FROM PIPE DREAM TO PIPING WATER: THE WIMMERA MALLEE PIPELINE PROJECT

J Rigby

The Project

The Wimmera Mallee Pipeline Project (WMPP) is one of the largest water management projects in Australia. The project will underpin a sustainable future for the Wimmera and southern Mallee regions of Western Victoria through the provision of a new water supply system that meets the needs of the region for the next 100 years.

The proposed pipeline system will reticulate water to about 9,000 rural property service points and 36 towns and will replace an existing and highly inefficient open channel system. The current channel system provides domestic, stock and bulk urban water to an area covering approximately 10 per cent of Victoria, but this supply arrangement is not sustainable. At present, 85 per cent of the water released to the channel system is lost through seepage and evaporation.

Project Outcomes

From a total release of 120,000 megalitres each year, only 17,000 megalitres is ultimately used by GWMWater customers on farms and in towns. The conversion from a channel to piped supply system will save the 103,000 megalitres of water that is lost from the existing system, and enable multiple economic, social and environmental benefits to be gained for the region. These benefits include:

- more secure, reliable and better quality water supplies to the farms, towns and businesses of the region;

The conversion from a channel to piped supply system will save 103,000 ML/a of water.

- the return of 83,000 megalitres of water to the region's river systems and the Murray River system as environmental flows, which will help to restore these degraded waterways, and provide increased frequency of flows to the region's nationally significant terminal lake system, including

Table 1. Pipeline system design criteria.

Design Requirement	Design Approach
Sources of Supply	• Lake Bellfield and Taylors Lake • Lake Wartook • Murray River
Design Strategy for System Trunk Pipelines	Design Flow = Peak 3-Month Average Demand Flow
Design Strategy for System Distribution Pipelines	Design Flow = Peak Day Average Demand Flow
Pump Station Operation	22 hours per day at peak demand
System Balance Storage Type	Lined In-ground Storages (no covers)
Minimum On-Farm Tank Storage Volume	3 days water requirement at peak demand
Supply Pressure	20 metres at the farm gate

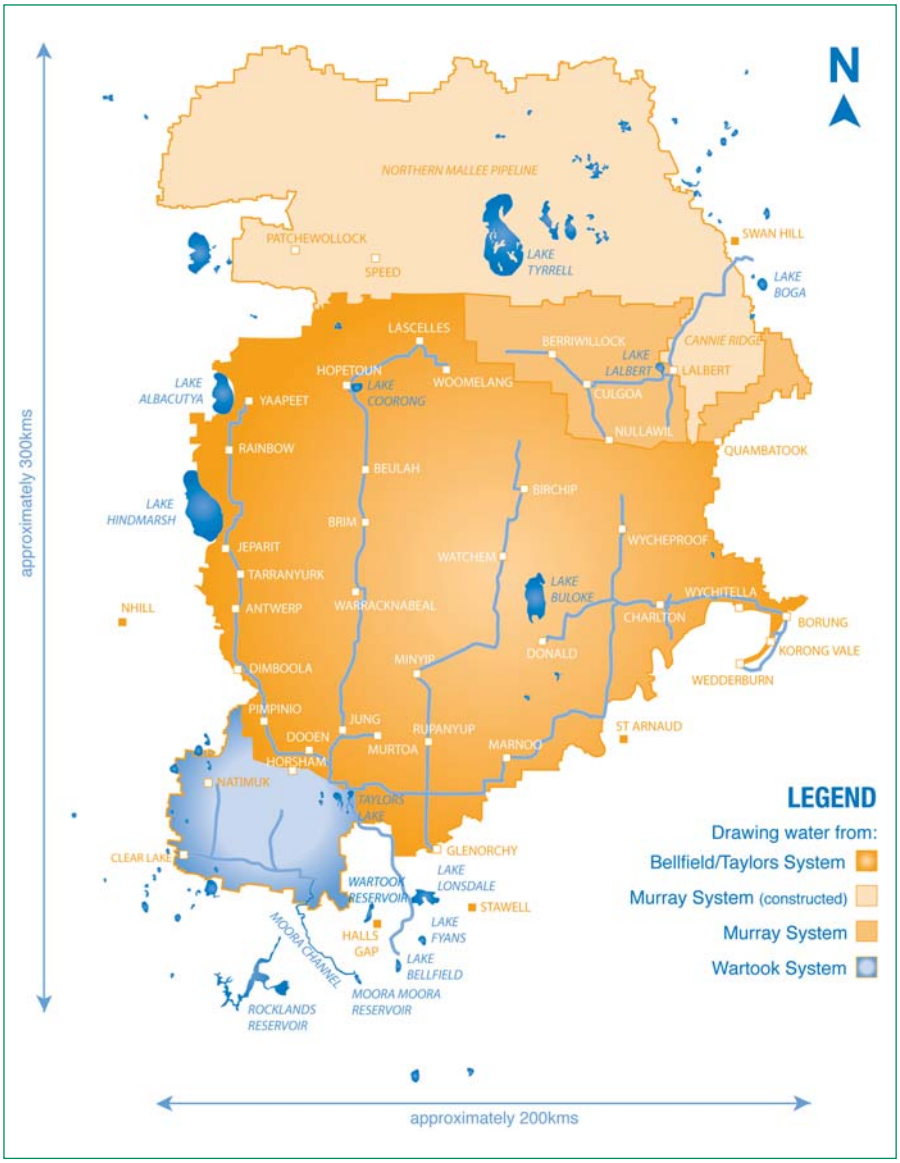

Figure 1. Wimmera Mallee pipeline system arrangement.

Lake Hindmarsh and Lake Albacutya;
- the provision of a further 1,000 megalitres of water for environmentally significant wetlands located within the area serviced by the new system;
- the availability of up to 10,000 megalitres of additional water from the new system for regional economic development, thereby providing new opportunities for sustainable on-farm diversification and new industry serviced by a water system that can support future growth; and
- the availability of increased water for 11 recreational lakes within the region, with substantial flow-on benefits for tourism.

The Pipeline System

The WMPP will implement a piped and pumped water supply system that will provide a continuous supply of water to individual farms and townships across the Wimmera Mallee region. The system incorporates trunk and distribution pipeline works, pumping stations, water balancing storages, headworks, control systems and other ancillary works that are connected to create five separate supply zones drawing water from two sources of supply in the Grampians mountains and a sixth supply zone supplied from the Murray River. The scope of the project also includes the decommissioning of redundant channel assets.

Figure 1 presents a general layout plan of the trunk main components of each supply zone. A major trunk pipeline will transfer water under gravity from Lake Bellfield to Taylors Lake. The remainder of the pipeline system is a pumped system due to the undulating terrain of the region that has no significant high points and so will be highly reliant on the regional power supply network. The trunk pipeline of each supply zone follows a route that extends between the towns situated within that zone, with a trunk pumping station and water balancing storage located along the trunk main alignment at each town.

Trunk pumping stations transfer bulk water between the water storages and also service the local distribution pipe networks connected to the pumped trunk main, with flows delivered directly from the trunk mains to the distribution mains under trunk main pressure. In situations where the trunk main supply is unable to adequately pressurise areas within the distribution network, local distribution system pumping stations will be installed to maintain the required delivery pressure at customer connection points. The key criteria that have been the basis for the design of the pipeline system are presented in Table 1.

Table 2. Pipeline system annual water demand allowances.

Water Demand Type	ML/year
Urban Township Demand (existing level of demand + 10% growth allowance)	9,151
Rural Homestead Domestic Demand	2,014
Livestock Demand (peak historic stocking levels of 1992/93)	5,123
Rural Supplies by Agreement and Intensive Industry (existing allocations)	1,707
Future Rural On-Farm Growth (supplied on demand)	5,000
Sub-Total	**22,995**
Water for Recreational Lakes (pumped at off-peak times)	2,979
Water for Environmentally Significant Wetlands (pumped at off-peak times)	1,000
Future Growth Within System (pumped at off-peak times)	5,000
Total System Demand Allowance	**31,974**

Table 3. Pipeline system infrastructure.

Project Component	Quantities
Trunk Pipelines	1,130 kilometres
Distribution Pipelines	7,720 kilometres
Trunk Pipeline Pumping Stations	41 No.
Distribution System Pumping Stations	Up to 100 No.
Water Storages	45 No. (total capacity of 1,165 ML)
Total Cost	$419

Water Allowances

Table 2 presents a summary of the annual water demand allowances that the pipeline system has been designed to deliver, with just under 23,000 megalitres able to be supplied "on demand" each year from the system to farms, rural industries and towns. Provision has been made within this "on demand" capacity for 10 per cent growth in the current level of urban consumption and up to 5,000 megalitres for growth in rural consumption across the entire system.

The system can also provide additional water that is to be pumped during off-peak periods, with up to 3,979 megalitres available to supply nominated recreational lakes and wetlands with high conservation value, plus a further growth allowance of up to 5,000 megalitres. Access to this extra growth allowance requires additional water storage located specifically where the demand for this water occurs.

Infrastructure

The infrastructure works that comprise the pipeline system are detailed in Table 3, with the major works component being the construction of around 8,800 kilometres of pipeline works. The new system will substantially improve the security of supply provided to customers, which will increase from the current levels of 78 per cent for rural services and 88 per cent for urban services to 96 per cent for both services.

Costs, Benefits and Funding

The project is estimated to cost $501 million, which comprises a system capital cost of $419 million and a separate

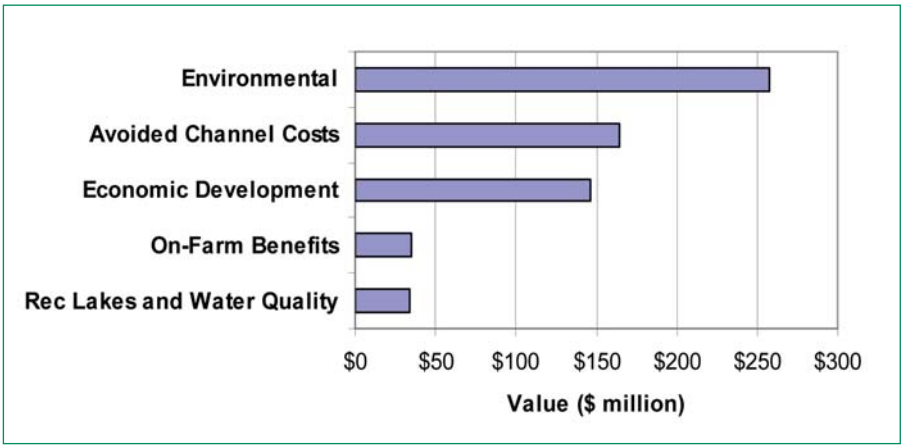

Figure 2. Economic benefits of Wimmera Mallee Pipeline Project.

Table 4. Pipeline system capital costs (based on preliminary design estimates).

Item	Cost ($ million)
Trunk Pipelines	$195
Distribution Pipelines	$140
Pumping Stations	$31
Water Storages	$20
Headworks	$1
Control Systems	$4
Waterhammer Control	$4
Treatment Systems	$3
Power Supply	$10
Channel Restoration	$11
Total	**$419**

Table 5. On-farm capital investment.

Item		Average Farm Capital Cost	Regional Capital Cost $ million
Reticulated Supply	Infrastructure Installation	$48,034	$50.0
	New Fencing	$546	$0.5
Removals	Farm Dams	$7,400	$12.0
	Farm Channels	$3,809	$5.0
	GWMWater Channels	$12,832	$13.0
	Fencing	$779	$0.8
	Other	$796	$0.7
Total Capital Costs		**$74,196**	**$82.0**

investment in on-farm works to be provided by rural customers that is estimated to cost $82 million. On-farm works will consist of water tanks, pipelines and troughs configured in local system arrangements that are connected to the major pipeline system and distribute water to various locations around each farm enterprise. A breakdown of project costs is presented in Tables 4 and 5.

It is estimated that the WMPP will provide economic benefits at a local, regional and national level that have a total present value of $637 million, and a summary of the quantified benefits is presented in Figure 2. The project will generate a benefit to cost ratio of 1.19 and a positive net present value of $100 million.

The Commonwealth and Victorian State Governments jointly launched the WMPP on 24 June 2005 after reaching agreement on the funding arrangements as part of the National Water Initiative. Both Governments have each committed to contributing amounts of $167 million towards the project, with the Commonwealth Government funding made available through the $2 billion Australian Government Water Fund. The local region serviced by the WMPP will contribute the remaining one-third of the total project cost, making the WMPP a three-way partnership. The support provided by both the Federal and State Governments has been premised on the significant environmental benefits achieved through water savings and the economic benefits provided through an improved water supply.

Project Management

In March 2005, prior to the project launch, the Victorian Government confirmed that GWMWater would be responsible for the delivery of the WMPP and GWMWater is preparing for the implementation of the project.

Detailed engineering design of the major trunk pipeline from Lake Bellfield to Taylors Lake, together with a trunk pipeline extending from Taylors Lake to Yaapeet and the distribution pipeline systems connected to this supply zone trunk main, commenced in 2004, and is expected to be completed in the latter part of 2005. Procurement of these works will then commence through competitive tendering for supply of pipe and pump components, and the construction of system works, with laying of pipes expected to commence during 2006. Construction of this initial phase of the project works will take around two years, with the entire program of works planned to take up to 10 years to complete.

The challenge for GWMWater is taking the Wimmera Mallee Pipeline Project forward from a community vision to a reality, and achieving the Triple Bottom Line outcomes from this new water supply system that will forever change the way that water supplies are managed in the Wimmera and Mallee regions.

The Author

Jeff Rigby is General Manager Strategic Services, GWMWater, email jeff.rigby@gwmwater.org.au