FOOD BOWL MODERNISATION PROJECT

STEERING COMMITTEE REPORT

NOVEMBER 2007

This publication has been authorised by the Food Bowl Modernisation Project Steering Committee, November 2007.

For further information about the Food Bowl Modernisation Project please call 136 186 or visit www.ourwater.vic.gov.au

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1 Background / Context

The Victorian Government has committed to the Food Bowl Modernisation Project as part of a $4.9 billion investment in major infrastructure projects announced as part of its *Our Water Our Future – The Next Stage of the Government's Water Plan*.

$1 billion will be invested in Stage 1 of the modernisation project to secure estimated water savings of 225 GL annually by 2012. This will include new Victorian Government funding of $600 million as well as contributions from Melbourne Water ($300M) and Goulburn Murray Water ($100M). This $1 billion in funding does not include the $750 million in Victorian Government funding for the Sugarloaf pipeline.

The Food Bowl Modernisation Project encompasses the reconfiguration, rationalisation and modernisation (channel automation, piping, channel lining and metering) of the Goulburn Murray irrigation system.

The Goulburn Murray Irrigation District (GMID) is Australia's most extensive irrigation network, supported by substantial food processing capacity and attendant infrastructure.

This network must deliver more competitive services and pricing. It is currently facing competition for water from large-scale green field developments downstream, from urban water authorities anxious to secure more reliable supplies and from the need to restore environmental flows to the rivers. In addition, much of the irrigation water is delivered across old and out-dated infrastructure, which is a severe restraint on modern and competitive farming development.

The cost to modernise the entire irrigation system on the delivery side has been estimated to cost $2.2 billion. This will require substantial funding by government. The Food Bowl vision is expected to generate substantial growth in the economic output from the Goulburn-Murray region. This economic wealth will not be achieved without the level of modernisation proposed.

Irrigation modernisation will:

- enable more efficient on farm water use through a more responsive water ordering system. Farmers will be able to order water when they need it rather than waiting several days for their water order to be processed.
- provide a proactive and progressive approach to rationalisation of our current delivery system, providing certainty for irrigators and our future irrigation industry
- improve the efficiency of the delivery system from about 70 per cent efficiency to 85 per cent efficiency and allow these efficiency gains to be used for commercially productive and environmental purposes underpinning future growth and confidence in the region.

The Victorian State Government's decision to fund Stage 1 of the Food Bowl Modernisation provides an opportunity to stand back and consider the irrigation system at a broad scale. This is in contrast with the previous reconfiguration program that focussed on rationalising at the extremities of the system.

This is a once in lifetime opportunity to replace the out-dated irrigation infrastructure in the GMID and provide the modern and efficient water delivery services required by 21st century farming operations. In an environmentally sustainable manner, it will provide a competitive advantage for the Food Bowl region, its communities and industries, underpinning the long-term viability of irrigated agriculture across northern Victoria.

1.1 Steering Committee

On 3 July 2007, the Government appointed the Food Bowl Modernisation Project Steering Committee to make recommendations to Government on key implementation options for the project.

Members of the Steering Committee are:

John Corboy, Chairperson, Food Bowl Alliance

Barry Croke, Member, Northern Victorian Irrigators

Bob Laing, CEO, City of Greater Shepparton

Don Cummins, Chairperson, Goulburn-Murray Water

Dudley Bryant, President, Northern Victorian Irrigators

Gavin Cator, CEO, Moira Shire Council

Gavin Hanlon, CEO, North Central Catchment Management Authority

Geoff Akers, Member, Victorian Farmers Federation

Keith Baillie, CEO, Campaspe Shire Council

Kelly O'Shanassy, CEO, Environment Victoria

Peter McCamish, Director, Water for Rivers

Ross McPherson, Member, Food Bowl Alliance

Stephen Mills, Chairperson, Goulburn Broken Catchment Management Authority

John Brooke, Director, Goulburn-Murray Water

Max Fehring, Member, Victorian Farmers Federation

1.2 The Terms of Reference of the Committee are:

- Recommend foundation arrangements and key decisions that need to be made
- Recommend preferred arrangements for the future governance of the project
- Recommend the broad staging and timing of the modernisation project
- Recommend the bulk entitlement rules and certification arrangements that should be taken into account in confirming allocations and savings
- Recommend access arrangements for the water savings to be allocated to irrigators, the environment and Melbourne
- Provide a technical report on modernisation

Three sub-committees were established to assist in the development of the papers that inform this Public Report for Consultation. These were the:

- Governance Sub-Committee;
- Environmental Flows Sub-Committee; and the
- Modernisation Sub-Committee

This paper describes the Steering Committee's key recommendations to deliver and implement the Government's commitments to this project.

1.3 The Consultation Process

The Food Bowl Modernisation Project Steering Committee (FBMPSC) has undertaken significant consultation on the draft recommendation since the announcement in June 2007. Throughout this process, Steering Committee members have been invited to approximately 60 community meetings and functions to inform attendees of the modernisation project and the process being engaged in.

The information obtained throughout this phase has formulated the 42 Recommendations and will assist in the next step of the Food Bowl Modernisation Project.

1.3.1 Rationale

The consultation was designed to:

- Gather information and feedback on the draft recommendations.
- Allow a mechanism for input from irrigators, environment groups, Melbourne water and communities across the GMID.
- Obtain a level of recommendation comprehension and potential concerns.
- Provide an opportunity for community to obtain further information and make informed submissions.

1.3.2 Issues Taken Into Consideration

- Community's ability to respond in a short time.
- Drought impacts, minimal commodity returns and reduced allocation.
- Confusion with parallel consultation processes such as VEAC and Unbundling
- Misinformation and speculation of the recommendations has fuelled protest action and angst.
- More digestible information for broader distribution in appropriate language.

1.3.3 Methodology

Consultation occurred in two phases with key stakeholders provided with an industry briefing sessions 23rd – 28th September 2007. The Chairperson, John Corboy, led all sessions and was supported by Steering Committee members at all meetings.

1.3.4 Public Sessions

Thirteen sessions were held across the Goulburn Murray Irrigation District, commencing in Swan Hill covering North West, North Central and North East Victoria. These advertised forums were open invitation and held in local venues, to allow participants to gain a better understanding of the draft recommendations. Various Steering Committee members also attended all sessions providing responses to community questions.

The information sessions logged 400 questions with responses under the five streams of Governance, Modernisation, Environment, Melbourne entitlement and Irrigators share. Attendees were able to access a copy of the draft recommendations, submission sheets and fact sheets to assist in the submission process. In addition, the DSE customer call centre also provided submission information.

The following table lists the public consultation sessions held:

Dates	Times	Location	Venue
Tuesday 2nd October	9am until 11am	Swan Hill	Swan Hill Town Hall
Tuesday 2nd October	2pm until 4pm	Kerang	Soldiers Memorial Hall
Tuesday 2nd October	7pm until 9pm	Pyramid Hill	Memorial Hall
Wednesday 3rd October	10am until 12pm	Rochester	Rochester Football Club
Wednesday 3rd October	2pm until 4pm	Nathalia	Community Centre
Wednesday 3rd October	7pm until 9pm	Shepparton	East Bank Centre
Thursday 4th October	10am until 12pm	Cobram	Civic Centre
Thursday 4th October	2pm until 4pm	Benalla	Town Hall
Thursday 4th October	7pm until 9pm	Mansfield	Performing Arts Centre
Friday 5th October	10am until 12pm	Tatura	Ballantyne Centre
Friday 5th October	2pm until 4pm	Yea	Town Hall
Monday 8th October	10am until 12pm	Lockington	Town Hall
Monday 8th October	2pm until 4pm	Kyabram	Plaza Theatre

1.3.5 Written Submissions

Written submissions to the steering committee numbered in excess of 140. These were made available to all Steering Committee members and a process of identifying relevant issues was agreed to and implemented.

Some submissions, especially those from Water Service Committees and industry bodies such as Murray Dairy, contained very valuable commentary on matters of detail which are beyond the scope of the present report.

This detail will be relevant to planning carried out by the body which eventually does the modernisation work. We have therefore retained this commentary for later consideration.

All of the identified issues were discussed and actioned where the committee believed appropriate.

1.4 The Government's Food Bowl Modernisation Project (Stage 1) Commitments

1. Stage 1 of the Food Bowl Modernisation Project will be funded by a Government contribution of $600 million, Melbourne Water $300 million and GM-W $100 million
2. GM-W contribution of $100 million will not be required until the latter stages of the project
3. Aims to capture 225 GL of water in savings
4. These water savings will be shared equally between Melbourne, irrigators and environment
5. Water savings will be available every year that the system runs
6. No water will be taken away from existing entitlements
7. Additional water for irrigators will be in the form of a water entitlement
8. Additional water for Melbourne will be in a Bulk entitlement
9. No temporary or permanent trade to purchase additional water for Melbourne
10. Melbourne will receive 75 GL in 2010/2011 prior to the completion of Stage 1 of the Modernisation project
11. Ability to access savings from pre-modernisation projects & water quality reserve to source 75 GL for Melbourne by 2010/2011
12. Melbourne's Bulk Entitlement will be capped at 75 GL per annum
13. The Project will be managed as a "whole of region" project
14. The volume of savings will be verified
15. Major configurations will occur first

2. Executive Summary

The Goulburn Murray Irrigation District (GMID) is Australia's most extensive irrigation network, supported by substantial food processing capacity and attendant infrastructure. Goulburn Murray Water is responsible for the delivery of water services to 10,936 customers through 26,620 serviced outlets, located within six management areas of Shepparton, Central Goulburn, Rochester-Campaspe, Pyramid-Boort, Murray Valley and Torrumbarry and along the river and groundwater systems of northern Victoria.

To date the system has provided a secure level of water to irrigators, being delivered 100% or in excess of 100% of irrigators' water entitlement in 97 of the last 100 years of operations.

Typically over 3,000 GL of water flows through the GMID each year but around 30%, or approximately 900 GL on average, of this water is lost through system inefficiencies partly due to ageing irrigation infrastructure, as much of the system was built almost 100 years ago, but also due to the available technology at the time the district was built. Water losses result from leakage, seepage and evaporation in channels, meter inaccuracies and overflows at the end of channels (outfalls).

Modelling of the system has shown that the volume of water available in the GMID will be sufficient to generate approximately 450 GL of water savings by undertaking a large scale program of irrigation modernisation works across the entire GMID.

The efficient use of water in irrigation systems will be even more critical in a drier environment as predicted under a warmer climate. This provides further incentive to implement the water efficiency measures outlined in this report as savings will be available every year the system runs, including when allocations are less than 100%. Importantly, this report recommends that water efficiency savings are shared equally between irrigators, the environment and Melbourne – in both volume and reliability. This equal reliability of water efficiency savings means that no-one will be unduly affected by climate change.

The Steering Committees vision for the future is:

- A strong and vibrant GMID community based on irrigated agriculture;
- A modern, efficient, real time, low energy, automated irrigation system. A system that ensures state of the art competitiveness for current and future irrigators;
- A better customer service based around different customer groups;
- World class efficiency;
- A solid framework for a viable irrigation community well into the future by investing $1 billion in funding for Stage 1;

The six underlying principles that must be met to deliver the Food Bowl vision are:

- Focus on economic development;
- Strive for efficiency in both supply and farm systems;
- Provide different levels of service to meet different needs;
- Develop system components that ensure competitiveness in water supply;

- Develop policies to support and guide decisions; and
- Stage work to match funding.

Fundamentally, the principles recognise that water drives the northern irrigations region's economy. What ever modernised system is implemented, it must assist the region in shaping its future by:

- Providing water supply where it is required;
- Meeting the needs of all customers; and
- Being cost and operationally efficient.

Achieving the outputs of the Food Bowl Modernisation Project will deliver many benefits to the GMID and to the Victorian economy. Not only will irrigators and industry benefit from additional water but the community and environment will be major beneficiaries. The positive legacy of a major investment in Victoria's northern irrigation region will result in:

- A competitive advantage for irrigators;
- The opportunity to further grow our exports (particularly in our agriculture and food sectors);
- A significant reduction in risk for rural industry, resulting in stronger communities;
- A healthier environment; and
- Stronger regional economy.

The Steering Committee recognises that a project of this size and complexity is not without risks – risks which must be carefully and diligently managed. The committee believes that the governance of this project to meet the outcomes of economic development and the equitable distribution of water savings through system modernisation will be critical in determining the successful outcomes of the project. The Steering Committee is cognizant of the importance of being able to meet irrigation water customer delivery expectations, the delivery of water to the environment and to Melbourne whilst at the same time modernising the system. To ensure successful outcomes of the project, a new State Owned Entity is recommended as the proper organization to deliver this project. This entity should:

- Be independently governed by a skills based board;
- Establish formal relationships with other key organisations to ensure no duplication of effort;
- Map the interface with GMW to enable clarity and efficiency in the delivery of functions;
- Possess the capacity to attract commonwealth funding;
- Have all of the powers necessary to independently fulfil the agreed functions;
- Have a new name that reflects the diversity of the region;
- Exist only for the life of the project.

It is expected that the entity will support itself with a series of reference groups / advisory committees, including regional development, local councils, planners, irrigators and

environmental groups, to assist in addressing all issues on a whole of region basis. The importance of consultation as the system is modernised is emphasised as a key component of the successful delivery of the project.

The State Owned Entity will be operated transparently to ensure modernisation of the system is optimised and that the savings are shared equally between irrigators, the environment and Melbourne.

2.1 KEY BENEFITS

The most important benefits of the Food Bowl Modernisation Project are:

- Water savings – an estimated 225 GL of water will be saved from Stage 1 and shared equally between the environment, irrigators and Melbourne. This will equate to 75 GL of additional water for each user group. The environmental savings will contribute to the health of Victorian tributaries.
- Maintaining Victoria's competitive advantage in the agrifood sector – modernised irrigation infrastructure will enable farmers to produce more with less water by providing a water delivery service to meet the needs of their future enterprise. The project will also save water that will be directed towards industry, allowing regional development communities and industry to plan with a higher degree of certainty in relation to water consumption and more importantly growth. This will help foster a better investment and job creation environment.
- Enhancing Victoria's export capability – Victorian food and fibre exports for 2005-06 were valued at $6.97 billion. Investment in infrastructure (including irrigation delivery systems) and new technologies and management practices are critical factors in growing the export sector.
- Stronger communities and new industries – this project will represent one of the biggest works programs ever undertaken in Northern Victoria and will generate many opportunities for new and existing businesses within the region. The project will create short to medium term construction job opportunities. It will help drive innovation in, and provide further stimulus for the growth of the already significant water technology industry in the Goulburn Murray area.
- Environmental benefits – the additional 75 GL of environmental water allocation generated by the project will allow significant improvements to the tributaries, rivers and wetlands of the Murray Valley. The environment will have the same access level of security as both Melbourne and the irrigators. The project will also enable a system wide review of management of channel outfalls. There is potential to manage un-seasonal flows in a more integrated systematic manner to mimic a more natural flow pattern.
- Farm benefits – modernisation will allow for more responsive management of the irrigation system. "On-demand" supply of water, with orders being confirmed at the time they are placed and water being received as ordered will be possible. The ability to deliver the volume of water to farmers to complete irrigation in the shortest possible time will result from modernisation.
- Modernisation will provide a proactive and progressive approach to rationalisation of our current delivery system, providing certainty for irrigators and our future

irrigation industry. It will also improve the efficiency of the delivery system from about 70% delivery efficiency to 85%.

The following Modernisation, Environment and Governance sections of this report should be read in conjunction with this Executive Summary.

3. Key Recommendations Of The Steering Committee

3.1 MELBOURNE'S ENTITLEMENT

1. Melbourne's share of savings will be delivered as a bulk entitlement.
2. Melbourne is to receive a third of all savings achieved up to 225GL.
3. Melbourne's share of savings is capped at 75 GL per year.
4. Melbourne's share of the savings will have the same level of security as the irrigators and the environment shares.
5. The Government and / or the Melbourne Authorities will not enter the permanent water market to purchase water.
6. Melbourne Water Authorities will be able to sell into the temporary GMID water market from their annual entitlement.
7. The pipe size from the Goulburn River to Sugarloaf Reservoir will have a maximum diameter of 1.75 metres.
8. Melbourne will receive 75 GL in 2010/2011 prior to completion of Stage 1 of the Modernisation project.
9. If sufficient savings are not achieved by modernisation by 2010/2011, Melbourne's 75 GL for 2010/2011 can be augmented from savings already achieved from existing projects and 20 GL from the water quality reserves.
10. An agreement, such as a Memorandum of Understanding, to be entered into by the Melbourne Water Corporation and Goulburn Murray Water detailing the characteristics of Melbourne's Bulk Entitlement and the framework within which it will be implemented.

3.2 MODERNISATION RECOMMENDATIONS

1. The Modernisation is to be designed and implemented on a whole of region basis.
2. Each phase of planning and implementation of the Modernisation will be undertaken in consultation with irrigators.
3. Modernisation of the trunks and carriers is to be undertaken first, i.e. channels having 50 ML per day capacity will be the first considered for upgrade.
4. Modernisation of the trunks and carriers will include full automation and an increase in service level – estimated cost $600 m.
    a. Under normal circumstances this is aimed to achieve real time delivery service for the front end of the system
5. The remainder of the funds for Stage 1 will involve consultation with irrigators for customer connection to the backbone. This could entail, but is not limited to:
    a. Direct access by individual irrigators
    b. Group assess – by public infrastructure
6. All customers will remain connected to the system unless they choose otherwise.

7. Savings are to be audited every year and reported in an annual report.

3.3 MODERNISATION CORE PRINCIPLES

1. Focus on economic development.
2. Strive for efficiency in both supply and on farm systems.
3. Provide different levels of service to meet different needs.
4. Develop systems components that ensure competitiveness in water supply (i.e. operating costs must be reduced).
5. Develop policies to support and guide decisions.
6. Stage works to match funding.

3.4 IRRIGATORS WATER SHARE

1. Irrigators are to receive a third of all savings achieved up to 225 GL.
2. Irrigators will receive half of any savings achieved above 225 GL.
3. Irrigators' share of the savings will have the same level of security as the Environment and Melbourne's share.
4. Irrigators' share of savings will only be distributed to irrigators in the GMID.
5. Savings will be distributed evenly across the GMID.
6. Savings will be allocated as high reliability shares at the completion of Stage 1.
7. Irrigators' share of savings will only be distributed to irrigators who, through water charges, contribute to Goulburn Murray Water's (GMW's) $100 m contribution for Stage 1 of the Modernisation Project.
8. High reliability shares from savings will be distributed on a pro-rata basis relative to the volume of high reliability shares held by irrigators at the completion of the project.
9. In the interim, savings will be distributed annually to irrigators as they are achieved.
10. Interim allocations of savings will be distributed on a pro-rata basis relative to the volume of high reliability shares held by irrigators on the year of distribution.

3.5 THE ENVIRONMENTAL WATER SHARE

1. Water savings should be shared equally between irrigators, Melbourne Water and the Environment, including volume reliability and timing of when savings become available. The environment will also receive half of any savings above and beyond the 225 GL.
2. The primary objective for the use of the environment's share of the savings should be for the improvement of Victorian Tributaries.

3. The environment share of the savings should be managed to optimize multiple benefits to Victorian rivers and help achieve the Victorian Government's contributions to the Snowy and Murray Rivers.
4. The environment's share of the Food Bowl Modernisation Project savings be granted as an Environmental Entitlement to be held by the Minister for Environment.
5. Catchment Management Authorities should develop a plan for the best deployment of the environmental water, consulting with all stakeholders with the plan to be approved by the Ministers for the Environment and Water.
6. Catchment Management Authorities should also manage the delivery of water within the Victorian Tributaries, monitor environmental outcomes, and integrate environmental flows with river and wetland management programs.
7. Where existing environmental and irrigation allocations flow together through the system, the defined environmental requirement must be deducted first before the savings are then calculated on the basis of the balance of the water in the system. The defined environmental requirement is the volume currently required to meet defined environmental obligations (such as the Environmental Protection and Biodiversity Conservation Act and the Flora and Fauna Guarantee Act – e.g. North Lake – Woorinen).
8. The environmental impacts of providing 75 GL to Melbourne in 2010/11 need to be assessed. Where such proposals have environmental impacts, offset measures need to be provided.
9. Carryover and / or borrow and payback rules such as those in place for the Murray Wetlands be developed for the environment's share in consultation and agreement with irrigators and the environment.
10. Headwork charges be applied to this Environmental Entitlement and delivery charges applied where appropriate.

3.6 GOVERNANCE

1. The entity responsible for the modernization should be a State Owned Entity
2. The Board of the entity should be a skills based Board
3. The entity will exist only for the duration of the modernization project
4. The entity should work with other key regional development agencies to assist, encourage, optimize and support regional development
5. To actively source additional funding for stage two of the project in conjunction with key stakeholders, Governments and other agencies.
6. The entity will establish links and a consultation process with irrigator and other stakeholders
7. The authority will engage those best placed to deliver the various components of the project – including GM-W
8. Given the financial and structural interdependency of the Food Bowl Modernisation Project and the Sugarloaf Pipeline Project, the State Owned Entity and where appropriate Goulburn Murray Water, will enter into talks with Melbourne Water to establish an effective interface between the organizations to ensure complimentary timelines, ensure consistent community liaison processes and resolve any issues or points of difference.

3.7 INITIAL PROGRAM OF SAVINGS FOR MELBOURNE

To secure 75 GL for Melbourne by 2010/2011, provision will be made to carry over savings realised in each year, building up to a total of 75 GL in Lake Eildon by the required time

The projects from which water will be sourced are as follows:

Project / Water Source	**2008/09**	**2009/10**	**2010/11**
Short Term / Temporary allocation to Melbourne			
Central Goulburn 1-4	17	17	17
Shepparton Modernisation Project		12	12
Part of Lake Eildon Water Quality Reserve		10	10
Long Term – Permanent allocation to Melbourne			
FBMP Stage 1a. Automation of regulators on trunks & carriers		10	20
Total savings generated	**17**	**49**	**59**
Cumulative water savings	**17**	**66**	**125**
Projected Melbourne water use			**75**

Melbourne's entitlement will be transferred to Melbourne from the Goulburn River via the Sugarloaf pipeline.

3.7.1 Key facts about the Sugarloaf pipeline:

- It is expected that the 75GL/year Bulk Entitlement will be mostly extracted during the irrigation season which is normally 9 months from August through to May (have allowed for the pipe to operate approximately 240 days per year).

- The dimensions of the pipeline from the Goulburn River offtake to the top of the Great Dividing Range is 1,750 millimetres. From the top of the range to the Sugarloaf Reservoir the dimensions of the pipeline is 1,404 millimetres.

- The pipe's operating regime will ensure that a maximum of 75 GL/year only will be extracted from the Goulburn River.

4 Modernisation Overview

4.1 Why Modernise?

The Goulburn Murray Irrigation District (GMID) is Australia's most extensive irrigation network, supported by substantial food processing capacity and attendant infrastructure. This network must deliver more competitive services and pricing to survive into the future. It is currently facing competition for water from large-scale green field developments downstream, from urban water authorities anxious to secure more reliable supplies and from the need to restore environmental flows to the rivers. This is threatening the viability of the supply system and therefore the viability of the current customers. In addition, much of the irrigation water is delivered across old and out-dated infrastructure, which is a severe restraint on modern and competitive farming development.

A strong and vibrant community based on irrigated agriculture is desired across the region.

4.2 *The Vision*

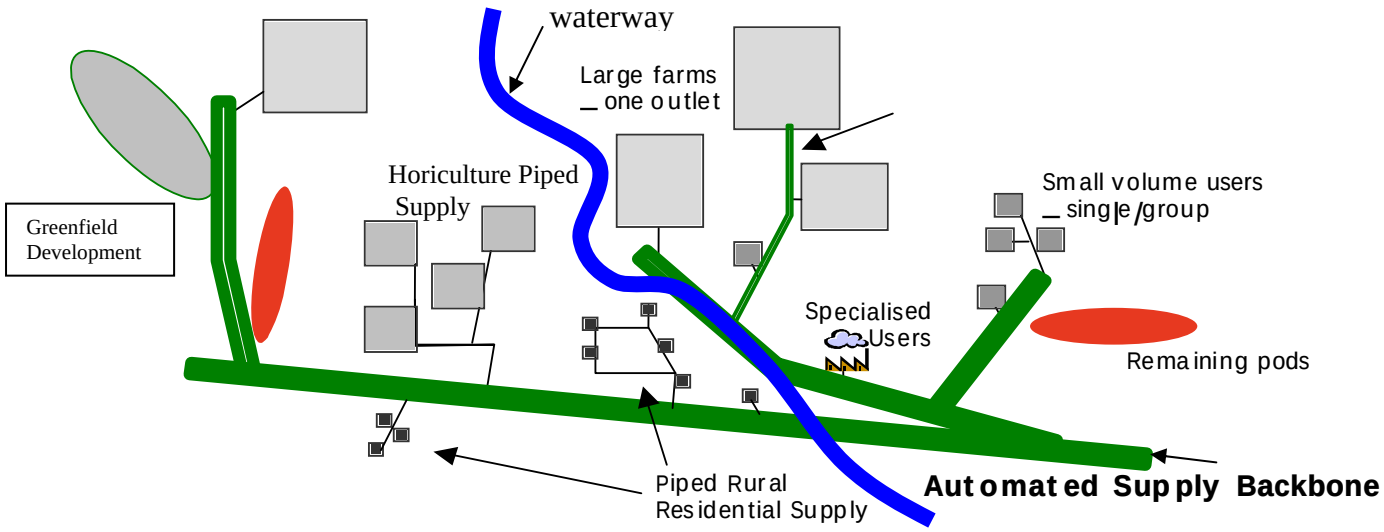
- A strong and vibrant GMID community based on irrigated agriculture.
  - Focus on regional development to ensure substantial growth in economic output from the GMID.
  - Create opportunity for productive and growing businesses that add value to water, by producing twice as much from half the amount of water.
  - Develop irrigation infrastructure that provides opportunities for enterprises that are competitive and retain/attract water to the region.
  - Enable increased value adding by industry to on-farm produce.
- A modern, efficient, real time, low energy, automated irrigation system is required. A system that ensures state-of-the-art competitiveness for current and future irrigators.
  - Modernise both the distribution and on-farm irrigation infrastructure.
  - Develop a fully automated supply backbone of major channels servicing the whole of the GMID. Completed all at once, this backbone will give everyone a better service right from the start
  - Develop a range of methods (and incentives, cash and/or tariff based) for customer connection to the supply backbone, including channels and pipes. This provides choice and opportunity to maximise integration with the farm system and will provide better, but often different service to individual farms.
  - Enable a shift in the boundary between public and private assets, with the public supply system retracting to the backbone to provide greater control of infrastructure to the farmers, with appropriate cost sharing.
- A better customer service based around different customer groups.
  - Provide a range of services with associated tariffs to match the needs of the different customer groups (rural residential, large farms, intensive irrigation, low cost users, new investors, urban users) – provide clear choices to customers.

- Connections to the backbone will be driven by customer needs with the most cost–effective mix of private/public supply as the solution.
- Meet the needs of the growing farm businesses that add significant value to water.
- Encourage greenfield investment in the region.
- Provide a complementary service for rural amenity customers who are critical to the social fabric of the region.

- World-class efficiency.
  - Focus on system efficiency from the storage right through to the plant/crop produced across the whole region. Backbone efficiency will reach 85%. Farm water use efficiency will be similar.
  - This would generate water savings from the current supply system that will be divided between urban, environmental and production components giving benefits to all.
- Establish a solid framework for a viable irrigation community well into the future by investing $1 billion in funding for Stage 1.
  - Construct an automated, low energy, bulk supply backbone to provide enhanced service and create opportunity for all.
  - Develop and start implementing the different customer connections, using local solutions to ensure cost effective integration of the farm systems with the supply backbone.
  - Target those who wish to change (supported with appropriate funding) and allow others reasonable time to adjust/modernise.
- The remaining modernisation will be completed over 10 years, with additional Federal Government investment, in conjunction with on-farm upgrades.

A schematic representation of the elements of the Future Supply System is shown in Figure 1-1. Note that these elements are illustrated as spatially separate. In reality, they are interspersed among each other across the landscape.

Figure 1-1 Schematic of Future Supply System

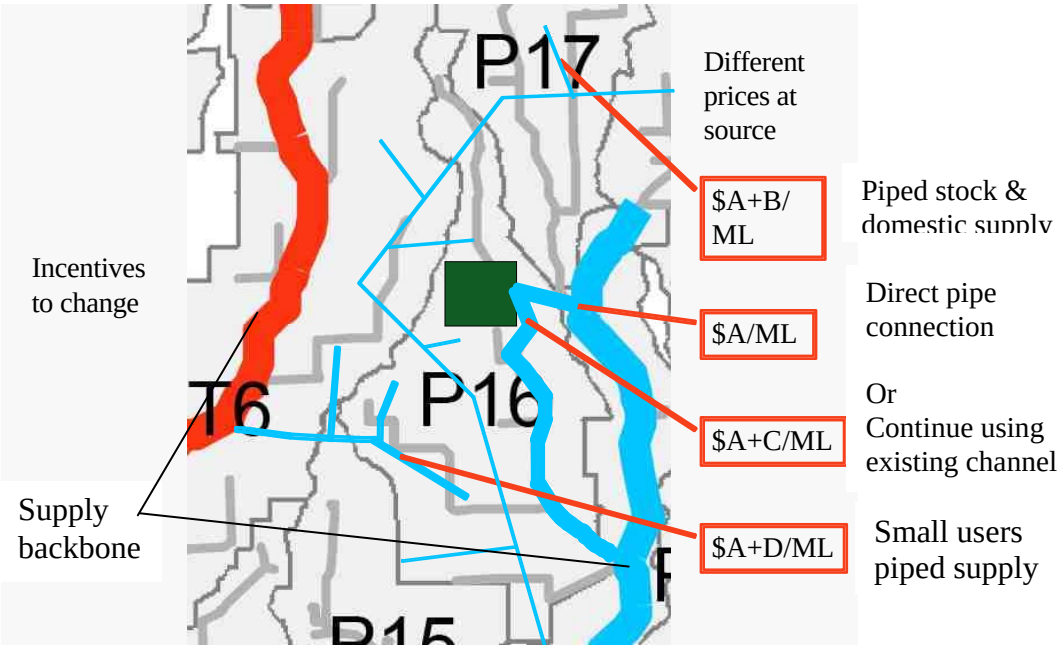


Potential for Stage 1 works could include up to 400 large farms connected, 800 local systems rationalised, five new developments, 1,700 stock and domestic customers with piped supply and one or two piped horticulture systems in addition to the real time automated supply backbone. In practice, we can't predict the future so these numbers are indicative of one scenario only.

Note: Remaining pods are those small (lateral) channels that are supplied by the existing carriers and trunks.

To illustrate how the system can exist across the same area of land, Figure 1-2 shows how some of the elements might come together.

Figure 1-2 Local Application



Note that the price of water at the backbone ($A/ML) would be much reduced from today's price. It is expected that to continue using the existing system the price ($A + $C/ML) would remain relatively at existing prices.

4.3 Enormous Investment Required

The modernisation of the irrigation infrastructure has been estimated to cost $2.2 billion to get water delivered on the farm boundary. Of this, $600 million is for the backbone and $1.6 billion to connect the customers to the backbone. There could be a similar amount spent by government and farmers on further upgrades on the farm side.

Stage 1 is to complete the backbone and do 25% of the farm connections. Stage 2 is to complete the customer connections and the farm upgrades needed to run concurrently with both stages to ensure the synergies are captured.

This will require substantial funding by all levels of government and will be matched by the farm businesses of the future. It is recognised that significant funding has already been

made by farmers to upgrade their irrigation systems over recent decades and current circumstances create major challenges for businesses to find capital for further upgrades. However, the Food Bowl vision is based on substantial growth in the economic output from the GMID. This economic wealth will not be achieved without the level of modernisation proposed.

4.4 State Government Commitment

The Victorian State Government have committed to the Food Bowl Modernisation Project as part of a $4.9 billion investment in major infrastructure projects announced as the next stage of the Government's *Our Water Our Future* plan.

$1 billion will be invested in Stage 1 of the modernisation project to secure estimated savings of 225 GL annually. This will include new State funding of $600 million as well as contributions from Melbourne Water ($300M) and Goulburn Murray Water ($100M).

This $1 billion in funding does not include provision of interconnecting infrastructure such as the Murray-Goulburn Interconnector or the Sugarloaf Interconnector. It is Stage 1 of an enormous investment in modernising the GMID. It will enable the "main game" to start, which is developing an automated modern supply backbone. This will create opportunities for modern farm systems, assist those who want to modernise and provide alternative supplies for small users. Those wishing to remain with the existing service can do so under the new tariff structure.

Two caveats come with the Government funding:

1. regional economic development benefits must be obtained; and
2. the efficiency gains must be achieved and hence generate water savings.

The water savings achieved will be shared equally between the irrigators, the environment and Melbourne. It is expected that the savings from upgrade works will occur in tandem with these works and be accounted for as the project unfolds.

Subsequent funding will be required from additional sources to complete the project.

4.5 Success Factors

Several factors when achieved will demonstrate the success of the project:

- The community says, "we had choice and opportunity in upgrading the irrigation supply system to our farms";
- Change was achieved in a positive way;
- The GMID is recognised as being a world-class irrigation system that runs at around 85% efficiency across both the supply system and the farm;
- Water used in the GMID returned to or exceeded the use relative to the mid 2000s;
- The northern irrigation region has prospered through primary production and value added industries that have increased:
  - wealth

  - economic turnover
  - disposable income
- Water savings were generated as the system was modernised – 75GL by 2010 and 225GL by 2012.
- The modernisation of the irrigation system was completed to schedule (budget and time).

4.6 This Document

The purpose of this document is to outline the vision and principles behind the overall modernisation concept developed by the Food Bowl Modernisation Sub-Committee. It describes what the modernised irrigation system will look like and shows where each customer can fit in the new system. The report covers the supply system, the farm systems and the region's interconnectivity with other areas. Predictions of future farm numbers, farm types, and industry growth are all indicative and it is acknowledged there are many possible future scenarios (all of which need to be serviced by the flexible new system).

The document also discusses:

- The modernisation process and priorities for implementation;
- The economic development and approximate water savings expected as a result of modernisation;
- The policies required to encourage (rather than force) change.

This document looks at the principles rather than the detail, because the vision has a new focus in facilitating economic development. These principles are to guide the future detail of planning and analysis that will be undertaken for this project.

Note that while many numbers are produced in the report, they must be read in the context that the report has used information available at the time and the limited time available for its preparation. Details may change as more information and results of more analyses become available.

5. History of Change

The GMID has undergone a number of changes since the post-World War II enlargement of Lake Eildon and Lake Hume. These changes include:

- The development phase of the 1950s – 1970s when water was tied to land, its availability was unlimited and the delivery infrastructure was appropriate to meet demand. Farms were much smaller than they are today.
- The introduction of rural water trading and the cap on water extractions in the 1990s (MDBC Cap 1995) when development reached a level such that water became scarce. This encouraged water to move to the more efficient and higher value properties. The value of water increased through scarcity and trading enabled that value to be realised. However trade also put pressure on the system by:
    - limiting development in some areas through channel capacity; and
    - providing a "superannuation payout" for retiring farmers to sell water separate to land and create "stranded assets".
- The post-1970s implementation of new technology on farm, including laser grading and pressurised irrigation in horticulture. This new technology, combined with trade and growth of efficient businesses, has dramatically improved farm water use efficiency (estimated from 50% to 70%).
- The delivery infrastructure has not been significantly updated since the 1950's although delivery efficiencies have increased (also estimated from 50% to 70%) through better management. Recently significant field trial work has been completed on automation, modern accurate outlets and modern regulating structures. These works have provided a basis for planning to modernise the system.
- Strong natural resource management programs delivered through Catchment Management Authorities and partner organisations have seen a real advance in property management over recent decades. Farmers have made major improvements to management of their resources at considerable expense to their businesses.
- In the 1990s and since 2000 there has been significant "Greenfield" development in irrigation. However very little of this has occurred in the GMID because of the need to access a "Murray River" type water supply (i.e. large volume, on demand, one supply point) and the desire for greater on-farm control of water along with larger parcels of land unencumbered by unwanted infrastructure. The GMID has seen only 3 large Greenfield investments. These have utilised the Waranga Western Main channel and Kangaroo Lake – large carriers that act as a "pseudo" Murray River. However, the GMID has seen numerous "small greenfields" where both existing dairy and horticulture has expanded onto traditional mixed farms. This has been very significant in terms of changes to water use and economic output.
- The recent Living Murray and Snowy projects have introduced the environment into the "demand" side for water. This has created an interest in infrastructure works to provide savings. It has also increased the value of water.
- The State Government's Sugarloaf Interconnector and Goldfields Super-pipe have created the start of a National Water Grid combining rural and urban water supplies. This

has meant that the water market is now moving towards one national market. Again this development increases the value of water owned by the irrigator.

- Competition and higher value for water is a catalyst for:
  - Farmers retiring to obtain a higher “superannuation” payout;
  - Farmers who wish to survive having to compete for water in order to grow their business. As a result only the best, and those in profitable industries are able to compete;
  - Development of new technologies to increase water use efficiency (e.g. sub-surface drip). These are critical to agricultural growth. The mantra “doubling production ($ value) with half the water” is absolutely vital and achievable; and
  - Development of modern efficient delivery systems, which are essential for the survival of GMID.
- The State Government’s decision to fund the Food Bowl Modernisation provides an opportunity to stand back and consider the irrigation system at a broad scale and essentially as a clean sheet (but without completely ignoring the existing infrastructure). This is in contrast with the previous reconfiguration program that focussed on rationalising at the extremities of the system as that is where most of the savings are, which is what the driver for change was until now.
- Farms are continuously getting bigger and irrigators using more water per business. This often means other properties decline in water use. The advent of part-time irrigators and rural residential or lifestyle properties has been significant. In fact the number of small water users scattered throughout the GMID far exceeds the number of farm businesses. Thus the GMID delivery system has a very different customer profile now, compared to when it was originally set up.

6 Underlying Principles for Modernisation

6.1 Principles

The Food Bowl vision is based on a number of underlying principles:

- Focus on Economic Development
- Strive for Efficiency in both Supply and Farm Systems
- Provide Different Levels of Service to Meet Different Needs
- Develop System Components that Ensure Competitiveness in Water Supply
- Develop Policies to Support and Guide Decisions
- Stage Works to Match Funding

6.2 Principle 1: Focus on Economic Development

Water drives the economy

Water is the fundamental building block of the economy in the GMID region. Therefore "adding value to water" is critical, along with modernising the system to generate new water from savings and achieving continued increases in production from each unit of water.

The region must be water competitive

The region has been losing water to other regions, particularly to large-scale greenfield developments downstream along the Murray River and to urban water authorities anxious to secure more reliable supplies. Irrigation water is the economic engine of the GMID. Water leaving the GMID depletes the agricultural production that can be achieved and the overall wealth of the region's community.

Climate change will also reduce the volume of water available in the system in the future, which is another driver for increased efficiency and to explore different production systems.

The region must develop irrigation infrastructure and enterprises that are both price and service competitive, retain/attract water to the region, and use water efficiently. There must be opportunities for industries to develop that can compete with the urban market and downstream developments.

The GMID needs to build on the natural advantages such as good soils, as well as the supporting social and industrial infrastructure, to be able to capitalise on a modernised irrigation system. The new entity must ensure that the whole region improves together to encourage a critical mass of opportunity that encourages people to stay and build their businesses as well as attracting new investment.

A modern system for the future

The irrigation infrastructure (both delivery to farm and on-farm) must represent the future. It must be the latest and best affordable technology and matched to the future needs of agriculture. It is not about "retrofitting the existing system".

Focus on modernisation first, but deliver savings

The first priority is to modernise the system and another is to achieve savings through improving efficiencies. There is an interdependence of modernisation and achieving water savings.

Whilst some (not all) of the funding available for modernisation comes as a result of savings, it is not productive to focus primarily on this aspect. Modernising to an efficient system will generate savings ultimately. However undertaking works for short-term savings alone will inevitably compromise the long-term modernisation. This is exacerbated by the inability to measure and or locate individual losses. The quickest way to achieve the savings will be to modernise the system and encourage use of the water by landholders who are also modernising.

The savings will need to be documented, reported and accounted for as the project is implemented.

The focus has evolved – build on what is known

Utilise those elements from existing programs that help meet the vision.

The Food Bowl vision has evolved from the extensive investigations, consultation and thinking undertaken by G-MW in the reconfiguration program. It is not a completely new idea, but an evolution from previous work. Further development of the program is expected to involve existing processes, like the Area Reconfiguration Groups, to maintain continuity of involvement with the community.

6.3 Principle 2: Strive for Efficiency in both Supply and Farm Systems

Storage to the plant

The aim of the irrigation system is to provide water from the storages to the plants or crops grown (sometimes referred to as providing water from "dam to rootzone"). Thus, there needs to be integration between the farm system and the supply system, and modernisation of the farm system should drive this integration.

Efficiencies – supply:farm - 70 : 70 ⟶ 85 : 85

The current infrastructure has agreed delivery efficiencies of around 70% in the distribution channel supply. On farm water use efficiencies range between 60-95% and are assumed for this report to average 70%. The expectation is to achieve efficiencies of 85% for both aspects. This would reduce losses in the system by up to 800 GL and deliver gains for stakeholders.

Control Consumptive Use of Water

The community has moved to the position that it is no longer acceptable to waste water.

Modernisation is about taking total control of all water for consumptive use and directing it to the root zone or other end use (urban, glasshouse etc). This will bring certainty for consumers, and allow them greater scope to plan agricultural and other activities.

Thus any modernisation must not accept old, outdated, inefficient uses of water or provide infrastructure that encourages waste.

Outfalls, seepage, runoff into drains and throughflow can all be partially reused, as occurs in the current system. However, this secondary reuse is both erratic and unpredictable and does not enable the same potential for efficiencies as a modernised system. The existing uses of outfall water (for the environment and production) are acknowledged. Some water may need to be continually supplied to particular resources (eg. a specific wetland). If this is so, delivery to the end use needs to be managed and losses accounted for.

All water diverted for consumptive use must be accounted for.

6.4 Principle 3: Provide Different Levels of Service to Meet Different Needs

Understand the Customer Base (80: 20 rule)

Most of the agricultural production and hence water use is achieved by relatively few businesses. Currently about 3,000 agricultural businesses (540 horticulture, 1,820 dairy farms and 550 mixed properties) use about 85% of the water and generate most of the regions wealth generated by water. Of these 3,000 agricultural businesses, it is estimated that about 1,500 use 70% of the water and produce about 80% of the direct farm economic output from the water.

The majority of customers (approximately 8,000) use 15% of the water and generate very little direct water driven economic output. However, they are critical to the social fabric of the region and are entitled to a water supply.

Table 3-1 Customers by Industry Type – Whole of GMID *(Based on a combination of sources including G-MW, ABS and DPI.)*

Industry	No. Customers	% Customers	Water Use (ML)	% Water Use	GVAP[1] ($million)	% GVAP
Dairy	1,820	17%	1,066,891	54%	800	63%
Horticulture	539	5%	140,864	7%	351	27%
Mixed	550	5%	465,320	23%	107	8%
Small Users	3,094	28%	278,397	14%	20	2%
Rural Residential	4,933	45%	30,128	2%		
Total	**10,936**	**100%**	**1,981,600**	**100%**	**1,278**	**100%**

1. GVAP – Gross Value of Agricultural Production

Demonstrate Different levels of service for different customers

The irrigation system serves a number of customers with very different needs i.e. horticulture, dairy, mixed farms, hobby/part-timers and rural residential. Other customers include specialist industries and large-scale investment projects.

There must be a range of better services and associated tariffs to match the needs of these different customer groups.

Based on economic output (farm gate) there is a distinct customer profile with each group likely to need a different supply system:

- 1,500 medium-large agricultural businesses
- 1,500 small agricultural businesses
- 3,000 part-time irrigators
- 5,000 rural residential users (<20ML usage)
- 100 specialist users (piggeries, food processing etc)
- 2 large investment projects

Practical options that provide individual customers with a clear vision need to be demonstrated to excite and encourage change. Change will only happen when individual customers decide how they want to change.

Services will involve provision of:

- Appropriate flow rates at appropriate head;
- Accurate metering;
- Water when the plant needs it;
- Appropriate notice of ordering (up to on-demand); and
- Allowance for irrigation to cease when needed (rainfall induced shut-down).

Meet the needs of the growing businesses

Farm businesses are continuously doubling in size every generation. The typical dairy farm was 30 cows when the current infrastructure was established, whereas today 300 cows is not uncommon – i.e. a 10 fold increase!

Businesses will continue to grow by a combination of switching to more profitable enterprises, becoming bigger and value adding. In addition there is the potential for a small number of very large businesses (outside investors) to replace/augment the existing businesses. It is important that all businesses in the area have an opportunity to grow.

The modern infrastructure must meet the needs of the growing businesses that are the economic future of the region.

As John Brown of Brown Brothers recently commented:

"We must be planning with global scale development in mind – and that is the producers must have critical mass and volume of supply to be given any hearing with the demands of supermarket chains – both here with Woolies and Coles, but particularly overseas with Tesco's and Sainsbury's etc – small lots will not make it on the global scene unless they are in the unique product market…."

6.5 Principle 4: Develop System Components that Ensure Competitiveness in Water Supply

Start with the supply backbone

The first step is to start with the bulk supply network– i.e. a fully automated supply backbone of major channels that delivers a measured volume of water throughout the region. This enables those who wish to modernise on-farm to connect in. It is about modernising the major elements to provide security and opportunities for customers.

Focus on whole of GMID

Water can be transported cheaply and efficiently right across the GMID in large volume carrier channels and trunks.

The 1,500 businesses that produce the bulk of the agricultural output are scattered across the region. This presents an enormous opportunity for business growth but also adds to the challenges and complexity of the modernisation project as scattered throughout are part-time irrigators and rural residential properties needing alternative supplies.

Throughout the GMID, recent development (large dairy and horticulture) has often occurred at the extremities of the system. Also, some of the best opportunities for new development exist at the extremes like the Mallee fringe in the west. Thus the modernisation network will need to retain an extensive supply backbone and consider extensions/additional capacity into those prime development zones that can attract greenfield investment.

Service points need to reflect the cost of supply

The infrastructure costs are directly related to the number of service points. The number of outlets required for today's businesses is a fraction of what was required 60 years ago. The concept of one outlet per business is a target, but it is recognised this could be decades away for many businesses.

There are currently over 20,000 metered outlets plus up to 3,000 un-metered stock and domestic supplies.

Shift the boundary between public and private assets

The infrastructure is located mainly at the extremities (in the pods – the terminal groupings of spur channels) as shown below.

Table 3-2 Existing Infrastructure *(Source: G-MW)*

	Channels (km)	Structures[1]	Outlets
Carriers	530	185	1,249
Trunks	1,137	866	3,663
Pods	4,386	4,269	15,551
TOTAL	**6,053**	**5,320**	**20,463**

1. Structure numbers for Pyramid-Boort are not included and refer to regulating structures only – there are a total of 18,276 irrigation structures.

Much of the current public infrastructure is now located within the farm boundaries. This needs to be taken over and be part of the farm system, not duplicated as occurs today. The modern system will bring water close to the farm boundary and private infrastructure initially funded by the Modernisation project (through substantial incentives), will take over from there when the individual businesses choose to change.

The farmer is best placed to select, fund (with appropriate cost-share with the public, that leads to an equalising of what is seen as an inequity between those on the backbone and those some distance from it), build and operate the appropriate farm connection infrastructure. In particular most of any "piping" should be done by the farmer (medium-large businesses). Farmers will get more control of the expenditure by shifting the interface. It is better to spend money on "farm controlled infrastructure" bringing the water from the supply backbone to and within the farm. Thus public funding through an appropriate cost share, is best used for this rather than retrofitting the existing public lateral system.

The current system will stay until individuals choose to alter their connection point.

Small properties generally want an authority to provide supply infrastructure, as it is uneconomic for them to have the sophisticated infrastructure (pressurised pump, scheduling etc.). In contrast large properties wish to control their own infrastructure and have minimal authority provided services. It is inevitable that the authority will withdraw from these large users.

Remain a Low Energy System

The GMID should remain a low energy irrigation system by utilising gravity to distribute large volumes of water across the region in modern automated channels. Targeted pumping at the end use is expected in many cases, so the service can optimise costs. For example, relatively low flows could be piped e.g. to small properties, part-time irrigators and rural residential properties. Strategic low-head pumps can be used on farm to supplement the head in gravity channels providing level of service on an as needs basis

Much of this reflects changes currently underway and should only occur when it optimises the costs of delivery services for both the customer and the supplier.

Consider groundwater and drainage as part of the system

Currently groundwater supply is considered separately to the channel supply. However, groundwater offers opportunities in particular areas (Murray Valley/Campaspe mainly) to

exchange with surface water and integrate systems efficiently. For example groundwater could be used as the rural residential supply rather than an extensive network of channels/pipes.

The drainage system is also critical to ensuring maximum production, as it reduces waterlogging in wet periods. This system needs to be incorporated into any alteration to the irrigation system.

Don't waste money on things that will disappear

Programs already in place for maintenance of the delivery system, such as "accelerated maintenance", should not continue unless they fit in with modernisation. Upgrade of the supply backbone is required, but there is no need to enhance lateral channels that will cease to exist once modernisation has occurred. Funding for maintenance programs should be redirected to align with the modernisation process.

Operating cost must be reduced

Farmers face a constant resource cost vs. product price squeeze that is overcome through developing efficiencies and reducing the unit cost of production. In a similar way, modernisation must result in an overall real reduction in operating costs (despite some component costs increasing) to ensure the system remains cost-competitive. The managing entity must start with this premise to foster a 'how can we deliver the service needed at a lower cost' approach - without unacceptable compromises of service and quality.

Accurate meters are essential but think about the regulator

Accurate metering is fundamental to the modernisation project and is mandated by Federal Government programs. However in the rush to install meters it is easy to forget that the choice of meters is related to the regulating structure at each measuring point.

The new regulators will vary with different customers and need to be the most modern structure possible in order to fully automate the system and obtain maximum efficiency.

The supply backbone needs to have meters installed as soon as possible. You can then target and prioritise the metering of each pod as required over 10 years. Money must not be wasted on installing meters on outlets that will be rationalised or totally changed.

6.6 Principle 5: Develop Policies to Support and Guide Decisions

Clarify choices for property connection services and costs

Modern system tariffs need to reflect the different types, level and costs of service. This will encourage end users to modernise and change their connection and rationalise outlets.

These messages need to be clearly spelt out for and understood by customers and are a key duty of the new entity. Use of existing processes (eg reconfiguration groups) need to be combined with clear involvement of the individuals whose properties the changes are being made on.

The current tariff system does not reflect the real costs (outlets have a nominal charge despite being the major cost driver), and discourages modernisation.

Give people time options and support

Businesses will continue to change given the right opportunity and time. Modernisation is about letting people respond in a reasonable time period. It is expected that the timeframe required will be in the order of 10 years.

There is also a need to provide the ideas and options with full information on incentives and tariffs for people to make a change that works for them.

For many customers, the changes implied in the modernisation will not have been considered before and will need the provision of information and advisory support to help work out the best decisions.

Integrate with Other Programs

The modernisation process needs to be integrated with other planning, infrastructure and environmental programs so it supports, and is in turn supported by, wider community objectives/imperatives.

For example a program is currently underway to review the rural planning zone. There is a need to work with Local Government to ensure the location of rural residential developments is such that protection of productive agricultural land that growing businesses can expand into (and includes prime development zones) is achieved. This will help to retain and attract investment into the GMID.

Ultimately, the suite of irrigation infrastructure projects also need to be brought into a single seamless process for customers to become involved with (refer also to 6.2.6).

6.7 Principle 6: Stage Works to Match Funding

$1 billion is only Stage 1

The recent State Government-funding announcement of $1 billion is only Stage 1 of the overall modernisation.

This first stage is to use the funds to create the supply backbone and commence connecting farms to it. Stage 1 is to complete the backbone (for $600 million) and to do 25% of the farm connections for ($400 million). Getting the framework right is important. It is not about chasing water savings per se – they will come as the system modernises and need to be realised.

Stage 2 is to complete the customer connections (for $1.2 billion – expected to come from the Federal Government). Therefore, the farm connections to the backbone are where the bulk of the estimated total cost for modernising the supply system of $2.2 billion will be spent. This will be in incentives that make decisions to modernise sensibly for the individual and allay fears of unfair burden being shouldered by those farms away from the backbone.

There could be a similar amount spent by government and farmers on further upgrades on the farm side that need to occur concurrently with Stage 1 and Stage 2 to capture synergies between savings.

The Federal Government has a number of large programs consistent with the Food Bowl Modernisation Project. As the GMID is a major irrigation system with the potential for substantial benefits from investment, people should have confidence that the funds for Stage 2 will be found.

Money for savings is a means to an end

The creation of a water backbone satisfies increased water demand, which increases the value of water. Thus water savings have value and have been a catalyst for obtaining funding from the State Government and urban water users.

From the irrigators point of view this money is for something they never previously had access to (water lost in delivery). The deal of one-third Melbourne, one-third environment and one-third irrigators provides the necessary money for modernisation, but recognises that some of the savings should be retained by farmers for production.

7 Physical System – What will it look like?

7.1 Overview

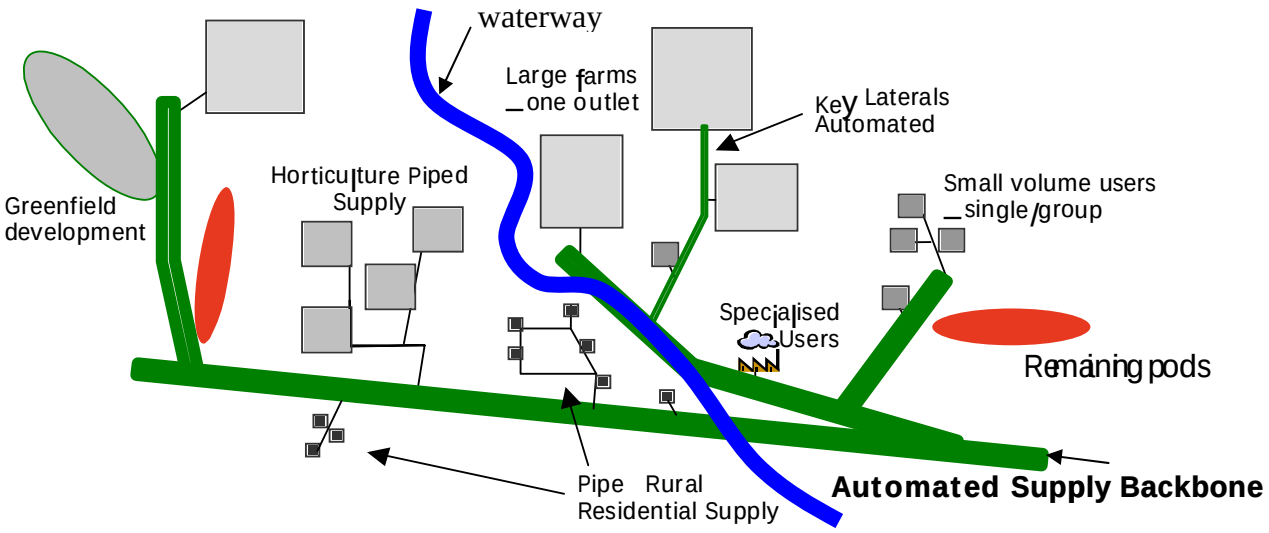
The modernised irrigation system will consist of four key components:

- Interconnectivity
- Automated Supply Backbone
- Different Connections to the Supply Backbone for Different Customers
- Customer Irrigation Systems

These components are summarised in Figure 4-3.

A visual example of what the connection systems are is provided in Figure 4.1 and further details are outlined in the following sections.

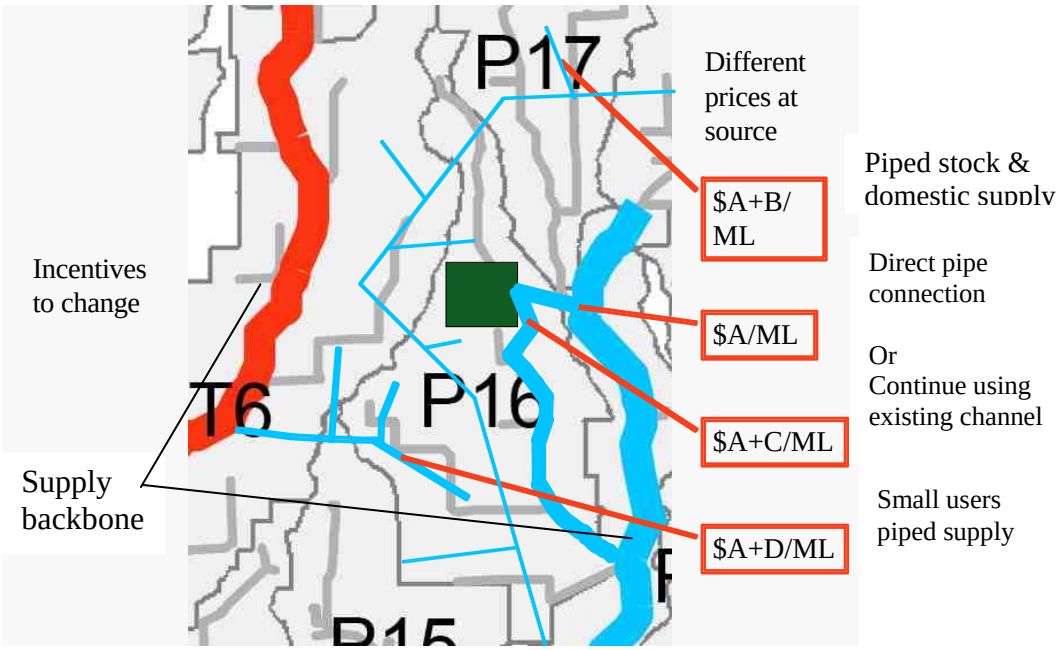
Figure 7-1 Schematic of Future Supply System



Note: These connections are shown as being spatially separate, but in reality, they are interspersed across the landscape.

To illustrate how the system can exist across the same area of land, Figure 4 -2 shows how some of these connections might come together.

Figure 7-2 Local Application



Note that the price of water at the backbone ($A/ML) would be much reduced from today's price. It is expected that to continue using the existing system the price ($A + $C/ML) would remain relatively at existing prices.

7.2 Component 1: Interconnectivity

The Victorian Government has decided that greater interconnectivity is required between water supply systems. This increases the security of water supplies by diversifying the sources of water available, and enables water to be traded more readily by making it easier to transfer to where it is needed. A fully interconnected system will allow maximum efficient economic use of the water resource.

7.3 Component 2: Automated Supply Backbone

The large channels known as carriers and trunks (according to the definition developed in the Pyramid-Boort reconfiguration project) plus larger laterals (potentially down to around 5GL/day capacity) make up the supply backbone. They shift large volumes of water across long distances and make up nearly half the length of channels in the current supply system.

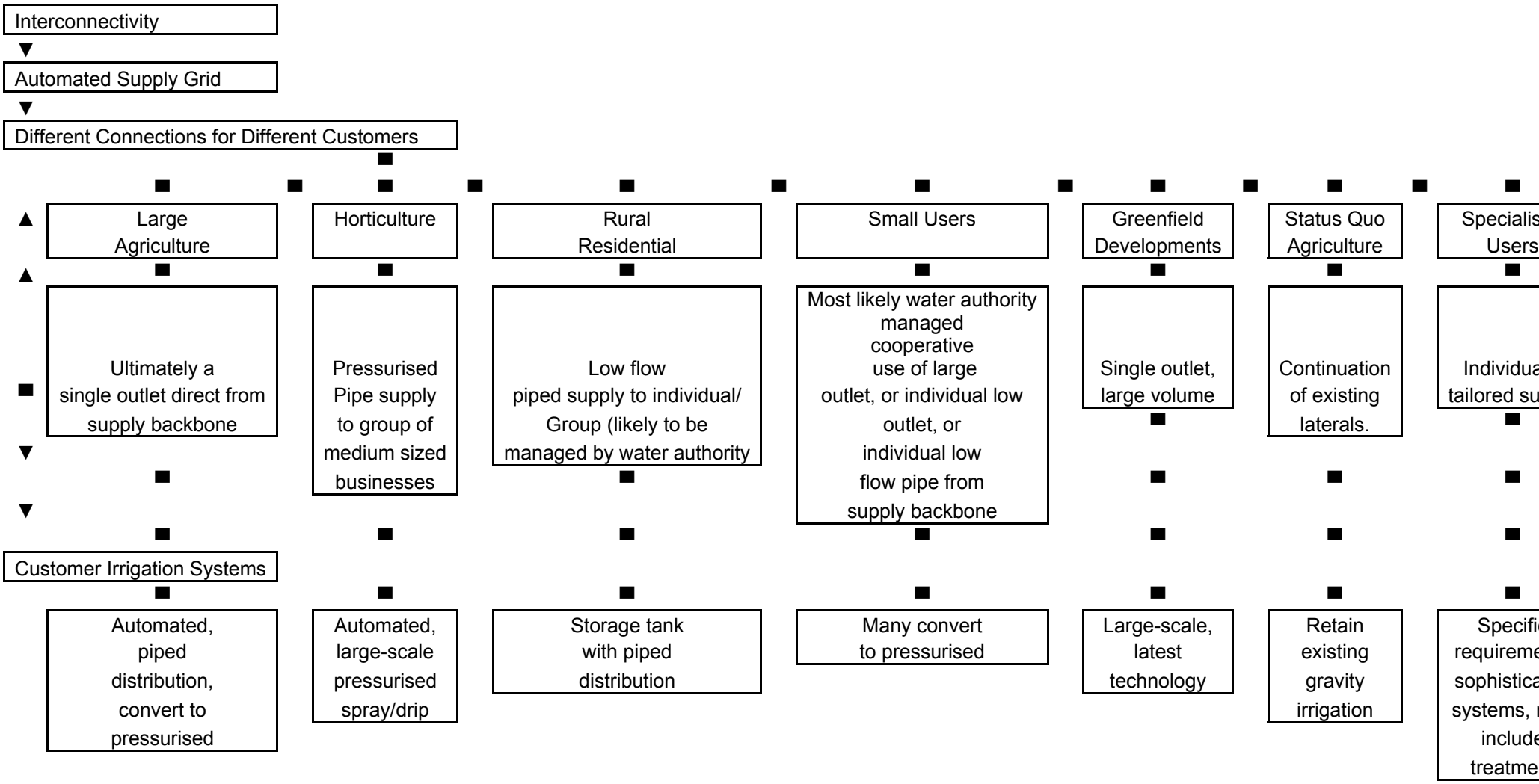
This backbone will be fully automated so that it can continue to be relied upon to provide efficient bulk water services with real time ordering and shut–down, at low cost. Strategic extensions or alterations may be made to the current configuration of carriers/trunks to maximise efficiency or achieve access to prime development zones. The backbone may also extend to strategic lateral channels where demand demonstrates a need.

Key carrier channels will include:

- Yarrawonga Main
- Waranga to Lake Marmal (Boort) Main

- East Goulburn Main plus No. 12 to Nathalia
- Lake Meran Channel Boort
- Macorna Main plus trunk through to Swan Hill.

Figure 4-3 Key Components



Key trunk channels

Approximately 15 – 30 trunk channels will be fully automated (generally >10 GL/d capacity).

Strategic Laterals

Strategic lateral channels (5-10 GL/d capacity) will also be fully automated. The extent of these will depend upon the exact location of the public/private interface in the supply system. The location will evolve over time, according to the criteria and customer needs.

7.4 Component 3: Different Connections for Different Customers

7.4.1 Connection Methods

There will be various methods for connecting the different customer groups to the automated supply backbone. These customer connections are outlined below and show how all-current customers are included in the modernised system.

7.4.2 Connection Type 1: Large Volume Agricultural Users

This connection option is targeted to the long-term stable growing agricultural businesses in the region. This will include dairy, horticultural and mixed (cropping/grazing) properties.

As farms continue to grow in size, there will be greater potential for direct connection of large properties to the main carrier and trunk channels. This will provide a single supply point for large users enabling greater control of water use and simplified on-farm automation.

Initially 1,000 businesses will be targeted. This is approximately 10% of the total customer base and 1/3rd of the existing irrigation businesses.

Ultimately there could be 1,500 - 2,000 businesses (the majority of future irrigation businesses) using approximately 1,100 GL (more than 70% of total water use) direct from the supply backbone with fully automated, large capacity outlets (2.5 GL/day). In total there may need to be 3,000 - 5,000 automated gravity outlets.

7.4.3 Connection Type 2: Piped Supply to Horticulture

There are a number of intensive horticultural areas across the GMID comprising small to medium sized properties. A piped supply (possibly pressurised) will be provided to 3 - 4 of these areas from the supply backbone because:

- They contain well-drained, highly productive sandy soils. As such the delivery channels tend to leak more readily and a piped supply would improve efficiency.
- Horticultural properties generally have pressurised on-farm irrigation systems. A piped supply will provide an improved level of service.
- Horticultural businesses tend to be smaller than dairy or grazing due to higher value production per unit area. They are less likely to have sufficient scale to enable direct access to the supply backbone.

Possible locations include:

- Cobram

- Ardmona
- Kangaroo lake
- Swan Hill

7.4.4 Connection Type 3: Piped Rural Residential Supply

A number of rural residential (domestic and stock type) supplies will be piped in a similar fashion to the Tungamah district scheme. This will provide an efficient, year-round water supply service for customers who use <2 GL per annum. These customers currently number 5000 and make up 40 – 50% of the total customers supplied in the GMID, but use only a small portion of the water.

The piped systems will be a combination of:

- Extensions to the horticulture systems discussed in section 4.4.2
- Authority operated schemes – up to 25 schemes mainly around urban areas;
- Small (3 – 4 property) co-operative schemes;
- Numerous individual schemes.

Due to different needs of water quality, period of supply and relative costs, more work is required to clarify how these options might unfold. However, it is expected these systems will connect direct to the backbone or involve extensions of urban supplies.

7.4.5 Connection Type 4: Small Volume Users (Part-time Irrigators)

Currently there are 3,000 customers who use small volumes (2 – 10 GL) of water for irrigation. With the exception of a few niche enterprises, these users can be classified as hobby, lifestyle or part-time (income supplemented) properties.

These properties may either have:

- Direct access to carriers/trunks via a low flow pipe (20 – 30 l/sec, which would require owner to pump).
- Access via a co-operative of properties that utilises one large outlet at the backbone. These are likely to remain under the water authority management.

The lower flow will be designed for pressurised application or to fill an on-site storage.

7.4.6 Connection Type 5: Greenfield Developments

In some areas there will be large-scale property restructuring to create a greenfield type opportunity that may need new infrastructure to meet investor's requirements. This will be similar to the real greenfield developments that are likely to occur at the edges of the existing network.

Prime development zones could include:

- Kerang Lakes
- Mallee fringe
- Yarrawonga
- Colbinabbin

Each of these schemes will need a single outlet, high volume supply (>2.5GL/d) for each business direct from the backbone.

There are also many Greenfield developments within the existing area e.g. dairy moving/expending onto mixed farms in the Murray Valley and horticulture moving/expanding to dairy/mixed farms in Central Goulburn.

7.4.7 Connection Type 6: Continuation of Existing Lateral Channels

Despite the overall modernisation of the system, there will be some areas that continue to use the existing infrastructure. This is likely to occur in less intensive broad acre regions.

Over time many of these systems are expected to:

- Convert to individual direct supplies from the backbone as properties are joined to create larger farms; or
- Be abandoned, with water shifting to growing businesses or prime development zones; or
- Convert to a small volume or rural residential piped supply connection.

In the short term the authority will operate these smaller channels as they do currently, but they will be considered sub-systems separate to the automated backbone and be subjected to a different tariff.

Continued operation of existing lateral channels is likely to remain in public hands (unless a group preferred to own and manage it themselves).

Ultimately individuals or groups of customers are expected to take-over and operate existing lateral channels.

The operation efficiency of these channels will depend, to some extent, on the users (what they are prepared to pay for). However, the supply point and metering is ultimately expected to occur at the off take point from the backbone, so that losses in the smaller channels can be accounted for and passed on to the end users (after a reasonable transition and at a realistic financial value).

There will not be new individual meters in the retained laterals. Existing dethridge wheels will be used to apportion water amongst individuals.

7.4.8 Connection Type 7: Specialised Users

There are a number of customers who use water for ‘specialist activities’ including food processing, hydroponics, intensive animal productive and so on. These users will have a connection individually tailored to their needs.

7.5 Component 4: Farm Systems

7.5.1 Farm System Type 1: Large Agriculture

The dairy/cropping/grazing users will develop more efficient irrigation systems. There will be a significant move toward:

- Pipe and riser distribution systems – particularly in permeable soils – ALL AREAS coloured YELLOW on soil maps are expected to be piped if they continue to be gravity irrigated.

- Automated gravity channels (only on less permeable soils i.e. green coloured on soils maps).
- Additional head requirements will be achieved by the most cost–effective method, to both customers and the water authority (strategic on-farm pumping or higher head in supply channels).
- Conversion to pressurised (buried drip but some centre-pivot/linear move) irrigation, particularly on the permeable soils (mapped yellow).

In all situations the systems are expected to have a minimum number of supply points, which simplifies on-farm automation and is consistent with decisions made by growing businesses to gain more control of their own water (and other resources).

Being large single supply points the need for rapidly varying supply rates will decrease as farmers will be irrigating for more of the time, with less stopping and starting. Farmers will then distribute that water according to farm demand. While this is difficult to accept by many, the move to fewer outlets to allow more on-farm control of water is expected to increase over the coming years.

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The connection with the authority system will be sophisticated ordering – real-time water on demand. The private and authority systems will operate separately but with a single point of interaction.

7.5.2 Farm System Type 2: Horticulture

On horticulture farms the irrigation systems are already significantly pressurised however it is expected that:

- all flood systems will disappear
- the farm irrigation systems will be larger, automatic and operated to meet plant water demand
- there will be sophisticated ordering/real time water on demand connection between the farm and the authority system.

In most cases “pressurisation” will be undertaken by the landholder (except where there are authority managed or private group piped systems (refer to 4.4.2).

7.5.3 Farm System Type 3: Rural Residential Users

A large number of small (<2 GL/annum) users currently utilise a range of systems from efficient pressurised systems with/without storage to “wild flooding”. Most of the water is used for garden or amenity.

A piped supply will be associated with these users having an on-site small storage tank and pumping water around the property as required. All on–site distribution will be piped.

It will be up to users as to the service they are prepared to pay for, but the ‘norm’ is expected to be untreated channel water without guaranteed 365day delivery.

7.5.4 Farm System Type 4: Small Volume Users

There are a large number of users who (through no fault of theirs) flood irrigate small areas for lifestyle/supplementary income. Typically they utilise 2 – 10 GL per annum, but sometimes up to 20 GL.

Many of these users will convert to a pressurised farm system with either individual direct access to the supply backbone or jointly with others (most likely under water authority management).

These low volume water users will have water on demand once they convert to a piped connection to the backbone.

Alternatively, they will remain on their existing supply channel (see 4.5.6).

7.5.5 Farm System Type 5: Greenfield Developments

There will be a number of external investment-driven, large greenfield developments taking large volumes of water from a single point (eg. (eg. Timbercorp's Boort based olive operation).

Ten such investments could use 2,000 GL each – i.e. using as much as the proposed Shepparton East pipeline. These systems will be pressurised irrigation utilising the latest technology.

7.5.6 Farm System Type 6: Agricultural Users – Status-Quo

Realistically, not all irrigators will move to a modern farm system. Whilst policy decisions will aim to encourage modernisation, some customers will retain their existing gravity irrigation (i.e. laser land with a reuse system but a manually operated farm channel system).

These properties will remain connected to the existing lateral system.

Most landholders in these systems will not change and will often be opportunistic irrigators (relying on traded water). Ultimately many of these landholders will sell their land and water separately.

There may be some areas where these systems will remain for a long time operating at a very low cost until they close.

7.5.7 Farm System Type 7: Specialised Users

The system will support and attract industries such as piggeries, food processing, hydroponics and so on. These users access moderate to large volumes of water – 30 GL or so.

Users within this group have very specific requirements and can be served directly from the supply backbone – just like the large agriculture/horticulture users.

They will be provided with year-round, on-demand supply.

Their in-house system will be sophisticated, piped and may involve on-site treatment.

8 Modernisation Process

8.1 General Approach

This project is about modernising the system to ensure/enable economic development of the region. Predicting the future is always fraught with danger. However not facilitating development or providing opportunity is inexcusable for a community.

Thus the Food Bowl vision is about:

- Setting up the framework for a viable irrigation based community well into the future; and
- Providing time and pathways for those who wish to evolve.

These can be considered as Stages 1 and 2 of the project, which are each explained in sections 5.2 and 5.3. This is followed in section 5.4 by discussion of some key tasks relating to implementation.

8.2 Stage 1 – Modernise supply backbone and develop different levels of service

8.2.1 Stage 1 – Proposed Works

Stage 1 will comprise the following works:

- Design and construct the modern real time backbone i.e.
  - network – just under half of existing channels (>5 GL/day) spread right across GMID.
  - automation – all remaining structures automated to provide real time control.
  - strategic measurement – all retained structures measured including off takes to "pods".
  - regulating structures - rationalised (5%) and upgraded as per current AMP.
  - outlets – rationalised (20% or more) various services, metering and flow control to be upgraded to meet industry standards.
  - other structures (bridges/culverts/syphons) – continue under current AMP for those not needing upgrading.
  - large regulators – limited works required.
  - channel remediation – target cost – effective areas for lining.
  - enhanced service – increase service levels (higher running level/strategic pumping/increased capacity) at strategic points around backbone where customer needs are clear and is cost-effective to do.
  - control system - radio controlled, computer-operated system.
- Develop and implement connection systems (25% of customers) to the backbone.
  - farm connections – upgraded single point automated access to the backbone (channel linings, piping, pumping increased flow/head) that is incorporated into the farm delivery system – approximately 400 businesses.
  - some farm modifications may be needed to make new connections workable (these should be included in the connection incentive package).

- D&S connections – piped supply to service rural/residential (single and multiple property systems) – approximately 1,600 connections.
- horticulture – two pressurised piped supply systems to two regions serving around 200 horticulturalists.
- supply rationalising – target excess infrastructure and rationalize supply to 1,700 customers, not cutting off, but streamlining supply.
- green fields – construct/upgrade four to six key channels to facilitate green field development.
- specialty users – identify and facilitate six specialty users and connect to backbone.

8.2.2 Costs for Stage 1

The estimated works and costs for Stage 1 (based on the available information and assumptions) are:

	Total ($mill)	**07/08 ($mill)**	**08/09 ($mill)**	**09/10 ($mill)**	**10/11 ($mill)**	**11/12 ($mill)**
Backbone						
Automation & metering	350	2	50	150	100	48
Channel remediation	150				50	100
Enhanced service	100			30	30	40
Connections						
Farm connections	100	2	10	30	30	28
D&S connections	100	2	10	10	38	40
Horticulture	50	2	20	13	15	
Supply rationalising	100	10	20	25	25	20
Green Fields	40	2	10	10	10	8
Specialty users	10	1	2	2	2	3
Total	**1,000**	**21**	**122**	**270**	**300**	**287**

8.2.3 Savings

Savings have been calculated based on existing losses, which have been estimated based on long-term deliveries of 2,000GL, rounded off with a system efficiency of 70%. These are shown as follows:

Existing Losses

Source of losses	Losses (GL)
Outfalls	100
System filling (net)	25
Evaporation	68
Seepage	100
Leakage	270
Source of losses	Losses (GL)
Metering	200
Torrumbarry natural carriers	68

Various other sources	19
Total	**850**

These figures show an indicative loss through seepage/leaks and evaporation of 7 GL per km of channel.

The potential supply system savings are estimated (based on the available information and assumptions) as follows:

Estimated Savings (Stage 1)

	Total Savings (GL)	**Seepage & Leaks (GL)**	**Meter (GL)**	**Outfalls (GL)**
Backbone	**144**	**34**	**50**	**60**
Connections	**81**	**45**	**31**	**5**
Total	**225**	**79**	**81**	**65**

There are inherent difficulties in savings calculations depending on the starting point and finish points (Note that these are estimates and are not to be used to audit savings against. Audits of savings will require measurement and comparison of pre and post project savings).

Aside from pre-modernisation commitments or any statutory requirements, meter replacement will occur as part of the works on a particular area of the system. Unrelated meters will not be targeted under this project for replacement across the system.

The capture of the losses is expected to follow the works and expenditure – the losses become available at best the following year.

In addition the farm savings need to be estimated.

The technical reference committee (recommended below) will need to formulate a basis for developing the savings.

8.2.4 Criteria

The proposed works will need to be undertaken in accordance with some explicit and agreed criteria in order to meet the outcomes and accord with the principles.

Some of the key areas that criteria will need to address are:

- the location and extent of channel backbone (consider capacity share, current use, enterprise, opportunities for growth, ensure adequate spread).
- the type of meters and associated flow rates.
- economic basis for remediation works for the backbone (ensure cost competitive products for customers).
- how and where to deliver an enhanced service or the backbone.
- service levels for each customer groups.
- Incentives for connection to the backbone.

To assist in developing these criteria a technical reference committee is required (comprising "expert" nominees and some representation from the Modernisation Sub-committee).

8.2.5 Stage 1 Key Tasks

In order to implement the works there are a number of key tasks that will need to be done.

- appoint a technical reference committee.
- develop the criteria for the backbone design and customer connections.
- develop a decision-making and customer engagement process that incorporates relevant existing processes and can be analysed and adjusted on implementation progresses.
- design and construct the backbone.
- develop a database (or other method to understand) based on customer group and business scale in order to target customers.
- develop the different customer connection options and provide working examples of each option to use as demonstrations.
- develop the basis for modernisation incentives that ensure decisions are sensible for individuals to connect to the backbone.
- identify the potential growth areas – e.g. prime development zones, along interconnectors.
- support the design and construction connections by those who wish to change.
- establish the technical basis for savings/loss calculation and monitor.
- develop appropriate extension and community education programs.
- set in place the policies (tariffs etc) to provide certainty (understanding that the modeling of costs and tariffs will need to be regularly reviewed as the project unfolds).

8.3 Modernise farm systems and customer connections together

Engaging with Customers

To ensure modernisation occurs on the farm side as well as in the supply system there will need to be:

- Involvement of existing processes (e.g. reconfiguration groups) to enhance the synergies between the supply upgrade and farm upgrades;
- An extension program to show/demonstrate what is possible both on farm (on-site in case of rural residential customers) and when connecting to the supply backbone. This element is a Department of Primary Industries function and could be achieved by reigniting the intent of the NewStream proposal;
- Involvement of the local irrigation surveyors and designers (rather than generalist engineering firms) needed for feasibility design work to determine the connection and farm options. The local designers understand on-farm requirements and the integration with the supply system, and are likely to develop more cost-effective systems;
- Early implementation of the connections are needed to demonstrate the options and to "fine-tune" the details and provide ideas/knowledge for farmers;

- Workshops to get all of those involved (G-MW, DPI, customers) to agree on the concepts and the vision;
- Explore the potential to involve urban water authorities (Goulburn Valley Water, Lower Murray Water, Coliban Water) in the peri-urban and rural residential options.
- Programs that encourage farm irrigation upgrades at the same time that new connections are being considered for the farmers (this will mean extension programs and incentives where appropriate) to capture the synergies between the two parts of the system.

8.4 Stage 2 – Modernise farm systems and customer connections together

Stage 2 Completion of Modernisation

Stage 2 will see the completion of the customer connections. In addition there will be considerable on-farm works to achieve improved farm efficiencies.

Realising the full potential of Stage 2 is only possible by the successful completion of Stage 1. Whilst Stage 1 will realize direct savings, there will be substantial indirect savings with Stage 1, which will be realised as, and when Stage 2 proceeds.

It is estimated that a further 271 GL of infrastructure savings will occur under Stage 2 (137 GL seepage/leaks, 15 GL outfalls and 119 GL meter error). In addition farm efficiencies will generate similar savings on the farm side.

Assuming similar costs as Stage 1 then this is estimated to cost a further $1.2 billion.

As stated under section 3.7, “Stage 2 funding is expected to come from the Federal Government, which has a number of large programs consistent with the Food Bowl Modernisation Project. As the GMID is a major irrigation system with the potential for substantial benefits from investment, people should have confidence that the funds for Stage 2 will be found.”

8.5 Policies

8.5.1 Market Driven Response

The Food Bowl vision involves regional development and creating opportunity for agricultural businesses. It is not about forcing people – it is about choices, based on services and their costs. Therefore policies must be set in place to send the right market signals that truly reflect the economic, social and environmental aspects of irrigation.

The current ‘postage-stamp’ approach to charging per ML of water, and socialising the losses, discourages change. Movement to a more cost ‘reflective’ charging and allocation policy, that maintains choice, but rewards efficiencies, is required.

For example the current infrastructure costs are primarily related to the number of outlets. However, while the current tariff is to some extent outlet based it provides little benefit to the landholder from reducing outlets. The losses occur predominantly in the small channels and are associated with numerous low volume outlets scattered all over properties. The current system of socialising losses does not send a strong enough signal to the inefficient areas about the need to change.

Changing policies has the potential to create perceptions of “winners and losers”. Therefore a key component will be assistance to perceived losers to maintain social equity and social cohesion, including giving them time to adjust.

8.5.2 Tariffs/Allocations

Background

The existing system of charging is based primarily on:

- Separate infrastructure, headworks and delivery charges;
- Calculations that reflects MLs used or able to be used;
- A “postage” stamp philosophy within 6 regions, but differences between regions;
- One level of service.

Similarly the allocations are based upon everyone sharing the system losses proportionally regardless of where the property is located.

A modern efficient system with a number of service standards and different locations will require a new efficient tariff and allocation system.

Tariff

Both the infrastructure charge and operating charges will have a common supply backbone component and a specific connection component.

The majority of the tariff will change to a “per outlet” charge reflecting the true cost of supply. This is critical to reward those who change and to encourage change.

Further each of the connection systems will have different tariffs.

An obvious first task is to calculate the cost of the supply backbone, including options (i.e. how many key laterals are upgraded and automated). This sets the framework cost. The second costing is to look at some representative customer connection costs and farm development costs to obtain region wide estimates.

Clearly those businesses that use large volumes with direct single point access from the supply backbone will have the lowest water supply tariff, but costs will be transferred on-farm.

Those businesses that retain old networks will pay for their maintenance.

Those customers that choose a piped supply will pay for the upgraded infrastructure.

The injection of money for savings provides the ability to offer incentives for those who wish to change.

It is noted that tariff change is complex with the need, among other things, to meet the needs of the Essential Services Commission in setting fair prices for services and meeting interstate trade agreements (controlled by the ACCC) to ensure there are no distortions to the market based on tariffs. However, tariff development is of the highest priority in the modernisation program.

Allocation of losses

The current system of socialising losses throughout the system and providing a consistent allocation at each supply point will evolve (eventually) into a system of losses being targeted to sub-systems off the backbone, ultimately (over a decade or so) becoming the

responsibility of the sub-system. Where this occurs, there needs to be a payment to the irrigators for the ML of losses transferred.

This is essential to ensure responsibility for losses. However, it is likely to cause social inequities if implemented immediately or without the appropriate financial incentive to change. Rather it is desirable to encourage people to shift to efficient systems (via incentives) and to monitor those who remain. A clear amnesty of say 5-10 years is required.

9 Modernisation Outcomes

9.1 Regional Economic Development

9.1.1 General

The main planks of regional economic development associated with water are:

- Volume of water used (keeping water in the area by making it an attractive place to do business);
- Productive value of water used (encouraging high value activities);
- Viable growing agricultural businesses (infrastructure allows this i.e. competitive water cost and choice of service level facilitates it);
- Water delivery products encourage value-adding within region;
- Industries that provide value-adding are facilitated;
- Secondary uses such as amenity living are provided for, to ensure a social fabric is maintained.

9.1.2 Enterprises

The irrigation system will be the best cost – effective modern integrated system allowing flexibility, growth and efficiency. Because of this, the "FOOD BOWL" will be retained which will comprise:

- Horticulture – increased area and production per unit area of a large range of crops.
- Dairy – will remain the dominant water user but the farm systems will be very different.
- Mixed farms – will grow totally new higher value crops.
- Rural residential living with very high amenity to provide a social fabric.
- Large Greenfield investments.
- Specialist industry type users.
- Residual low-value, low cost opportunistic users.
- Small hobby users.

One scenario for these enterprises is explored below. Trying to predict the future is fraught with danger. The Modernisation Sub-committee uses this scenario to illustrate how things could change, not to say this is the only outcome that the future could hold.

There is no doubt that all enterprises must continue to increase their productivity (produce more with less). For the region, the mantra of "double production from half the water" becomes the aspirational goal that is conceivable with top current management and systems, but remains a challenge to achieve across the board. Each of the following enterprises will contribute to this pursuit in its own way.

Horticulture

The current number of businesses is expected to remain at around 500, but the land area could double along with farm water use. Properties could be larger and will likely concentrate on the best soils.

To survive, the canning crops will likely have to find ways of “mechanising” those activities that currently require high labour input.

Therefore, the enterprises will most likely rely less on canning crops and be a wider mix

The shifting of water to horticulture invariably increases production using less water.

Dairy

The number of dairy businesses will most likely continue to decline but produce more milk. Farms will likely increase from the current 200 cow average to say 400 cows.

The farming systems may have less pasture and be more “cut & carry” systems using higher productivity species such as lucerne and maize.

They will should easily achieve their productivity goal.

The growing businesses will most likely be a combination of these:

- Consolidating from the existing home base, and
- Taking over existing broad acre mixed farms.

Mixed farms

A small number of specialist mixed-farms may grow high value crops such as ethanol, seed crops and so on. Some will supply the feed to the dairy industry. These properties may utilise “buried drip” and row cropping to increase their production from each unit of water.

Greenfield investments

Approximately 10 – 20 “Greenfield” investments will develop either:

- In the prime-development zones; or
- By restructuring land and re-packaging into large operations.

These investments could utilise finance from ‘silent’ investors such as superannuation funds. These businesses could be dairy, horticulture, or something else; they could be on the edge of the existing irrigated district or an unirrigated part within; or could be a change of enterprise of an existing irrigated property (eg. a mixed farm becoming a Greenfield site for a dairy business).

Rural residential living

There will be large numbers of rural residential properties (who use in total <2 GL) scattered throughout the region. These properties are critical to the social fabric of the region and a service must be provided to suit their needs.

The number of these properties will expand from the current 5,000 to maybe 7,500 or more.

The location of any new properties will be well planned in accordance with updated council planning schemes. A program is currently underway to review the rural land use planning, with a key objective being the protection of productive agricultural land. The Modernisation program supports the initiative undertaken by Local Government in the region to use the farm zone to better protect the areas likely to be needed for business growth.

It is possible that a ‘no further housing’ approach will be granted where business growth is likely.

Specialist industry

The region is well suited to any number of specialist industry users that “value-add” to water.

These include, but are not limited to:

- piggeries
- poultry
- food processing
- hydroponics

The number could treble to an estimated 200 using 1,000 GL and will be attracted to the region by the modern infrastructure.

In addition many rural towns take their supplies from the backbone.

Residual low-value opportunistic agriculture

There are vast areas of land, which will not be required for the above enterprises.

There will always be a number of businesses that capitalise on utilising old infrastructure and water opportunistically. Whilst policy decisions are likely to discourage most of these over time, some will inevitably remain in the short to medium term.

These low value, low input agricultural businesses will be located mainly in the heavier, less permeable soils.

In the short-term a number of current businesses in low value grazing will also continue but inevitably decline. It is likely that 500 properties could remain across the GMID using old infrastructure.

Small users – hobby/lifestyle properties

There will be a number of properties that utilise 2 – 10 GL for hobby/lifestyle purposes. Whilst policy decisions are likely to discourage most of these over time, those that are willing to upgrade to efficient systems and able to pay the necessary tariff will continue to exist.

Several of the current small users are likely to shift to a rural residential type supply.

9.1.3. Economic Output from Agriculture

The table below summarises the estimated agricultural output following modernisation.

Table 9-1 Estimates of Future Water Use and Agricultural Production

	No. Businesses	% Businesses	Water delivered (GL)	% Water delivered	GVAP[1] ($million)	% GVAP
Dairy	1,000	9%	800	43%	1,200	41%
Horticulture	540	5%	280	15%	701	24%
Greenfield	20	0.2%	250	16%	855	29%
Mixed	200	2%	300	13%	125	4%
Specialist	200	2%	10	1%	?	
Small Users	1,000	9%	85	4%	6	0.2%
Residual Opportunistic	500	5%	100	5%	25	1%
Rural Residential	7,500	68%	45,	2%		
Total	**10,960**	**100%**	**1,870**	**100%**	**2,912**	**100%**

1. GVAP – Gross Value of Agricultural Production

Assumptions made in Table 9-1:

- The number of businesses, level of production and water use for each enterprise type is in line with the discussions in Section 9.1.2 and is the scenario used by the Food Bowl as a vision for the area (it is recognised that other scenarios could result).
- Water use figures are based on deliveries to the farm gate.
- Total water deliveries (termed use in this table) decrease by approximately 100 GL. This assumes;
  - An increase in farm efficiency to 85% (which would decrease current water use by ~370GL).
  - That 50% of these savings are retained by farmers for use in increased production (so decrease is only 185 GL – based on 50% split with federal funding).
  - 75GL of the supply system savings are provided to farmers as part of the $1 billion Stage 1 funding arrangement.
  - About half the dairy feed would be sourced off-farm – from mixed farm irrigators or dryland (if dairy farmers retained control over more of this feed, they would use more water directly).
- Farming systems will change over time (recognising many people don't agree that they will).

Table 9-2 provides a comparison with the current situation.

Table 9-2 Current vs Future Output

Industry	No. Customers		Water Delivered (GL)		GVAP ($million)	
	Current	Future	Current	Future	Current	Future
Dairy	1,820	1,000	1,065	800	800	1,200
Horticulture	539	540	140	280	351	701
Greenfield		20		250		855
Mixed	550	200	465	300	107	125
Specialist		200		10		
Small Users	3,094	1,000	280	85	20	6
Residual Opportunistic		500		100		25
Rural Residential	4,933	7,500	30	45,		
Total	**10,936**	**10,960**	**1,980**	**1870**	**1,278**	**2,912**

9.1.4 Value-Adding

The GMID has a large number of industries that value-add to the products produced on-farm.

In horticulture there are numerous packing sheds for fresh fruit, SPC-Ardmona and Henry Jones Foods (IXL) for fruit manufacturing, Cedenco and Heinz Watties for processing tomatoes, wineries, and niche industries.

Six large manufacturing plants, and considerable milk packaging for domestic consumption support the dairy industry. Companies such as Murray Goulburn, Fonterra, Kraft, Tatura Milk and Nestlé provide this value adding.

Abattoirs support the meat industry, and the grains industry by stock feed manufacturing, oilseeds and milling.

These industries – horticulture, dairy, meat and grain – provide the basis for employment in the region.

Identifying the economic output of value adding is complicated. Economic activity multipliers have been used here to provide an estimate. The multipliers have been sourced from CRC for Irrigation Futures Technical Report No. 03/05, *The Irrigation Industry in the Murray and Murrumbidgee Basins*, Wayne S. Meyer, June 2005. This report provides economic multipliers on a sub regional basis. The Goulburn Broken region multipliers were applied to the whole of the GMID.

Table 9-3 Value Added to Primary Agricultural Production ($ million)

Industry	Estimated Value Farm Gate Production	Associated "Upstream" Economic Activity	Associated "Downstream" Economic Activity	Total Economic Activity
Dairy	1,200	1,920	2,880	**6,000**
Horticulture	1,556	2,490	2,801	**6,847**
Mixed	125	200	263	**588**

Notes to Table 9-3:

1. Farm gate value for horticulture includes Greenfield customers listed in Table 9.1.
2. “Upstream” activity is off farm economic activity that provides goods and services to agriculture;

3. “Downstream” activity includes processing and distribution activities.
4. Upstream economic activity for horticulture is the average of fruit, grapes and other horticulture.
5. Downstream economic activity for horticulture is the average of fruit processing, tomatoes (proc), vegetable processing and wine.
6. Upstream economic activity for mixed farming is the average of cereal crops, hay/seed and grazing.
7. Downstream economic activity for mixed farming is based on meat processing.
8. In the interest of brevity, the above table assumes that all greenfield sites are developed into horticulture. This will most likely not be the case.

9.2 Social Change

Communities associated with irrigation are under constant change. Recently these changes have been exacerbated by drought.

Essentially changes under the Modernisation program are part of this continuum. The rate of change over time may speed up or slow down.

However, it is critical that the individual is central to any change that physically impacts on their business.

The new entity should build space into the program to explore new/improved ways of preparing people for, and involving them in, the opportunities created (therefore helping people manage change).

9.3 System Efficiencies – Saved Water

9.3.1 Storage to Plant – An Integrated Approach

The Food Bowl modernisation is focused on developing an irrigation system that adds value to water. To do this requires getting water to the growing plant/crop efficiently and effectively.

It is not just about minimising losses as cheaply as possible in the channel supply.

Rather, the focus is on:

- Firstly, maximising plant growth and providing the right amount of water, at the right time, at the right place efficiently. Both in terms of water used and $ spent;
- Secondly, ensuring the businesses growing the plants are viable 'growing' businesses; and
- Thirdly, the system that delivers water from the storage to the farm is efficient and cost competitive.

To do this requires an integrated approach that starts with the needs of the plant and the businesses.

9.3.2 Target the Bulk Water Users but Accommodate All

The system must focus primarily on the 1,500, or 20% of customers, that use 70% of the water and produce 80% of the economic output. The efficiencies start with optimising the performance of these large agricultural users. Clearly making sure the bulk of the water is used efficiently will get the best 'bang for the buck' or will add the most value to the most water.

However, there are a myriad of customers who use small volumes of water. Supplying these customers is critical in maintaining the social fabric and providing a labour force in the region. The Food Bowl proposal identifies the need to provide an alternative efficient piped system for the peri-urban or rural residential properties and encourages all customers to identify how they would prefer to be supplied with water.

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9.3.3 Components for Efficiency

The irrigation system will be fully integrated from the storage to the plant to maximise the system efficiencies and minimise losses. The key components for efficiency will be:

- A backbone of large channels with fully automated structures (minimum head supplemented with strategic farm pumping);
- A minimum number of automated outlet structures;
- A farm delivery system which will be a combination of
    a. piped/automatic channel farm delivery systems (computer controlled) for agricultural properties
    b. piped laterals supplying small-medium horticulture properties on demand
    c. piped rural residential supply
- Associated irrigation systems;

a) agriculture: buried drip, centre pivots and where applicable efficient large flow gravity systems

b) horticulture: all pressurised (micro-sprinklers/drip)

c) rural residential: pressurised (sprinklers)

- Appropriate irrigation scheduling.

Because the infrastructure will be "responsive" and water will be supplied almost on demand, the latest irrigation scheduling techniques will be able to be utilised.

9.3.4 Efficiencies Achieved

Efficiencies will generally change from:

70 : 70 – i.e. 70% delivery system and 70% farm system

to

85 : 85 – i.e. 85% delivery and 85% farm

The associated losses are illustrated in the following table (these numbers change depending on the assumptions used).

Table 9-4 Current and Future Efficiencies

	Average Inflows/ Diversions (GL)	**Delivery Efficiency * %**	**Delivery Losses (GL)**	**Average Deliveries (GL)**	**Farm Efficiency ~ %**	**Farm Losses (GL)**	**Plant Use (GL)**
Current System	2,850	70%	850	2,000	70%	600	1,400
Future Modernised System	2,353	85%	353	2,000#	85%	300	1,700#
Savings (GL)			**496**			**300**	

(Note that these are estimates and are not to be used to audit savings against. Audits of savings will require measurement and comparison of pre and post project savings).

* amount of water delivered onto farms as a percentage of the water released into the delivery system

~ amount of water estimated to be retained in the rootzone and used by the plant as a percentage of water delivered to the farm

Assumptions made in Table 9-4 include:

- Figures for the current system are based on average long-term inflows available to the GMID as outlined in *Long-Term System Modelling*, DSE, 2007;
- A commonly accepted approximation of 70% is used for both the current delivery and farm efficiencies;
- In reality the quantum of farmer deliveries and plant use in the future (#) will be determined by:
  - the savings in any given year will be calculated based on the gigalitres delivered in that year

- future net trading in/out of the region
- allocations
- the proportion of connection savings from Stage 2 that go to the farmers and
- the proportion of farmer savings that go to farmers (dependent on who pays).

9.3.5 Losses and Saved Water

Calculating Saved Water

It is difficult to determine where losses occur in the current system due to a number of factors:

- To date losses have been thought of separately for the channel system and the farm system. This has fuelled debate about "meter" error and whether these discrepancies are losses or not.
- There are large unaccounted for losses in the channel system.
- On the farm side, some of the losses are reused downstream and some are pumped as groundwater.
- Similarly the channel outfalls from one district become part of the water supply for a downstream district or benefit intermediate wetlands or irrigators.

Much wasted effort can go into calculating the losses "saved" as a result of particular works. The Food Bowl proposal is not only about chasing the current losses. Rather it is about "modernising" the system (from storage to plant) to ensure minimal future losses. The difference between the new and the current is SAVED WATER.

When the whole system is modernised then the saved water could represent more than 800 GL (less some unknown amount that is currently de-facto recycling through drainage outfall reuse downstream).

A robust, well explained methodology with an agreed starting point is needed early on to show how losses will be accounted for.

Confidence in the Proposal

If the system is modernised according to the Food Bowl proposal the required efficiencies will be achieved.

Some of the works proposed would have immediate impact on improving efficiencies, whereas others will seemingly have no impact until well into the future. Worrying about determining this in advance will end up with poor decisions being made about which parts of the system to modernise.

The Food Bowl project is about systematically putting in place a modern system across the region.

It may appear to some to be a leap in faith, but ultimately the only certainty in achieving 85:85 efficiencies is to implement an integrated modern system across the whole GMID.

Auditing Savings

Despite the previous comments about losses, it is fundamental – from a Government, community and landholder perspective – that the savings are measured and audited.

Because we have difficulty knowing where we are now (due to inaccurate measurement) this will not be an exact science. However a rigorous approach that is transparent will need to be adopted.

It is expected that annual business planning and reporting cycles for the managing entity will include projected targets for water savings and reporting on their realisation.

9.3.6 From Reconfiguration to Modernisation

Changing the Focus

The current reconfiguration process within irrigation districts has been an extremely valuable exercise in identifying inefficiencies and losses. However, whilst some tidying up of laterals/spurs/structures is inevitable this should be a by-product of the main game.

The main game is developing the supply backbone, creating opportunities for modern farm systems, assisting those who want to modernise, and providing alternative supplies for small users.

Aligning Programs

Due to the advanced nature and alternative funding sources of the Reconfiguration program, some activities are well down the track.

It would be appropriate that existing upgrading of parts of Shepparton and Central Goulburn that are currently underway with planning and implementation meet the principles of this Modernisation program so that those irrigators involved are not disadvantaged in the future.

9.3.7 Aspects of Modernisation that Improve Efficiencies

Meters

Accurate metering is absolutely essential to a modernised system. There is however no point in installing accurate meters in supply points that will not be part of the future modern system.

New meters will be installed at all off-takes from the supply backbone. This includes all individual outlets and supply to existing channel laterals. These meters will be fully automated and accurate.

In addition any new piped horticulture or rural residential supply system will have new “appropriately sized” meters for individual customers.

This will enable:

- All those properties connected to the modern system to be accurately and individually metered.
- Those properties in the remaining pods to be accurately metered collectively at the off-take from the supply backbone to clearly identify losses in the remaining laterals. Existing dethridge meters can be recalibrated from the new supply backbone meters over time.

The perceived savings in the distribution system that result from meter error is really passing the loss over to the landholder side of the equation. This is recognised in the

funding provided for Stage 1 of the project, as 1/3rd of the losses will be returned to the irrigator.

Channel Outfalls

Some districts (eg. Pyramid-Boort and the Barr Creek Catchment) have dramatically reduced outfalls. Others (eg. Shepparton) have significant outfalls.

The rationalising, metering and automation of channels is essential and fundamental to the system. Direct real time monitoring will reduce outfalls to a minimum.

Whether outfall losses are real or not (some become part of the downstream supply), a modern system will provide total control and thus maximise efficiency.

As there is expected to be much less drainage water in future, the tariff review needs to include drainage diversion licences and how drainage water is paid for.

Gravity Outlets

In the G-MW channel system, every gravity outlet is a potential source of losses. The modern system will have 20 – 25% only of the number of gravity outlets. This will be a major contributor to improved overall system efficiency. The outlets for the agricultural users will all be large (2.5 GL/d) and will provide constant flow. Reducing outlets on-farm is a key driver in achieving efficiencies. The same benefits will occur with the modernisation of the delivery system.

The implementation of 'laser-grading' and 'whole farm plans' has demonstrated the effect of farm channel outlets on water efficiency. Reducing on-farm outlets by 10 – 20 fold was a key factor in laser grading enhancing efficiencies.

Supply Levels

Running channels at relatively high heads to enable gravity irrigation of small areas of high land may be a thing of the past in some places.

Lower running levels will improve the channel efficiencies, but comes at a cost to provide the alternative head. The most cost-effective solution between running high channel head and specific on-farm low head pumps to create the head required could become the local solution. This will improve integration between the delivery and farm systems. Any service changes in this way need corresponding cost adjustments between the public and private systems.

Channel Lining

Channel lining is a very expensive operation, and whilst necessary at times, the modern system will not need a lot of channel lining because the focus will be on:

- Removing/replacing small channels in permeable soils with piped on-farm delivery;
- Installing piped horticulture supplies (always in permeable soils);
- Encouraging the switch to horticulture and associated piped farm systems in permeable soil areas;
- Maintaining large through flow volumes in channels that intersect permeable soils, i.e. minimise loss as a percent of the volume;
- If necessary relocating main channels to bypass permeable soils.

In some remaining areas where seepage is relatively large, the cost of lining will be measured against the water saved and implemented where appropriate.

Permeable soils

The largest on-farm losses occur with gravity irrigation of perennial/annual pasture on permeable soils, particularly dairy farms.

The modernisation will focus on converting the gravity pasture irrigation in these areas (coloured yellow on the soil map, or class I & II) to:

- Horticulture
- Pipe & riser delivery systems
- Buried drip irrigation
- Lucerne (deep rooted perennial)

Best practice gravity systems

On medium permeability soils (green coloured on soil map, or class III & IV) gravity pasture irrigation will remain to a large degree and will be relatively efficient.

These systems will be upgraded and be more efficient through:

- Larger constant flow outlets.
- Strategic pumps for re-use, distribution and increased head.
- Automatic channels (computer controlled).
- Fully integrated re-use systems.

Small Users

The supply to small users will be piped and at a rate that does not facilitate gravity irrigation to encourage more efficient systems to be installed.

Greenfield Developments

The modern supply backbone system will facilitate greenfield developments, which will utilise the latest technology and achieve maximum efficiencies.

Assist Those Who Want to Modernise

The best efficiencies will come from working with those who want to modernise.

At the same time, it is ineffective to provide modern outlets to those properties with aging infrastructure.

The implementation of an enhanced delivery system needs to be coupled with new farm plans demonstrating ‘modernisation’ on-farm.

Transfer Water to Efficient Users

The Food Bowl vision involves ‘growing businesses’ (existing and new). It is these businesses that adopt efficient and new technologies. Growing businesses will seek and trade water, which will come from the businesses with the inefficient or aging infrastructure.

The very act of transferring water increases efficiency dramatically. In fact the conversion of water use from low value agriculture to horticulture has a dramatic effect on improving water efficiency.

The concentration to date on losses in the supply system only, rather than on “storage to plant”, misses this easy and effective way of improving efficiencies.

Piping

Most of the water losses are due to lots of small volumes delivered in small leaky channels, using lots of gravity outlets.

Piping is seen as a panacea and will reduce losses considerably. However it is not cost effective or energy efficient to pipe the whole system. Piping needs to be strategically used and in conjunction with the farm systems.

Natural carriers and environmental flows

The Torrumbarry system uses a significant amount of natural carriers as part of the supply system, and many of the associated “losses” have environmental benefits. The re-assignment of these beneficial “losses” is required.

10 Environmental Recommendations

The Food Bowl Modernisation Project Steering Committee makes the following recommendations in relation to the Environmental Entitlement:

Recommendation 1: Water savings should be shared equally between irrigators, Melbourne Water and the environment, including volume, reliability, and timing of when savings become available. The environment will also receive half of any savings above and beyond the 225GL.

Recommendation 2: The primary objective for the use of the environment's share of the Food Bowl Modernisation Project savings should be for the improvement of Victorian tributaries.

Recommendation 3: The environments share of the saving should be managed to optimise multiple benefits to Victorian rivers and to help achieve the Government's contribution to the Snowy and Murray Rivers.

Recommendation 4: The environment's share of the Food Bowl Modernisation Project saving be granted as an Environmental Entitlement to be held by the Minister for Environment.

Recommendation 5: Catchment Management Authorities should develop a plan for the best deployment of the environmental water, consulting with all stakeholders, with the plan to be approved by the Ministers for the Environment and Water.

Recommendation 6: Catchment Management Authorities should also manage the delivery of water within the Victorian tributaries, monitor environmental outcomes, and integrate environmental flows with river and wetland management programs.

Recommendation 7: Where existing environmental and irrigation allocations flow together through the system, the defined environmental requirement must be deducted first before the savings are then calculated on the basis of the balance of the water in the system. The defined environmental requirement is the volume currently required to meet defined environmental obligations (such as the Environmental Protection and Biodiversity Conservation Act and the Flora and Fauna Guarantee Act – e.g. North Lake – Woorinen).

Recommendation 8: The environmental impacts of providing 75 GL to Melbourne in 2010/11 need to be assessed. Where such proposals have environmental impacts, offset measures need to be provided.

Recommendation 9: Carryover and/or borrow and payback rules such as those in place for the Murray Wetlands be developed for the environment's share in consultation and agreement with irrigators and the environment.

Recommendation 10: Headworks charges be applied to this Environmental Entitlement and delivery charges applied where appropriate.

10.1 Environmental Flows

10.1.1. Introduction

Of the 225 GL of water to be saved by the Food Bowl Modernisation Project, 75 GL is for the environment. The underlying objective must be to use that water to achieve the maximum possible environmental benefit. The environmental issues associated with the broader modernisation/reconfiguration project also need to be managed.

The minimum environmental flow requirements are described in the environmental watering plans for each Victorian tributary, the Living Murray and the Snowy River.

These plans articulate that our rivers need a range of flow regimes in any given year to maintain their values and to assist in maintaining water quality. These flow regimes may include:

- Maintenance of low flows at certain times of the year
- Small flushes to enable fish passage between deep pools and improve water quality as salinity increases
- Bank fills to maintain the riparian zone and flush the river; and
- Overbank flows to maintain the floodplain and provide water and connectivity to wetlands for fish and bird breeding.

The timing and volumes to achieve the objectives of the water plans will be different in any given year. In some years the environment's share will only be used to manage risk and therefore it us unlikely to use its full allocation. In other years greater volumes will be required to achieve Bankfills and overbank flows. The following recommendations relate to how to maximise the environmental gain through the Food Bowl Modernisation Project.

10.1.2. Share of Water Savings

The Food Bowl Modernisation Project will generate water savings. The Victorian Government has committed to sharing the water equally between irrigators, Melbourne Water, and the environment. The savings will also be released progressively over time.

Recommendation 1 - Water savings should be shared equally between irrigators, Melbourne Water and the environment, including volume, reliability, and timing of when savings become available. The Environment will also receive half of any savings above and beyond the 225GL.

10.1.3. Priority for Use of Environmental Water

The Victorian tributaries, particularly the Goulburn, Campaspe and Loddon Rivers, and non-Living Murray wetlands are all stressed and need additional water, well in excess of the 75 GL. However, the Victorian Government also has commitments to provide additional water to the Snowy and Living Murray. The primary objective for the use of the environment's 75 GL share of the Food Bowl Modernisation Project savings should be the improvement of Victorian tributaries and non-Living Murray wetlands, noting that this will also result in water

flowing into the Murray, thereby achieving multiple environmental benefits.

Recommendation 2 - The primary objective for the use of the environment's share of the Food Bowl Modernisation Project savings should be for the improvement of Victorian tributaries.

Recommendation 3 - The environment's share of the saving should be managed to optimise multiple benefits to Victorian rivers and to help achieve the Government's contribution to the Snowy and Murray Rivers.

10.1.4. Environmental Entitlement held by the Minister for Environment

The environmental water should remain the property of the State of Victoria, and should be held as an environmental entitlement by the Environment Minister (as defined in section 48A of the *Water Act 1989*). This provides flexibility to trade (as water allocations under environmental entitlements are tradeable on the temporary water market), but also ensures permanent protection of the environmental water. Environmental entitlements also offer additional advantages, as they can be created with slightly different properties to water shares.

Recommendation 4 - The environment's share of the Food Bowl Modernisation Project savings be granted as an Environmental Entitlement to be held by the Minister for Environment.

10.1.5. Governance

The use of environmental water will need to be targeted at a range of sites across northern Victoria. A coordinated approach will be needed to set priorities between sites and to maximise environmental benefits across Victorian tributaries and wetlands. There also needs to be transparent and accountable arrangements for decision making, including deployment of water and water trading. The aim is to optimise environmental outcomes and find win-win outcomes.

Recommendation 5 - Catchment Management Authorities should develop a plan for the best deployment of the environmental water, consulting with all stakeholders, with the plan to be approved by the Ministers for the Environment and Water.

Recommendation 6 – Catchment Management Authorities should also manage the delivery of water within the Victorian tributaries, monitor environmental outcomes, and integrate environmental flows with river and wetland management programs.

10.1.6. Environmental Implications of Modernisation and Reconfiguration

The irrigation delivery systems are often heavily interrelated with the water regime of environmental assets, including natural carriers, wetlands and downstream river systems.

Modernisation and reconfiguration has the potential to change water flows in these environmental assets, sometimes substantially.

The current system may be providing water to parts of the environment that because of its legal status (i.e. a threatened species or internationally recognised wetlands), has a requirement to have its water needs maintained. For example, in the Woorinen Pipelining Project, water was retained to manage the habitat of endangered Murray Hardyhead and migratory birds.

Recommendation 7 - Where existing environmental and irrigation allocations flow together through the system, the defined environmental requirement must be deducted first before the savings are then calculated on the basis of the balance of the water in the system. The defined environmental requirement is the volume currently required to meet defined environmental obligations (such as the Environmental Protection and Biodiversity Conservation Act and the Flora and Fauna Guarantee Act – e.g. North Lake – Woorinen).

It is also recognised that some inefficient parts of the system may have created artificial environments that may have local significance. Where this is the case, local communities are encouraged to work with Catchment Management Authorities to plan how to prioritise the use of the environmental water across the system in any given year as per recommendation five and six.

10.1.7. Melbourne Water Supply

In 2010/11, arrangements are being proposed for ensuring Melbourne Water obtains supply. These arrangements can have significant environmental impacts, and are to be assessed and considered in any decision which increases environmental risk. Further, any use of environmental water for Melbourne needs measures to offset that use. These could be by paying back the borrowed volumes in later years or by investment in river health improvements.

Recommendation 8 – The environmental impacts of providing 75 GL to Melbourne in 2010/11 need to be assessed. Where such proposals have environmental impacts, offset measures need to be provided.

10.1.8. Environmental Water Requirements

The environment needs additional water to provide:

- Baseflows and refuge needs in droughts,
- Winter/spring river freshes and high flows in most years, and
- Overbank and wetland flooding in some years.

Substantial flexibility will be required in the entitlement to efficiently meet environmental needs as:

- Environmental needs are mainly in winter and into spring, and are generally dependent on the natural inflows. These are not well synchronised with the availability of allocations at this time of year,
- There will be a need for different volumes released in different years, with some large volumes occasionally, and
- When flows are provided and environmental responses monitored, our understanding of needs will evolve and the application of water will need to evolve to match it.

It will be important to make the most effective and efficient use of the water for environmental benefit, obtaining multiple uses of the water as it moves downstream.

As environmental water will leave the river onto floodplains and return to the river, **credit for return flows** is required to track the water through multiple environmental sites down the river.

The general principle is that environmental water and how it is moved, used or converted, should have minimal impact on other water use entitlements.

Recommendation 9 – Carryover and/or borrow and payback rules such as those in place for the Murray Wetlands be developed for the environment's share in consultation and agreement with irrigators and the environment.

10.1.9. Environmental Water – Associated Costs

Normal irrigation entitlements incur headworks and delivery charges associated with the cost of harvesting of water and delivery of water.

***Recommendation 10 – Headworks charges be applied to this Environmental Entitlement and delivery charges applied where appropriate*.**

10.1.10. Appendix: Examples of Environmental Uses

The minimum environmental flow requirements are described in the environmental watering plans for each Victorian tributary, the Living Murray and the Snowy River.

The **Goulburn River** requires summer low flows and freshes, winter low flows, and winter/spring bankfull and flood flows. Summer low flows and freshes will easily be provided by transfers of irrigation water from the Goulburn system to the Murray system, and therefore require no additional water. In fact, environmental considerations will limit these transfers.

Winter low flows will generally need to be provided every year, although there will be some variability between years in what flows need to be provided, and in how much water is required to top up normal winter/spring catchment unregulated runoff. On average up to 20,000 ML/year could be required, with up to 40,000 ML in dry years.

The biggest deficiency in Goulburn flows is bankfull and out-of-bank flows. Out-of-bank flows of between 15,000 ML/day and 60,000 ML/day are required in different years. The required flows need to increase the frequency of all high flows to half of the natural frequency. These can occur naturally as unregulated flows, or need to be supplemented by reservoir releases. The requirements for water to be released are therefore likely to be for large flows, of different magnitudes in different years, and not in every year. If a 37,500 ML/day peak flow was required in a dry year, a release of 244,000 ML would be required.

The **Campaspe River** requires summer low flows and freshes, winter low flows, and winter high flows, bankfull flows and overbank flows. Summer low flows and freshes are generally provided (exceeded) above Rochester. InterValley Transfers from the Goulburn system have been providing these below Rochester.

The key deficits are therefore the winter low flows, high flows, bankfull flows, and overbank flows. The low flows and high flows will tend to be required annually (but with some year to year variability), with the other flows being in large volumes in some years. For example, to provide one high flow event of 9000 ML/day could require 44,000 ML.

The **Loddon River** system requires summer low flows and freshes, winter low flows and freshes, and winter high flows and overbank flows. The current bulk entitlement provides summer low flows and freshes and winter low flows in most years. To provide winter low flows in some further years could require 8000 ML. The key deficits are again the winter freshes, high flows and bankfull flows. These are generally annual requirements, although some higher flows are less frequent, and all flows are provided by unregulated flows in some years. For example, to inundate high level benches twice a year with 2000 ML/day would take 34,000 ML in a dryish year. Out-of-bank flows of 13,000 ML/day are also required 1 year in 3.

11. Governance Recommendations

11.1 Introduction

This section provides recommendations regarding the key functions, characteristics, and structure of an entity to deliver the modernisation program.

In making recommendations regarding the governance arrangements, the Steering Committee is cognisant of the importance of being able to meet irrigation water customer delivery expectations at the same time as modernising the system. This will require a very close working relationship with GMW throughout the life of the project and this is reflected throughout the recommendations.

The Modernisation project encompasses the reconfiguration, rationalisation and modernisation (channel automation, metering, piping and channel lining) of the Goulburn Murray irrigation system.

RECOMMENDATIONS:

1. ***The entity responsible for the modernization should be a State Owned Entity***
2. ***The Board of the entity should be a skills based Board***
3. ***The entity will exist only for the duration of the modernization project***
4. ***The entity should work with other key regional development agencies to assist, encourage, optimize and support regional development***
5. ***To actively source additional funding for stage two of the project in conjunction with key stakeholders, governments and other agencies.***
6. ***The entity will establish links and a consultation process with irrigator and other stakeholders***
7. ***The authority will engage those best placed to deliver the various components of the project – including GM-W***
8. ***Given the financial and structural interdependency of the Food Bowl Modernisation Project and the Sugarloaf Pipeline Project, the State Owned Entity and where appropriate Goulburn Murray Water, will enter into talks with Melbourne Water to Establish an effective interface between the organizations to ensure complimentary timelines, ensure consistent community liaison processes and resolve any issues or points of difference.***

11.2 Characteristics Of The Entity

The Steering Committee recommends that:

The entity responsible for the project be a newly established State Owned Entity that will:

- Be independently governed (an independent skills-based Board of Directors appointed by government.)

- Be a small organisation with a minimal staff base.
- Establish formal relationships with other key organisations to ensure that there is no duplication of effort across the region in delivering modernisation.
- Map the interface with GMW to enable clarity and efficiency in the delivery of functions.
- Possess the capacity to attract Commonwealth funding.
- Have all of the powers necessary to independently fulfil the agreed functions.
- Have a new name that reflects the diversity of the region.
- Exist only for the life of the project.

It is expected that the entity will support itself with a series of reference groups/advisory committees, to assist in fulfilling its recommended functions as required. It is anticipated that the entity will use existing groups such as Water Service Committees.

11.3 Functions Of The Entity

These recommended functions are, in the view of the Steering Committee, broadly enabling rather than prescriptive, since the board of the entity must have flexibility in determining priorities. However, in order to successfully deliver the modernisation project, it is recommended that the entity has the following broad functions:

1. **The development of a strategic business plan for the modernisation of the Food Bowl (GMID) to deliver water savings, increase agricultural productivity and provide regional development opportunities**. That encompasses (but is not limited to):

    i. the articulation of timing and location of works, incorporating a timetable for the realisation of benefits

    ii. defining the benchmark from which water savings will be accrued and realised

    iii. establishing a framework for engaging and collaborating with key stakeholders such as Local Government, CMAs

    iv. establishing a framework for ensuring a region-wide approach to developing complementary non water infrastructure and services

    v. establishing a framework for community consultation

    vi. determining a process for supporting and facilitating adjustment

    vii. creating linkages to other programs of government.

    viii. creating linkages with the strategic land use planning of Local Government within the GMID

    ix. identifying opportunities for enhancement of the natural environment.

    This plan could also be used as a prospectus for attracting funding for phase two of the project.

    On an annual basis the “entity” should develop a corporate plan and annual report that:

    x. is made available to the public
    xi. outlines key deliverables in any given year
    xii. outlines key performance indicators (including anticipated water savings) for their delivery
    xiii. outlines the annual budget.

This could be endorsed by the Minister in the same way that the corporate plans of Water Corporations and Catchment Management Authorities are currently approved.

2. To maximize and leverage existing agency resources, external knowledge and expertise with the objective of attaining world competitive agribusiness throughout the region:

i. Through developing clear linkages with Land and Water Management Plans; and
ii. By ensuring alignment with on-farm programs of government.

3. To work with other key regional development agencies, on a whole-of-region basis to facilitate, assist, encourage and support regional development so as to:

i. Optimize the economic productivity of irrigated agriculture across the region

ii. Optimize food processing and value adding opportunities
iii. Encourage the relocation of appropriate industry to the region, including agricultural, food processing and high-water-use industries
iv. Encourage and accelerate complementary infrastructure investment;
v. Assist and encourage the enhancement of the region's natural, physical and human resources
vi. Support and encourage economic development processes that enhance the region's capacity to leverage the benefits of the modernisation project and assist with rural adjustment.

4. To procure the services necessary to design and construct infrastructure upgrades, ensuring:

i. A close working relationship with GMW to ensure minimal disruption to the delivery of water to customers
ii. Appropriate consultation with directly affected landholders and other stakeholders
iii. Opportunities for upgrade of on-farm systems at the same time.

The entity should have the freedom to choose specific design and construction mechanisms to suit any given circumstances; these may include partnerships with GMW, joint ventures with construction authorities, alliances etc.

5. To provide a mechanism for the transfer to GMW of upgraded and new infrastructure, upon completion, to an agreed standard.

6. To actively source additional funding for stage two of the project in conjunction with key stakeholders, governments and other agencies.

7. To develop a whole of business risk management plan that recognises the need for business continuity for GMW and landholders during construction.

8. To report to the Minister at least annually, or as requested, on the performance of the entity against agreed business plans. The annual report should be publicly available and include:

i. A statement on administrative and corporate expenditure.
ii. A statement on water savings generated and confirmed through a third party (such as the MDBC).
iii. An assurance statement from the Victorian Auditor General.