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# Harvey Irrigation Bulkwater Operating Cost Review

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*A report prepared by Marsden Jacob Associates  
for the Economic Regulation Authority*

9 March 2007

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Document History and Status

Project Manager: Phil Pickering

Computer File Name:



Last Saved:

Issued To	Transmission Type	Qty	Date	Authorised

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# 1. Introduction

The Economic Regulation Authority (ERA) has requested that Marsden Jacob Associates (MJA) conduct a review of the Water Corporation's proposed operating expenditure for the Harvey Bulk Water Pricing Inquiry. The review is required to provide independent verification of the Water Corporation's methodology and the appropriateness of the proposed cost of \$1.2-\$1.4 million per year for the current agreement. The review is particularly significant in light of the fact that operating cost estimated during the original transfer of irrigation assets in 1996 was only \$198,000.

This review examines the operating expenditure from two perspectives:

- a "bottom up" review of the components of the Water Corporation's estimate of \$1.2-\$1.4 million;
- a "top down" review of the Water Corporation's estimate – i.e. a comparison against dam operators in eastern states jurisdictions.

## 1.1. Basis of 1996 Estimate

Bulk water operating costs for the Water Corporation's South West irrigation dams were previously estimated in 1996 for the bulkwater service agreement between Water Corporation and Harvey Water. Estimates were detailed in the document titled "Transfer of Ownership and Operation of Irrigation Assets in the South West: Financial Proposal" prepared by the South West Irrigation Committee (SWIC). The document states<sup>1</sup>:

*Despite attempts by SWIC to obtain OM&A cost data relating to the headworks from the Water Corporation, no estimates were able to be obtained. As a result, SWIC officers developed estimates based on their understanding of current practices. An additional allowance of \$25,000 to cover administration/travel expenses was made. The cost estimates included on the model are shown below.*

<i>Dam Operations</i>	<i>\$80,000</i>
<i>Dam Safety/Maintenance</i>	<i>\$93,000</i>
<i>Administration</i>	<i><u>\$25,000</u></i>
	<i>\$198,000</i>

Attempts to locate the individuals who developed the original estimate, or any supporting information, were unsuccessful. It has been suggested that the original estimates were developed at a high level only and were not subject to rigorous analysis. Previous estimates have therefore not been relied on when determining the current pricing arrangements.

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<sup>1</sup> SWIMCO, *Transfer of Ownership and Operation of Irrigation Assets in the South West: Financial Proposal*, Schedule 7, p. 11

## 2. “Bottom up” Review

The Water Corporation’s operating expenditure estimates until 2011 are shown in Table 1 (estimates repeat every year thenceforth). The costs shown in Table 1 represent the share of operating expenses allocated to Harvey Water only. Total cost allocated to Harvey Water reduces after 2007 as water will be traded to Water Corporation and therefore Harvey Water’s allocation in these dams will be reduced.

**TABLE 1: WATER CORPORATION OPERATING COST ESTIMATES FOR HARVEY WATER**

Harvey Water Cost Recovery (excludes Dam Safety) in 2005/06 dollars	2006	2007	2008	2009	2010	2011
Stirling Dam	\$246,073	\$289,368	\$279,255	\$262,291	\$262,291	\$262,291
Harvey Weir	\$270,874	\$286,054	\$286,054	\$286,054	\$286,054	\$286,054
Wokalup Dam	\$0	\$0	\$0	\$0	\$0	\$0
Logue Brook	\$116,049	\$178,607	\$143,698	\$124,213	\$92,551	\$92,551
<b>Total Harvey District</b>	<b>\$632,996</b>	<b>\$754,029</b>	<b>\$709,006</b>	<b>\$672,558</b>	<b>\$640,896</b>	<b>\$640,896</b>
Waroona Dam	\$182,669	\$173,668	\$173,668	\$173,668	\$173,668	\$173,668
Drakesbrook Dam	\$133,825	\$103,627	\$107,256	\$107,256	\$107,256	\$107,256
Sampson Brook Dam	\$198,090	\$129,114	\$58,871	\$58,871	\$58,871	\$58,871
<b>Total Waroona District</b>	<b>\$514,585</b>	<b>\$406,409</b>	<b>\$339,794</b>	<b>\$339,794</b>	<b>\$339,794</b>	<b>\$339,794</b>
Burekup Weir (Collie Diversion Dam)	\$47,136	\$74,346	\$74,346	\$74,346	\$74,346	\$74,346
Wellington Dam	\$187,478	\$185,882	\$185,882	\$185,882	\$185,882	\$185,882
<b>Total Wellington Dam</b>	<b>\$234,614</b>	<b>\$260,228</b>	<b>\$260,228</b>	<b>\$260,228</b>	<b>\$260,228</b>	<b>\$260,228</b>
<b>Harvey Water Cost Recovery</b>	<b>\$1,382,195</b>	<b>\$1,420,666</b>	<b>\$1,309,028</b>	<b>\$1,272,580</b>	<b>\$1,240,918</b>	<b>\$1,240,918</b>

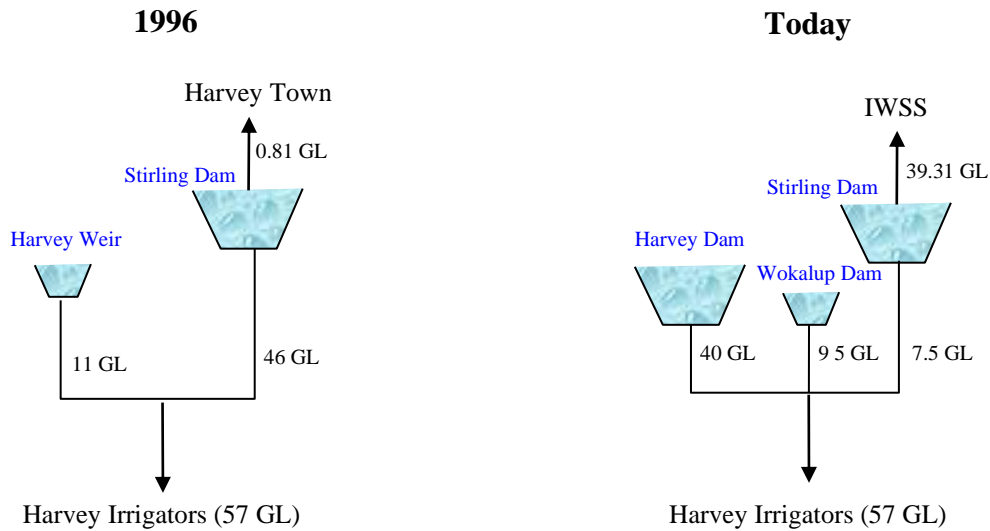
### 2.1. Water Corporation Approach

The Water Corporation has developed the estimates of cost in Table 1 on the basis of the water supply infrastructure and cost sharing arrangements that existed when the previous South West bulk water agreement was struck in 1996. At that time, Stirling Dam was a dedicated irrigation supply, as was the relatively small Harvey Weir. In 2000, Harvey Dam and Wokalup Dam were constructed (and Harvey Weir was decommissioned) to provide substitute water to irrigators and allow the higher quality water from Stirling Dam to be diverted into the Water Corporation’s Integrated Water Supply Scheme (IWSS) for use in the metropolitan area.

The Water Corporation has therefore allocated costs on the basis that no expenditure required to satisfy metropolitan demand should be charged to Harvey Water. Costs for Harvey Dam have specifically been excluded from the cost allocation, however estimated costs for Harvey Weir have been added instead. Actual costs for Harvey Weir are no longer available and therefore the cost has been estimated based on the cost of Samson Brook Dam – a dam of similar size and purpose (both dams provided non-potable water for irrigation purposes; Samson Brook Dam provides 8.75 gigalitres compared with Harvey Weir 11 gigalitres).

A diagram of the Harvey/Stirling dam system is shown in Figure 1, showing the layout of the system in 1996 compared with the layout today. The Harvey/Stirling dam system represents 57 gigalitres or 38% of the irrigators’ total water entitlement.

**FIGURE 1: HARVEY/STIRLING DAM SYSTEM – 1996 AND TODAY**



Due to the high cost of Harvey Dam, the “1996 approach” results in a lower price for Harvey Water than a straightforward allocation of costs based on water entitlements. A cost allocation based on water entitlements (the “entitlements approach”) is shown in Table 2, while the Water Corporation’s “1996 approach” is shown in Table 3 (note that the total cost is higher than the cost shown in Table 1 – see footnote (b) of the table for explanation).

**TABLE 2: COST ALLOCATION BASED ON ENTITLEMENT 2005/06**

Dam	Harvey Water Entitlement (ML)	Capacity (ML)	Harvey Water Entitlement (%)	Total Opex (2006)	Harvey Water Allocated Opex (2006)
Stirling	7,500	46,810	16%	246,073	39,426
Harvey Dam	40,000	40,000	100%	457,638	457,638
Logue Brook	11,000	11,000	100%	116,049	116,049
Wokalup	9,500	9,500	100%	107,012	107,012
Waroona	7,700	7,700	100%	182,669	182,669
Drakesbrook	2,000	2,000	100%	133,825	133,825
Samson Brook	5,960	8,750	68%	290,820	198,090
Samson Brook Pipehead	0	8,000	0%	110,585	0
Burekup Weir <sup>a</sup>	68,000	68,000	100%	47,136	47,136
Wellington	68,000	98,250	69%	270,878	187,478
<b>TOTAL</b>	<b>151,660</b>	<b>232,010</b>	<b>65%</b>	<b>1,962,685</b>	<b>1,469,323</b>

**TABLE 3: WATER CORPORATION COST ALLOCATION APPROACH**

Dam	Harvey Water Entitlement "1996 approach" (%)	Total Opex (2006)	Harvey Water Allocated Opex (2006)
Stirling	100%	246,073	246,073
Harvey Weir <sup>a</sup>	93%	290,820	270,874
Logue Brook	100%	116,049	116,049
Wokalup	0%	107,012	0
Warooka	100%	182,669	182,669
Drakesbrook	100%	133,825	133,825
Samson Brook	68%	290,820	198,090
Samson Brook Pipehead	0%	110,585	0
Burekup Weir <sup>b</sup>	100%	47,136	47,136
Wellington	69%	270,878	187,478
<b>TOTAL</b>	<b>63%</b>	<b>1,795,867</b>	<b>1,382,194</b>

Notes to both tables:

Shading indicates alternative cost sharing based on 1996 water allocations

- a. Since 1996 Harvey Weir has been decommissioned and Harvey Dam constructed in its place. Estimate of cost for Harvey Weir is based on expenditure at Samson Dam.
- b. Burekup Weir allocation is released to Wellington. Not included in total capacity.

The "1996 approach" appears equitable and ensures that Harvey Water have not been disadvantaged by the integration of the South West dams with the IWSS. The allocation of costs in this manner has therefore promoted efficiency in decision making because the Water Corporation has faced the full long run marginal cost of converting Stirling Dam into a metropolitan water source. However ongoing costs allocated to Harvey Water are based on the cost of dams that do not actually supply Harvey Water, and therefore will not provide a true indication of the short run marginal cost of supply.

MJA have calculated prices based on both the "entitlements approach" and the "1996 approach".

## 2.2. Cost Breakdown

The operating costs established in Tables 1 to 3 are derived from actual historic costs reported in the Water Corporation's Cost Centre reporting system. The Cost Centre reports break operating costs down between direct and indirect costs as follows:

Direct	\$1,100,369
Indirect	\$1,153,182
<b>TOTAL</b>	<b>\$2,253,551</b>

We review the direct costs and indirect costs separately below.

## 2.2.1. Direct Costs

Actual costs spent over the last three years are available from the Water Corporation's Cost Centre reporting system, which provides a view of the settled costs of the business. A complete breakdown for 2005/06 was not available from the Corporation, however the costs for the 12 months beginning November 2005 were used to estimate the breakdown of costs for the 2005/06 financial year. Table 4 provides a breakdown of direct costs that has been developed from:

- a) information from the South West region on the number and cost of catchment rangers;
- b) detailed information from Cost Centre reports between November 2005 and October 2006;
- c) the total cost reported between July 2005 and June 2006.<sup>2</sup>

**TABLE 4: ESTIMATE OF DIRECT OPERATING COST BREAKDOWN 2005/06**

Item	Estimated Cost	Proportion
Rangers (5)	375,000	34%
Other labour	119,814	11%
Materials	40,445	4%
Plant & Equipment	30,143	3%
Pumping, Energy and Power	11,746	1%
Infrastructure maintenance	168,335	15%
Operations	129,144	12%
Planned maintenance	59,061	5%
Unplanned maintenance	4,695	0%
Other	161,985	15%
<b>Total Direct Cost</b>	<b>1,100,369</b>	<b>100%</b>

The cost breakdown indicates that the three key costs are labour (both rangers and "other" labour), infrastructure maintenance and operations. Combined, these items account for over 70% of the total cost.

<sup>2</sup> Costs reported between November 2005 and October 2006 were within 3% of costs reported between July 2005 and June 2006.



The Water Corporation has indicated that five rangers are employed to manage the dams at an average cost of approximately \$75,000 per ranger. An additional ranger will be employed to cater for the existing workload in 2007/08. The Rangers' time is divided amongst the following tasks:

- General surveillance
- Catchment management
- Travel
- Administration
- Sampling
- Dam inspections
- Other

For comparison purposes, Marsden Jacob reviewed a number of similar irrigation schemes in the eastern states and found:

- **Grampians Wimmera Mallee Water**, which owns three major dams and employs five rangers, has operating costs of around \$150,000 and \$69,000 for maintenance of headworks (\$219,000 total, including materials), and around \$60,000 for administration expenses (one staff member).
- A rural water authority that provided information on a confidential basis, which owns seven major dams of similar capacity to the Water Corporations dams and employs 12 rangers, has a budget of around \$2.5 million for operating and maintenance of headworks, of which about \$700,000 is for maintenance, around \$1.4 million for operations and \$400,000 for administration (which includes travel, compliance etc.).
- **Coliban Water**, which owns six major dams with a total capacity of 63 GL and employs four reservoir keepers, had operating and maintenance costs of \$2.1 million and administration cost of \$1.3 million for their wholesale water operations<sup>3</sup>.

The figures above demonstrate the large variability of operating costs across Australia, depending on locational factors and the level of service provided by each utility. The survey also demonstrates that the labour costs, in particular the number of rangers employed, are within expected ranges from similar sized bulk water suppliers in other jurisdictions.

### 2.2.2. Sampling Costs

Some sampling of potable water sources is required to meet Australian Drinking Water Guidelines (ADWG). Costs associated with meeting the ADWG guidelines has specifically been excluded from the operating cost estimates provided in this report.

From the current desktop review, MJA is unable to comment on other specific cost items, as these are unique to the age, configuration and location of the South West irrigation system. However, a review of the aggregate quantum of all cost items is shown in Section 3.

### 2.2.3. Indirect Costs

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<sup>3</sup> Coliban Water Annual Report 2005/06

The indirect costs estimated by the Water Corporation are based on a standard overhead recovery rate of 105% of direct cost. This rate was developed through an extensive one-off review of overhead costs by the Water Corporation in 2001. Research conducted by OFWAT (the UK economic regulator) demonstrates that this rate benchmarks comparatively well against other water utilities around the world.<sup>4</sup> OFWAT indicate an average allocated overhead rate for water of approximately 125% for the water utilities it had investigated.

The key concern for using a standard recovery rate in the Harvey Water bulk water price is that the standard rate represents a retail overhead allocation rate. The overhead rate therefore includes major expense items such as retail call centres, residential billing and land development services. The Water Corporation has calculated an alternative rate of 53% for large customers, which excludes retail cost items. Marsden Jacob recommends the use of the Water Corporation's large customer rate or, alternatively an itemised approach that specifically identifies the administrative costs incurred.

Furthermore, the overhead rate is an average across all customers. Recovering the average overhead from all customers is equitable, but is not required for economic efficiency. To achieve economic efficiency, customers should be charged no less the "lower bound" or incremental cost of providing the service. To determine the "lower bound" cost, MJA has also examined the Water Corporation's *incremental* overheads, as opposed to the allocated *average* rate and recommends a rate of 18% for the "lower bound" cost estimate for this project. Importantly, overhead costs that are not shared by Harvey Water will need to be met by other water or wastewater customers through the general Water Corporation tariffs.

### 2.3. Efficiency gains

The Water Corporation has not included any allowance for efficiency gains in the operating cost forecasts. MJA recommends that the efficiency gains expected of all Water Corporation expenditure should be applied to the operating component of the Harvey bulk water price. The Economic Regulation Authority's 2006 review of urban water priced indicated a productivity factor of 1.8% per annum.<sup>5</sup>

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<sup>4</sup> 'Comparing the performance of England & Wales water & sewerage companies with Sydney Water, Water Corporation Western Australia (1997-98 data)', Ofwat, August 1999; 'A benchmarking study of the England and Wales Water Companies and Sydney Water Corporation Ltd for 1996 97', Ofwat, April 1998.

<sup>5</sup> Economic Regulation Authority (2006) *Inquiry on Harvey Water Bulk Water Pricing: Draft Report*, p. 47

### 3. “Top down” Review

Marsden Jacob has reviewed a number of other bulkwater businesses to determine whether the Water Corporation estimate appears reasonable from a high level. MJA reviewed the bulkwater costs (excluding treatment or pumping) of the major regulated bulk water providers across Australia – Sydney Catchment Authority and SEQ Water (Table 5). As these bulk water providers vary in size and also provide a significant urban customer base, MJA also examined several eastern state irrigation suppliers of a similar size and nature compared with the South West irrigation area (Table 6). The identity of two of the businesses has not been disclosed for reasons of commercial confidentiality.

**TABLE 5: BENCHMARK AGAINST MAJOR AUSTRALIAN BULK WATER PROVIDERS 2005/06**

	Annual Yield 2005 (GL/a)	Capacity (GL)	Number of Large Dams <sup>1</sup>	Op Cost (incl overheads)	Cost per ML yield (\$/ML)	Cost/ML Capacity (\$/ML)
Sydney Catchment Authority <sup>2</sup>	643	2,838	22	82,181,000	127	29.0
SEQWater (pre-drought)	285	1,721	3	13,308,000	47	7.7
Water Corporation (incl overheads)	232	684	9	2,253,000	9.7	3.3

**TABLE 6: BENCHMARK AGAINST REGIONAL IRRIGATION PROVIDERS 2005/06**

	Annual Yield 2005 (GL/a)	Capacity (GL)	Number of Large Dams <sup>1</sup>	Op Cost (excl overheads)	Cost per ML yield (\$/ML)	Cost/ML Capacity (\$/ML)
Regional Water Authority One	30	75	8	\$386,904	13	5.2
Regional Water Authority Two	Approx. 120	766	9	\$1,074,000	9	1.4
Southern Rural Water	300	499	9	\$7,348,000 <sup>3</sup>	24	15
Goulburn-Murray Water <sup>4</sup>	2,424	4,818	15	\$17,075,000	7	3.5
Water Corporation (excl overheads)	232	684	9	\$1,100,000	5	1.6

- Notes:
1. From ANCOLD Large Dams Register
  2. Operating cost includes employee, contractors, property and materials and other operating (from 2006 Annual Report)
  3. Whilst direct costs appear high, administrative costs appear very low (at only 13%), and it is possible that direct costs include some indirect costs (from 2006 Annual Report)
  4. Yield based on adding back 662.8 GL of “lost” supply to 1,762 GL of disclosed irrigation supply to give 2,424 total yield (from 2006 Annual Report). Yield also assumes that nothing comes from the Murray River at minimal or zero cost; however, even if a portion does, it would have the effect of *increasing* the cost per yield, not decreasing it, so the assumption does not adversely affect the relationships amongst the figures with the Water Corporation.

From the table above, the Water Corporation's unit costs appear lower than the costs of urban bulk water providers and similar to or lower than the cost of the regional irrigation water authorities examined.

## 4. Recommendation and Directions

The analysis provided in this report demonstrates that:

- the initial operating cost estimates in the 1996 agreement appear to lack sufficient rigour to apply as a benchmark for the new agreement;
- the Water Corporation has used a pricing approach that allocates only the operating and capital costs that would have been incurred if metropolitan water supplies had not been sourced from the South West. If cost allocations are based on actual usage, the costs allocated to Harvey Water would be higher (approximately 6% for 2005/06);
- preliminary analysis suggests that the order of magnitude of the Water Corporation's direct costs (excluding overheads) is similar to or less than the bulk water supply costs for similarly sized eastern states water businesses.

Based on the preceding analysis, MJA recommend that:

- a 'large customer' rate of 53% be applied to allocate overheads rather than the 'retail customer' rate;
- a marginal overhead rate of 18% be applied in calculating the "lower bound" (i.e. incremental) cost estimate. We note that if the marginal overhead rate is applied, then overheads that would otherwise have been allocated to Harvey Water will need to be recovered from other customer groups;
- productivity estimates equivalent to the productivity applied to the remainder of the business (1.8%) should be applied to all Water Corporation expenditure into the future.

An estimate of the revised forecast of water charges, based on the above recommendations (based on the Water Corporation's '1996 approach'), is shown in the table below.

**TABLE 7: REVISED OPERATING COST ESTIMATES FOR HARVEY WATER SUPPLY**

Harvey Water Cost Recovery (excludes Dam Safety) in 2005/06 dollars	2006	2007	2008	2009	2010	2011
Stirling Dam	\$183,654	\$214,133	\$202,995	\$187,293	\$183,981	\$180,728
Harvey Weir	\$202,165	\$209,827	\$206,117	\$202,472	\$198,892	\$195,375
Wokalup Dam	\$0	\$0	\$0	\$0	\$0	\$0
Logue Brook	\$86,612	\$131,400	\$103,848	\$88,179	\$64,541	\$63,399
<b>Total Harvey District</b>	<b>\$472,431</b>	<b>\$555,360</b>	<b>\$512,960</b>	<b>\$477,944</b>	<b>\$447,414</b>	<b>\$439,503</b>
Waroona Dam	\$136,334	\$133,376	\$131,017	\$128,701	\$126,425	\$124,190
Drakesbrook Dam	\$99,879	\$81,042	\$83,174	\$81,703	\$80,259	\$78,839
Sampson Brook Dam	\$147,843	\$96,165	\$43,072	\$42,310	\$41,562	\$40,827
<b>Total Waroona District</b>	<b>\$384,056</b>	<b>\$310,583</b>	<b>\$257,263</b>	<b>\$252,714</b>	<b>\$248,246</b>	<b>\$243,856</b>
Burekup Weir (Collie Diversion Dam)	\$35,180	\$55,171	\$54,195	\$53,237	\$52,296	\$51,371
Wellington Dam	\$139,923	\$136,098	\$133,691	\$131,328	\$129,005	\$126,724
<b>Total Wellington Dam</b>	<b>\$175,102</b>	<b>\$191,268</b>	<b>\$187,887</b>	<b>\$184,564</b>	<b>\$181,301</b>	<b>\$178,095</b>
<b>Harvey Water Cost Recovery</b>	<b>\$1,031,589</b>	<b>\$1,057,211</b>	<b>\$958,109</b>	<b>\$915,223</b>	<b>\$876,960</b>	<b>\$861,454</b>