultation) and the benefits, provide costing, and specify agency commitments and a timeline for completion.

3.2.6 Conclusion

The proposed Gnangara Horticultural Precinct provides options for increased and more efficient agricultural production, security of water and land tenure for producers, and a potentially more sustainable water future for the Gnangara Mound. The precinct approach would assist in minimising land use conflict and securing metropolitan vegetable and fruit supplies for the longer term (e.g., 50 to 100 years). This integrated approach considers agricultural production and urban development as potentially synergistic by providing access to locally produced fresh food, allowing for the recycling of water resources, increasing horticultural production, and reducing competition with environmental water requirements. The approach to be taken will require integration and cooperation from a range of agencies and organisations, but could result in positive triple-bottom-line outcomes for Western Australia, and in particular for the Gnangara area.

References:


3.3 KIMBERLEY REGION

3.3.1 BACKGROUND

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

The irrigation area at Kununurra currently contributes around $57 million in farm gate output to the State economy. With further sustainable development in sugar and cotton at East Kimberley and West Kimberley respectively, the contribution to the State economy from irrigation in the Kimberley region could rise to between $200 million and $400 million within 10 years.

The existing and planned additional irrigation areas of the East Kimberley Ord River Irrigation Area (Stages 1 and 2), when fully developed, could equal or exceed the State’s current total irrigation area of around 50,000 hectares. In excess of five million hectares of land suitable for irrigation has also been identified in the West Kimberley. Detailed planning studies indicate that around 200,000 hectares of this land located in the vicinity of the Fitzroy River floodplains and the sandplain areas south of Broome is capable of immediate development.

Significant volumes of both groundwater and surface water flow in this region, and the climate is suitable for a range of crops including sugar cane, cotton, tropical fruits, vegetables, pulse crops, seed and tree crops. The availability of suitable land and abundant water presents opportunities for large-scale irrigation development for both East and West Kimberley that are not available to most other regions of Australia. The Ord Irrigation Scheme is managed and controlled by an irrigation cooperative. The approach is providing a coordinated and efficient system for managing water distribution, trade, measurement and environmental monitoring.

Future large-scale irrigation developments need to be economically viable and environmentally sustainable. A preliminary comparison of the economics of investing in the East and West Kimberley shows a distinct advantage for large-scale cotton production in the West Kimberley, over the full development of Ord Stage 2. Key drivers in this economic advantage are the world market for cotton, higher crop yields in the West Kimberley, and the availability of groundwater to self-supply irrigation operations, thereby avoiding the cost and time needed to fully develop the publicly-funded irrigation scheme of Ord Stage 2. These large-scale developments need to incorporate sustainable production systems that meet social and environmental sustainability criteria.

For example, Hart (2004) and Cordner (2004), in identifying the pressure for a shift of irrigation in Australia from the south to the north, caution on the need to avoid repeating the mistakes made in the south. They identify an urgent need for scientific research to support the sustainable management of Australia’s under-allocated water resources in the north. Hart characterises ‘modern’ irrigation systems as having pressurised supply, trickle feed lines and minimum drainage. Moreover, they will not be stand-alone schemes, but would combine irrigation, post farm processing, tourism and grazing.

The land and water resources in the Kimberley region with irrigation potential are significant compared with the rest of the State for specific crops and market opportunities. Future development of large-scale commercial irrigation in the Kimberley will depend on a sustainable modern approach to irrigation development and practice that meets economic, social and environmental criteria, longer terms for water entitlements that better match investment periods, and access to land with suitable security of tenure.
3.3.2 SITUATION ANALYSIS EAST AND WEST KIMBERLEY

The Kimberley region has significant potential for large-scale irrigation production for a range of crops (Wright 2004; Yeates 2002; Sherrard 2004). Climate, land and water resources of the region are suitable for irrigated cropping of sugar cane, cotton, tropical fruits including mangoes and bananas, vegetables and melons, pulse crops, seed and tree crops. Research into cotton production in the Kimberley region has shown that the region has significant potential for large-scale production using modern drip irrigation systems (Yeates 2002). Cotton production in the Kimberley will require a comprehensive Environmental Management System, Integrated Pest Management, and approval from the Office of the Gene Technology Regulator for the use of pest resistant GM cotton.

The irrigation industry at Kununurra contributes between $57 million and $67 million in farm gate output to the State economy, and employs 437 people directly and a further 340 people indirectly (Sherrard 2004). With large-scale irrigation development for sugar and cotton, the economic contribution from irrigation in the Kimberley could rise to between $200 million and $400 million in farm gate output within 10 years (Department of Agriculture WA 2004). Large areas of land exist in both West and East Kimberley with suitability for irrigation. As mentioned previously, the importance of these large areas is reinforced by the availability of water resources for irrigation.

Water resources in the West Kimberley described by the Kimberley Water Resources Development Office (KWRDO 1993) include surface water from the Fitzroy River, and groundwater resources of the Canning Basin. This study identified large quantities of surface water potentially available from the Fitzroy River; however, flooding and development approvals have proved problematic. Groundwater can be sourced from the Canning Basin, a large sedimentary basin extending from central Western Australia to the coast of the West Kimberley. The groundwater areas with most potential for large-scale agriculture in the West Kimberley are the Broome, Derby, Wallal, La Grange, Willare and Fitzroy sub-basins with up to 700 gigalitres potentially divertible from these particular areas (Allen et al. 1992).

In the East Kimberley, the Ord Irrigation Cooperative has a water allocation of 335 gigalitres per annum for distribution and use of water within the ORIA, and sourced from the Lake Argyle dam. Currently around 209 gigalitres of this amount is distributed to irrigators within the scheme area with around 159 gigalitres of crop water use on-farm (Wright 2004), allowing for evaporation and drainage losses through the distribution network.

3.3.2.1 EAST KIMBERLEY CROPPING

Currently around 13,000 hectares can be irrigated within ORIA Stage 1. There has been significant planning for the expansion of the ORIA, with a further 43,000 hectares net irrigable area identified as suitable for irrigation and connection to the Ord scheme water within Stage 2 (Sherrard 2004; Dixon 1996). Additional areas on the Carlton Plain downstream of the Diversion Dam, and on the Weaber Plain, Keep River Plain, and Knox Plain north-east of Kununurra are included in the Ord Stage 2 proposal currently being evaluated by government and local communities.

Irrigated production within Ord Stage 1 currently supports a wide range of crops. There were 10,121 hectares of irrigated crops in the East Kimberley region in 2001 (ABS 2003). The majority of this cropping exists in the ORIA, and includes more than 3,500 hectares of sugar cane, 2,426 hectares of vegetables including melons, and additional areas of irrigated pasture and cereals, tropical fruits and cotton.

Ord Stage 2 involves further infrastructure development and on-farm development to suit mainly channel distribution systems and on-farm flood irrigation systems, servicing an additional area which could yield approximately 43,000 hectares net irrigation farmland. Some 30,500 hectares on the Weaber, Keep and Knox Plains would be gravity fed by a channel system with most of the remaining area served by a number of pump stations downstream from the diversion dam. On-farm development to support the application of surface water from the scheme includes construction of feeder channels and head ditches, drainage channels, bridges and crossovers, and laser levelling of paddocks. The infrastructure development to establish Ord Stage 2 is estimated to cost around $200 million (McLeod, 2005). The major crop analysis to support Ord Stage 2 has been for sugar cane and cotton, and the scale of production needed to support the sugar mill at Kununurra.
3.3.2.2 West Kimberley Cropping

Feasibility studies funded by Western Agricultural Industries for the West Kimberley region during the 1990s confirmed that irrigated farming systems using sub-surface drip irrigation can produce high yielding and quality crops including cotton, lucerne, maize, sorghum, chickpeas, and other horticultural crops reliably in an economically and environmentally sustainable manner (I. McLeod pers. comm. 2004). The climate of the area is semi-arid tropical climate with a long dry season. Hot dry conditions with high radiation during the dry season make the West Kimberley environment ideal for a wide range of crop production options, particularly cotton. Cotton and other crops planted in the dry season take advantage of this ideal cropping window that avoids the effect of wet weather, allowing high quality cotton and other products to be produced (Yeates 2002; I. McLeod pers. comm. 2004).

Building on the land capability for irrigated cropping and the climate, there is strong potential for a large-scale irrigated agricultural industry to be established within a 200 kilometres strip to the south of Broome based on groundwater from the La Grange sub-basin and surface water from the Fitzroy River system (I. McLeod pers. comm. 2004). Sufficient land has been identified to develop up to 20,000 hectares for cotton production using groundwater reserves south of Broome (Yeates 2002).

The proposed farming systems for West Kimberley cropping would access groundwater resources within 30 metres of the ground surface, and be self-supply autonomous areas with privately developed power and groundwater bore infrastructure (I. McLeod pers. comm. 2004). On-farm development to support the application of groundwater includes bore and pumping equipment, piping to irrigation fields, and installation of drip-tape water delivery systems.

3.3.3 Potential for Growth in Irrigation Industries - Kimberley

Development of irrigation in the Kimberley is dependent upon meeting community and regulators’ requirements for sustainable production, linked to community and environmental objectives. The Northern Australia Irrigation Futures (NAIF) project funded through Land and Water Australia – NPSI and hosted by CSIRO will investigate how sustainable irrigation can be developed across northern Australia.

Northern production of tropical fruits and vegetables in Western Australia mainly targets off-season domestic markets in the south of the State. Profitability in horticulture and other irrigation production in the Kimberley is dependant on commodity prices and market access, timeliness and transport systems to meet market windows, and having competitive costs of production.

For emerging crops with developed markets, the gross margins can be high, which can provide important cash flow during the period of high capital expenditure in the early stages of development.

3.3.3.1 Sugar

Nationally, 77 per cent of sugar production is exported. The sugar outlook is currently influenced by low world sugar prices and an adverse exchange rate for export commodities (ABARE 2004). Australian sugar producers are struggling to cover the cost of production with current world sugar prices, and increased competition from Brazil in recent years (Hildebrand 2002), protectionism and trade policies in Russia, Europe and the United States (ABARE 2004). Consequently there are few drivers for expansion in sugar production in Australia.
3.3.3.2 Cotton

Nationally, all cotton lint production is exported. Although the world cotton price is forecast to decline in the short-term due to an increase in world supply of raw cotton, ABARE (2004) also forecasts an increase in world demand for textiles and an increase in China’s demand for raw cotton in line with its strong domestic economic growth. The cotton production forecast for Australia is for reduced planting of cotton due to reduced water availability in the eastern states (ABARE 2004). The ability of Australian growers to command a price premium over the Cotlook ‘A’ index is dependent on maintaining high quality fibre (ABARE 2004), and suitable quality and quantity of irrigation water. The Kimberley region has significant potential for large-scale cotton production, where the combination of climate, land and water resources provides an ideal opportunity to produce high yielding quality cotton.

3.3.3.3 Conclusion

Brennan (2004) has identified that future growth in water demand within irrigation industries in Western Australia is related directly to growth in industry markets. This growth is mainly within southern horticultural industries, and dominated by the riskier export markets for fruit and vegetables. Should cotton become established in the Kimberley, growth in water demand could increase significantly. Further investigation is needed into the requirements for large-scale sustainable irrigation development in this region, and support should be provided for the NAIF project, involving Western Australian agencies and industries.

3.3.4 Economic Analysis East (Ord) and West Kimberley

The critical differences between the economics of irrigated cropping at Ord Stage 2 and in the West Kimberley are that yields for some major crops are likely to be higher in the West Kimberley, and the cost of infrastructure development will be lower, both in terms of capital invested, and the time taken to achieve a return. The importance of these factors is illustrated in Table 1, which presents the comparative cropping analysis for cotton.

The assumptions regarding differences in yield were based on yield differentials simulated from OZCOT-APSIM. Based on the climatic potential at the two sites, the maximum potential yield at Broome was estimated to be 11.5 bales per hectare, whereas in Kununurra it was 10.4 bales per hectare (Yeates 2002). In this analysis it was assumed that growers achieve 80 per cent of this maximum potential yield at each location.

Prices and costs of production are based on five-year average figures obtained from cotton grower surveys (Boyce Chartered Accountants 2003). The difference in the gross margin per hectare attributed to yield advantage in the West Kimberley is $405 per hectare. This estimate does not account for the relatively lower yield risk in the West Kimberley, nor the greater potential for economies of scale. Thus, it is likely to be a conservative estimate on the gross margin premium achievable at the West Kimberley site.

Two rates of return calculations are provided in Table A3.5, based on assumed development cost of $10,000 per hectare at West Kimberley (Ivan McLeod, pers comm.), and $12,000 at Ord Stage 2 (Marsden Jacob, 2004). A simple return on asset calculation is based on dividing the annual return by the value of invested capital, but this figure does not account for the differences in the timing of investment. In the case of Ord Stage 2, a significant part of the investment cost per hectare is off-farm, large-scale and on public infrastructure. This type of investment would require several years of capital expenditure before the commencement of farm production. In contrast, the development expenditure at West Kimberley is largely private expenditure for development of on-farm infrastructure and the time to achieve production is likely to be shorter. An internal rate of return was calculated for a 20-year period of farm production, based on the assumption that West Kimberley production commences in year two, with all expenditure in year one; and Ord Stage 2 production commences in year five with capital expenditure spread evenly over the first four years of the project. Internal rates of return are almost three times higher for the West Kimberley project.
Table A3.5. Comparative Economics of Cotton Production at Ord and West Kimberley

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Ord</th>
<th>West Kimberley</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield, Bales per ha</td>
<td>8.5</td>
<td>9.40</td>
</tr>
<tr>
<td>Cotton Price $ per bale*</td>
<td>450</td>
<td>450</td>
</tr>
<tr>
<td>Gross revenue per ha</td>
<td>4,145</td>
<td>4,550</td>
</tr>
<tr>
<td>Operating Cost $ per ha*</td>
<td>2,941</td>
<td>2,941</td>
</tr>
<tr>
<td>Gross Margin $ per ha</td>
<td>1,204</td>
<td>1,639</td>
</tr>
<tr>
<td>Difference $ per ha</td>
<td>435</td>
<td></td>
</tr>
<tr>
<td>Development Cost $ per ha**</td>
<td>12,000</td>
<td>10,000</td>
</tr>
<tr>
<td>Simple return on asset</td>
<td>10.0%</td>
<td>16.4%</td>
</tr>
<tr>
<td><strong>Internal rate of return</strong></td>
<td>5.1%</td>
<td>15.3%</td>
</tr>
</tbody>
</table>

* Boyce Chartered Accountants (2003), five-year average.
** West Kimberley cost. Ivan McLeod, pers comm.; Ord from Marsden Jacob report.

3.3.5 RECOMMENDATIONS

Key directions and recommendations to achieve regional economic potential from irrigation in both the East and West Kimberley include:

- It is recommended that guidelines for sustainable irrigation farming systems be prepared for the Kimberley region, and that the government immediately commits to developing a Regional Sustainability Strategy for the Kimberley region.

  New irrigation development in the Kimberley needs to be environmentally, socially, and economically sustainable. A well-developed modern irrigation farming system suited to large scale northern irrigation development is needed that meets sustainability guidelines for the region, and minimises drainage from the crop area. This modern irrigation farming system would be incorporated into project assessment guidelines and a Regional Sustainability Strategy for the Kimberley Region when such a strategy is prepared.23

- It is recommended that investment of public funds into the expansion of irrigation areas in the Kimberley should be justified economically to ensure long-term sustainability.

  Economic viability should be a key driver in determining public funding for expansion of irrigation areas in the Kimberley region to ensure long-term sustainability and effective use of or wealth creation from water.

- It is recommended that environmental water provisions for the lower Ord River be based on clear criteria formulated on and negotiated against the balanced economic, social and environmental needs of the region.

  The irrigation industry in the East Kimberley currently represented by the Ord River Irrigation Area (ORIA) needs a high level of certainty over water availability for future expansion. Expectations for environmental water provisions have grown in the past few years with growth in tourism and recreational interests on the Ord River. Formulating EWPs for the Ord River should recognise historical water requirements for ecological systems and incorporate best-practice community consultation that negotiates a water regime that meets the balanced economic, social and environmental needs of the region.

- It is recommended that the State Government facilitate negotiations with traditional owners in the West Kimberley to support access to land and suitable security of land tenure for irrigation development in this region.

  Access to land for irrigation development, and negotiating suitable arrangements with traditional owners and Indigenous communities, are requirements for further irrigation development in the Kimberley.

- It is recommended that the State Government place additional emphasis on regional planning and project assessment for the West Kimberley, combining social and economic sustainability assessment, to ensure sustainable development can occur in a timely manner.

  Feasibility studies by Western Agricultural Industries show water availability and integrated land planning and management can be combined successfully in the West Kimberley to support large-scale irrigation development.

- It is recommended that there be ongoing or perpetual licence terms for water entitlements to facilitate long-term investment in irrigation infrastructure.

  Water allocation policies need to support long-term investment in large-scale agricultural operations with longer terms for water licence entitlements, greater than 40 years.

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References:


3.4 HARVEY / MYALUP HORTICULTURAL PRECINCT

3.4.1 BACKGROUND

The purpose of this paper is to consider integrated options for developing a horticultural precinct in the Myalup district in the Shire of Harvey. The proposal is based on consideration of agricultural, environmental and water use trends and the implementation of principles and recommendations from the Irrigation Review. A thorough analysis of options for establishing a Myalup Horticultural Precinct has been undertaken by the Department of Agriculture WA (2002). In addition, an assessment of options for improving irrigation water use efficiency in the South West Irrigation Area (SWIA) was undertaken for the Irrigation Review by ACIL Tasman (2004) and provides significant supporting documentation to this proposal. A pre-feasibility study of options for reusing Myalup drainage water for horticultural production has been undertaken by GHD for the Department of Agriculture (GHD, 2004, draft). This provides further information investigating opportunities for the expansion of horticultural production in the Myalup area.

This proposal recommends that Harvey Water and the State Government consider redefining the boundaries of the SWIA, in particular the Harvey Irrigation District, to include existing Myalup horticultural areas and the Myalup pine plantation within the SWIA boundaries. The aim is to protect productive land, within reasonable proximity to Perth to enable fresh produce supply, with potential for large-scale horticultural production and access to large volume quality water required to maintain year-round cropping regimes. The proposal redefines the irrigated area to include land resources that have potential for intensive horticulture, hence high value creation potential for water. In addition, it will also allow Harvey Water to potentially move water to the coastal plain to recharge the superficial aquifers which in some cases are experiencing rising salinities due to over-pumping, concentrating salt levels in the superficial aquifer.

The development of the Myalup Horticultural Precinct is based on the premise that it is logical to access quality water from the Harvey Irrigation District for local horticultural production purposes, and consider other sources for current and proposed trades to the Water Corporation for (non-localised) public supply purposes. Secondary to the main focus of this proposal, but essential in addressing multiple water demands in Western Australia, is the decommissioning of the bulk of irrigation supply to the Collie Irrigation District and potentially the removal of the Collie Irrigation District from the SWIA boundary. Water from Wellington Dam, which currently supplies the Collie Irrigation District at restrictive salinity levels, could then be allocated to the Water Corporation for public supply purposes. In addition, there is potential for including water from the Harvey Diversion Drain as part of the overall allocation to Harvey Water, for use in the Myalup area. An estimated 14,000 to 15,000 megalitres per annum could be available to irrigators from this source (GHD, 2004).

It is recommended that sensible consideration of this proposal be undertaken before significant investment in piping the Collie Irrigation District is committed. The comparative advantage of developing irrigation infrastructure in the Myalup area in preference to further investment in the Collie Irrigation District requires thorough analysis and consideration in an integrated manner which addresses multiple outcomes. At present, there exists no overall planning group whose role it is to consider land and water resource planning in the SWIA in conjunction with proposed major investments, such as the piping of the Collie Irrigation District. There is an urgent need for integrated planning to occur before major investments are made in areas with limited futures for irrigated agriculture.

3.4.2 OUTCOMES

This integrated proposal, if assessed as feasible and implemented accordingly, will:

• Maximise horticultural potential of high capability land in western parts of the Shire of Harvey (i.e. Myalup) and protect highly productive land from urban encroachment, to enable large-scale production efficiencies.

• Convert a relatively low return production area (Myalup pine plantation: $150 per hectare per annum) into high return per hectare horticulture ($14,500 per hectare per annum) (Department of Agriculture WA, 2002).

• Secure fresh produce (vegetable) supplies for the Perth metropolitan community.

• Allow for the purchasing of water from Wellington Dam from low value (pasture growth) to higher value usage (pending salinity amelioration), potentially providing 105,000 megalitres for public water supplies.

• Minimise environmental consequences of applying high salinity water to clay (waterlogging) soils in the Collie Irrigation District.

• Reduce groundwater draw from Myalup groundwater (through removal of the pine plantation), thereby reducing impacts on local wetland areas and reducing the risk of saltwater intrusion into local groundwater aquifers from the adjacent Indian Ocean.

• Potentially provide an option for reuse of water from the Kemerton Wastewater Treatment Plant, to the immediate south of the proposed Myalup Horticultural Precinct.
3.4.3 Myalup Horticultural Precinct

As shown in Figure A3.3, there are currently significant areas of horticultural production within the Myalup District, utilising self-supplied groundwater, predominantly from the superficial aquifer. Land capability assessment has shown that the soils underlying the Myalup pine plantation, adjacent to existing horticultural areas, have high capability for annual horticulture. It has been estimated that approximately 2,000 hectares of additional horticultural development could occur in the area should the pines be removed. Access to sufficient water to maintain year-round horticultural production becomes the limiting factor; thus the extension of the Harvey Water supply area to include the Myalup horticultural production can offset this factor.

Figure A3.3 Myalup Horticultural Areas & Proposed SWIA Boundary Re-definition
3.4.3.1 Water Supply

It is proposed that additional water for the expanded Myalup Horticultural Precinct be sourced from the Harvey Irrigation District and supplied by Harvey Water. An additional 2,000 hectares of horticulture would require an estimated 32,000 megalitres per annum (16 megalitres per hectare per annum based on continuous cropping regimes for a range of vegetables), or less than 100 megalitres per day in total. This has been identified as being within Harvey Water’s current physical supply capacity (Department of Agriculture WA, 2002). Infrastructure requirements to access Harvey irrigation water, which currently extend to four kilometres east of the Myalup pines area, require determination. One option is to utilise the Harvey River Diversion Drain, which extends from the Harvey townsite to the ocean at Myalup.

Supplying water to the Myalup area from current Harvey Water allocations in the Harvey Irrigation District will require an integrated solution to secure water for irrigated agriculture in the northern part of the Harvey Shire. This is where cooperation with the State Government (Water Corporation, Forest Products Commission and Department for Planning and Infrastructure) is essential and it is imperative to consider realistically the future of the Collie Irrigation District and the Wellington Dam reservoir.

3.4.3.2 Land Zoning Change

The proposal to include the Myalup area within the SWIA will enable the Myalup area to be classified as a Priority Agricultural Zone under Statement of Planning Policy 2.5. Current State Forest reserve tenure for the pines area can be changed through a resolution passed by both Houses of Parliament, with planning and environmental approvals required (Department of Agriculture WA, 2002). Should this occur, the land could either be leased to proponents or converted to freehold. Either way, land security of tenure will be essential to warrant the level of private investment that will be required to develop the horticultural precinct.

3.4.4 Collie Irrigation District

One hundred and five thousand megalitres of water from Wellington Dam are currently allocated to irrigation within the Collie Irrigation District. This water exhibits prohibitive salinity levels (at least 900 milligram per litre) which restrict both suitability and demand for use in irrigation. Compounding the salinity risk is the heavy (clay) and poorly drained nature of the bulk of irrigable soils within the Collie Irrigation District. These soils have low capability for horticulture, and are used generally for low-return pasture grazing systems (dairy and beef). As a result, the irrigation infrastructure and the available volume of water within the Wellington Dam reservoir are under-utilised due to water quality and land capability issues.

Economic issues associated with the predominant land uses (dairy and beef) also contribute to the under-utilisation of irrigation water within the Collie Irrigation District. Returns to water from beef and dairy grazing are low and the soils within that District cannot capably support other forms of irrigated agriculture on a large scale. This fact means that proposals to eventually pipe the Collie Irrigation District (subject to water quality improvements) may not necessarily result in increased agricultural productivity. Higher capability soils within the Collie Irrigation District, such as those along the foothills of the Darling Scarp, could retain irrigation supply through a strategically placed water supply main. Irrigators within the Collie Irrigation District who wished to retain their water allocation could potentially do so by linking to this supply main.

3.4.5 Water Trading Possibilities

A number of steps are proposed to ensure that sufficient water is available within the Harvey Irrigation District to support the Myalup Horticultural Precinct. Firstly, water from Wellington Dam should be re-allocated to the Water Corporation for public supply purposes. Water allocations could be purchased from irrigators at an agreed rate per megalitre. It is anticipated that the Water Corporation could then access water from the Wellington Dam reservoir at a cost lower than that of new supply from other sources, provided that appropriate treatment is undertaken to ameliorate salinity levels. For example, if 50,000 megalitres were purchased from irrigators at a cost of $500 per megalitre (permanent trade to Water Corporation), this could be treated and used within the public water supply at a cost of $25 million, plus treatment and piping costs. This cost would be substantially cheaper than establishing alternative supplies, such as the new desalination plant and the proposal to access the South West Yarragadee/Blackwood Groundwater Area to augment the Integrated Water Supply Scheme. Up to 105,000 megalitres of water could be available for allocation from Wellington Dam should all irrigators agree to trade their allocation. This would provide a substantial source of water for high-value domestic consumption, with minimal reduction of agricultural production anticipated.
Other trades within the Harvey Irrigation District could also be facilitated such that available water is secured for local horticultural production. As noted earlier, there may be options for the retention of part of the Wellington Dam water allocation for irrigated agriculture for high capability sections of the Collie Irrigation District; for example, in areas of high capability for horticulture soils along the Ridge Hill Shelf (foothills). Where existing irrigators wish to retain allocations, negotiation is required and options for the piping of water need to be considered for specific irrigation purposes within the Collie Irrigation District.

Piping of the entire Collie Irrigation District to maintain (low return) pasture irrigation appears to be a poor investment. Better return for public investment could be achieved by considering Wellington Dam as a future public water supply rather than irrigation water for an area with limited future potential for irrigated agriculture.

If this proposal eventuates, there will be implications for the management of the Wellington Dam catchment as a public drinking water source and for the short-term adaptation issues within the Collie Irrigation District. However, the comparative advantages of converting the Collie/Wellington system to public water supply may outweigh the economic, environmental and social costs of securing new public water supplies, such as the new supplies from the South West Yarragadee/Blackwood Groundwater Area.

Finally, temporary water trading to entities outside the Harvey Water scheme should be encouraged. This in turn will encourage investment within the Harvey Water area in activities leading to improved water use efficiency on-farm and hence increase the economic value attributed to water.

### 3.4.6 Policy Requirements

Implementation of the following recommendations resulting from the Irrigation Review will be essential to the success of this integrated approach:

- **Security of water entitlements in perpetuity**
  Essential if large-scale investment in Myalup horticulture is to be achieved.

- **Water markets should be encouraged**
  Water trading should also include the potential for “external” trades from individual irrigators (including those scheme supplied) to entities outside the scheme (e.g., Water Corporation), subject to physical accessibility.

- **Use conditions on irrigators**
  Use conditions for both self-supplied and scheme-supplied water within the Myalup Horticultural Precinct must be separated from water allocation licences due to annual variations in cropping regimes practised by irrigators.

- **Separation of water licence eligibility from land access requirements**

### 3.4.7 Recommendations

Specific recommendations in relation to this proposal are:

- The government supports the Harvey Water proposal that it will transfer an allocation of about 18 gigalitres of water per annum to the Water Corporation in exchange for the construction of the piped irrigation system in the Harvey/Logue District by the Water Corporation.

- Consider buying back water from irrigators using Wellington Dam water and dedicating the same amount to IWSS rather than piping the system in the Collie River to deliver savings of 23,000 megalitres as per the ACIL Tasman report, thereby potentially providing up to 105,000 megalitres of water to the public supply system.

- Re-define the Harvey irrigation area to include the potential high-value production areas of Myalup, and include the Harvey Diversion Drain water in Harvey Water allocation so that over time, with water trading, water in the Harvey scheme can move to high value-creation intensive horticultural enterprises.

- Allow all licence holders in the Harvey Scheme to trade water outside the scheme on an annual basis, as temporary trades, subject to criteria to be developed in conjunction with irrigators and Harvey Water, to drive the introduction of water-efficient systems.
3.4.8 Conclusion

Should a sound water policy environment be created in Western Australia, opportunities from the Myalup Horticultural Precinct proposal could result in significant increases in horticultural production, exports and employment. The benefits to the public water supply outlined in this paper could provide positive triple-bottom-line impacts and secure water for both agricultural and public usage for the medium to long-term.

References


GHD, November 2004 draft, Myalup Drainage Water Reuse Pre-feasibility Study report, prepared for the Department of Agriculture.
APPENDIX 4. OTHER REPORTS AVAILABLE UPON REQUEST


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