



# Harvey Water Supply System: Notes on Pricing Frameworks

One of 4 papers relating to aspects of dam safety  
and cost allocation, provided as input to the  
Inquiry into Harvey Water Bulk Water Pricing

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**ACIL Tasman**

Economics Policy Strategy

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## Executive summary

The objectives of a pricing regime are to secure prices that are efficient, equitable and readily understandable, while avoiding excessive regulatory burdens.

Efficiency requires that prices recover at least the incremental/avoidable costs involved with the supply of the service. Efficiency also requires that prices be limited to no more than the stand-alone cost of the service. Standalone cost is the cost that would be incurred by a new entrant in a contestable market, and typically involves allowing a return on the depreciated optimised replacement cost (DORC) of the assets involved.

However, when examining the cost of the Harvey Water bulk supply services (as in many other utility services), a stand-alone cost ceiling is of limited use. The assets were built for a range of social/non-economic reasons, and would probably not be built by a new entrant today without significant subsidy.

For this reason, economic regulators in the water industry have placed little emphasis on the DORC approach to asset valuation. Instead, a line-in-the-sand approach has tended to be used, which recognises the economic value of the assets at the time that the pricing regime was established (or pricing agreement reached). A relatively low initial value is then “rolled forward” over time by adding all allowed new investment and deducting depreciation. For pricing purposes, the rolled forward regulatory asset value (RAV) is used to calculate a return, which when combined with depreciation and operating and maintenance costs provides the revenue requirement that needs to be covered by prices.

In many jurisdictions, including NSW, Victoria and the UK, the initial value determined for the RAV was based on the economic value of the assets at the time the regulatory regime was introduced. For many rural water supply businesses, this value was essentially (or was agreed to be) zero, since prices did not support a positive value for the existing business. The current approach used by Water Corporation to calculate the CSO implies a different initial value, namely two thirds of the depreciated replacement value of the assets in 1996. Under this approach, the economic value of the assets is given by the initial value net of the CSO.

- The NSW/Victorian approach to the line-in-the-sand has some advantages in terms of clarity, with initial value related to the economic value of the assets concerned as at 1996. Sunk assets with no revenue generating ability were value at zero, and imply a subsidy of zero. The subsidy would remain at zero provided the BWSA price covers all of the expenditures incurred subsequently that are properly attributable to Harvey Water.

- Under the WA Government’s approach to the calculation of the CSO the benchmark against which subsidy is measured reflects the “accident” of history where prices were relative to costs for Water Corporation’s asset base as a whole.

A DORC approach fits with treating the higher cost of retrofitting dam safety as a legacy cost. However, DORC is based firmly on the theory of a contestable market. Although it can be squeezed to “fit” the current level of prices using the concept of a rolled forward “customer benefit”, it runs the risk of producing inefficient outcomes in a world that is in practice a long way from being contestable.

The rolled forward RAV approach provides for efficient outcomes by ensuring that prices remunerate all new capital expenditures, provided these are efficient and allowed by the regulator as necessary to:

- Maintain existing levels of service;
- Meet mandatory obligations, or
- Provide improved levels of service, provided there is willingness to pay for that improved level).

Equity considerations may influence which costs are allocated to Harvey Water and hence rolled in the RAV, as discussed in Paper 2.

However a number of efficiency considerations are key:

- Costs that would be avoidable under an alternative use of the asset should be rolled forward;
- Where costs are not efficient, for example as a result of the institutional and community processes involved in determining required dam safety expenditures, the “inefficient” component should not be rolled forward into the RAV.
- To the extent that costs are efficient but not necessarily avoidable (by the actions of the irrigators), it is partly a matter of equity as to whether they should be allocated to users of the dam services or to the Government/community. As discussed in paper 2, this will include considerations as to expectations at the time the original agreement was signed, but also the appropriate allocation of the implied risk at the time.
- However, the extent to which such costs would be affordable by other users introduces a further efficiency aspect. In particular, there are efficiency benefits from ensuring that water moves to the use best able to cover the costs involved in supply. This would favour including more rather than less of such costs in the RAV.



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- Under a RAV approach, the level of subsidy would be a residual, the difference between the actual price charged to Harvey Water and the price required to remunerate the rolled forward RAV.

# 1 Introduction

This paper is the third in a set of papers prepared by ACIL Tasman for the Inquiry on Harvey Water bulk water pricing. The first paper examines the ANCOLD dam safety guidelines, considers whether Water Corporation's proposals represent an efficient level of safety expenditure or whether an alternative process or institutional structure would yield more efficient outcomes. The second paper is concerned with the principles for allocating (efficient) dam safety costs across the community.

This paper examines the pricing frameworks that could be used to translate the costs attributed to Harvey Water into prices. It makes particular reference to the efficiency properties of the alternative approaches, and the definition and measure of subsidy each implies. The paper builds on the previous two papers by assuming that the efficient level of cost has been identified and that costs have been allocated appropriately between Harvey Water, recreational users of dams and the wider community.

The final ACIL Tasman paper examines the benefits attributed to recreational use of the dams.

## 1.1 Objectives for price regulation

The objectives of regulatory intervention are typically stated in terms of efficiency, equity and simplicity. That is, regulation should be designed to ensure that prices:

- Encourage outcomes which are efficient in that they involve the lowest possible costs to society;
- Encourage outcomes that are judged as fair, and
- Use pricing rules that are simple, transparent and avoid excessive regulatory burdens.

Efficiency involves a number of considerations, including signalling the cost of services to users to encourage appropriate usage and investment, appropriate management of risk, incentives for improving performance and (in the regulation of access prices) efficient entry into and exit from up-stream or downstream activities.

Economic regulation often views efficient outcomes as the key objective of pricing decisions – with other regulatory instruments (including CSOs) being available to assist in achieving equity.

## 1.2 Principles for efficient pricing

There are two main strands to regulatory practice in Australia to date. The first concerns the regulation of utility prices to final customers (typically using price cap regulation of prices underpinned by a building block approach to the determination of allowed revenues). The second, related, strand concerns the regulation of the price of access to monopoly infrastructure to enable efficient entry to up-stream or downstream markets.

Baumol and Willig set out the principles required for ensuring efficiency in the presence of economies of scale or scope. They are designed to mimic the constraints placed on firms by contestable markets, and state that:

- No price, or set of prices, should exceed the stand-alone costs of providing the service or services, where stand-alone costs are determined as the costs that an efficient competitor would incur in providing just that service or group of services.
- No price, or set of prices, should be less than the incremental (or avoidable) costs of providing the service or services, where incremental costs are the additional costs incurred by the monopolist in providing just that service or group of services.

These principles have been widely adopted in Australia within the context of access to monopoly infrastructure services. The definition of the ceiling is also widely used as a basis of regulating the retail revenues of monopoly utilities, as providing a benchmark against which monopoly profits should be assessed. The principles accord also with the upper bound and lower bound pricing principles developed by the NWI and its pricing working group.

## 1.3 Building block approach to regulation

The building block approach to setting the required revenue for a utility supplier is well established within Australia, including by ERA in its review of Water Corporation charges. The building blocks are typically used to define the maximum allowable revenue stream for the service supplier as a whole (although they could also be used to define the reasonable revenues for particular classes of customers).

The revenue requirement includes components for operating and maintenance costs, together with depreciation and a return on assets. By the far the most controversial and difficult area concerns the valuation of assets for the purpose of identifying the appropriate return on and of capital.

Two broad approaches to asset valuation have been used by regulators within Australia. These are Depreciated Optimised Replacement Cost (DORC) and the so-called “Line-in-the-Sand” (LIS) approach.



### 1.3.1 DORC

The intellectual roots of the DORC approach lie in the efficient pricing bounds defined above. Thus a DORC asset value (when combined with a cost of capital) provides a measure of the maximum return that a firm would be able to earn in a contestable market. Prices that provide a return above that level create the risk of by-pass, whereby a new entrant with efficiently configured assets could set up and take over the whole of the existing market.

At each price review the DORC valuation is reassessed. Consistent with a contestable market, the benefits of technological improvements are passed through into prices to customers through their impact on the optimised replacement cost of the assets. Likewise assets which become stranded by changes in demand are removed from the asset base as part of the optimisation process. In practice, of course, utility infrastructure services are not generally contestable. Nonetheless, DORC provides a useful theoretical benchmark for regulators in assessing reasonable returns.

DORC is not the only cost concept that can be employed however. A DORC valuation can be subject to considerable judgement as a result of the optimisation process. For this reason, some regulators have used net (or gross) replacement cost instead of the optimised replacement cost. A replacement cost approach will pass through technological changes into prices, but will retain stranded assets in the pricing base.

For several infrastructure industries (including water) DORC often implies prices far above those actually achieved by the service supplier. In industries such as rail, this can be because the price ceiling above which the incumbent faces by-pass is in fact defined by an alternative technology (eg road). In industries such as water, it may be that the decision to build was based on considerations other than economic use, rendering the benchmark of a potential new entrant irrelevant.

### 1.3.2 Line in the sand

As a consequence many jurisdictions have used an alternative basis of asset valuation, one that reflects economic value rather than replacement cost. Termed “line-in-the sand”, it sets a pragmatic opening value on the assets for price regulation purposes. The regulatory asset value (RAV) is then “rolled forward” over time according to a simple set of rules which are designed to provide incentives for investment.

The line in the sand approach has been used explicitly for setting prices in the water industry in NSW, Victoria and WA. The method recognises that past expenditures are sunk and are largely irrelevant for efficient decisions regarding usage and future investment. Accordingly, the value attributed to the existing

businesses is in essence a cost allocation process driven by questions of equity and acceptability to the stakeholders involved rather than efficiency per se.

Indeed, in the context of rail access pricing King noted that where the by-pass or contestability rule for stand-alone cost does not apply, the relevant costs (for price ceiling purposes) could be evaluated on whatever basis was seen to be relevant by the regulator<sup>1</sup>.

In the UK, the flotation value of the water and sewerage authorities provided a clear indication of the market's assessment of the future value of the businesses. Thus the opening market value (of debt and equity) was used as the initial regulatory value for the businesses.

In Australia, water utilities have not been privatised so there is no market value available. Instead regulators have tended to assess an initial value of the business on the basis of the existing level of prices that customers pay for the services.

In Victoria, the Minister for Water was responsible for determining the initial RAV. The initial values recommended by the ESC to the Minister were based on the level of returns expected to be earned by the existing businesses, ie economic value<sup>2</sup>. Other considerations taken into account included the profile of future expenditure requirements, with the Government able to choose to mitigate the impact of future price rises on customers by abating the initial RAV (and in consequence accepting lower dividend payments in future).

The “line-in-the-sand” is usually regarded as defining the value of the assets at a given point of time, where value is measured in terms of income-generating ability. Equally, however, the line can be regarded as defining a “customer benefit”, being the sunk cost of the assets on which customers are not expected to provide a return<sup>3</sup>.

With respect to usage and investment, the efficiency properties of a line in the sand approach are secured by ensuring that

- All (approved) new investment in infrastructure is “rolled forward” in the RAV over time, and hence is remunerated appropriately by the cost of capital,
- The revenue requirement includes depreciation of the RAV alongside operating and maintenance expenditures, and

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<sup>1</sup> Stephen King, February 1999, “Review of Aspects of the NSW Rail Access Regime”, p3

<sup>2</sup> ESC, March 2005, “Advice to the Minister for Water, Regulatory Asset Values for the Victorian Water Businesses”

<sup>3</sup> Depending on the price regulatory framework used, the customers may or may not be expected to provide for the replacement of these assets. As discussed in Section 1.3.3 the UK used one approach and Australia has used another.

- Price structures are regulated to ensure appropriate incentives for usage by customers.

The process of rolling forward the RAV over time is fairly mechanistic. In particular the initial value is typically “set in stone” to avoid moral hazard and circularity problems. (If the initial value of the existing assets is revised in the light of future changes in prices, then under the building block approach prices depend on the RAV, which depends on prices). This contrasts sharply with the DORC approach to asset valuation.

Much of the work of ensuring efficient outcomes is done through the process of adding allowed new investment into the RAV. The intention is to ensure that all new investment is full remunerated by the cost of capital, so that prices reflect the cost of resources being devoted to the provision of the service.

However, such new investment is heavily scrutinised by the regulator. In particular new investment needs to be justified in terms of being required to maintain the existing business, required to meet mandatory obligations or providing improved levels of services.

New mandatory obligations are usually defined in terms of legislative requirements, although there may be an element of Ministerial guidance involved. For example, in the UK Ministers were asked to provide guidance on the appropriate timing of the introduction of new drinking water quality standards (including the level of nitrates) following the passing of significantly tighter standards by the EU. For the capital expenditure to be included in the RAV, there is usually a requirement that both the investment program and the outcomes it provides be well defined and measurable.

Capital expenditures required to maintain the existing functions of the infrastructure are usually heavily benchmarked against past performance and/or other suppliers to ensure that the proposed expenditures are efficient.

Where expenditures are intended to improve levels of service (sometimes termed discretionary expenditures), they need to be supported by evidence of willingness to pay on the part of customers. In addition, all new capital expenditures are subjected to scrutiny regarding the efficiency of delivery, and productivity savings are often imposed.

### **1.3.3 Depreciation in the revenue requirement**

In addition to a return on regulatory asset value, the revenue requirement also incorporates an element to cover the depreciation of existing assets. Thus when rolling the RAV forward, capital expenditure is added and depreciation deducted.

In Australia, the standard regulatory approach is to depreciate the RAV (usually on a straight line basis). However, it is important to note that alternative measures of depreciation could be employed: the key requirement being that whatever depreciation is allowed in the revenue requirement is also deducted from the RAV during the roll forward process.

In the UK, depreciation is based on the current cost value of the assets rather than the regulatory asset value. Thus the amount of depreciation in the revenue requirement was significant right from the start of the building blocks regime. In a steady state, where depreciation matches replacement expenditure, the regulatory asset value would be expected to remain broadly constant over time, with the return on RAV and allowed depreciation likewise broadly constant.

This differs from regulatory practice in Australia, where regulators typically allow regulatory depreciation based on the RAV. Where the initial RAV is set at a low level or zero, the level of depreciation allowed in the revenue requirement is likewise very low to start with.

This implies a different profile for prices to the one instituted in the UK. Under a steady-state situation in Australia, the revenue requirement would start low and rise over time, as replacement expenditures are added into the RAV and start contributing to the required return and allowed depreciation. The total PV of prices would be the same as under the “flat” UK profile, but would end up higher in recognition of the fact that the water supplier was financing most of the replacement expenditures initially. This contrasts to the situation where depreciation charges are used to finance the replacement of assets, as in the UK.

## **1.4 Renewals versus building block approach**

In theory the renewals annuity and the RAV building block approach give the same answer in terms of price level. However this requires that the expenditures in the annuity calculation cover the whole asset life (including the initial expenditure on the asset). This equivalence is demonstrated in IPART’s 2004 Issues Paper regarding bulk water prices<sup>4</sup>.

The precise calculation of the renewals annuity varies between businesses. In general, however, the initial investment in the asset is excluded from the annuity. This could be regarded as broadly equivalent to excluding the value of the existing business from the RAV.

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<sup>4</sup> IPART, Sept 2004, “Bulk Water Prices from 2005/6 Issues Paper”, Attachment 4.

A further issue arises with the annuity in that the period of the annuity is usually significantly less than the life of the assets involved so that some later expenditures are excluded. Concomitantly, the level of the annuity will depend on where one is in terms of the asset life cycle. If the annuity period covers the replacement of the assets, the annuity charge will be high. If it excludes both the original investment and does not extend to the replacement of the assets, then the annuity charge will be low. This compares to the constant real charge that would be derived if the period of the annuity matched the life of the asset.

## **2 Application to the Harvey Water BSWA**

This section of the paper considers what application of the building block approach might imply for the Harvey Water bulk supply agreement, in terms of the level of price, the implied level of subsidy and the efficiency and equity of the resultant outcomes. Thus we are concerned to identify whether the price charged for the bulk supply will be efficient, in terms of reflecting the additional costs attributed to Harvey Water. However, this needs to be done while maintaining the intent of the original agreement.

To a certain extent this involves imputing intentions for the decisions that were not explicit at the time. Our purpose in doing so is to explore the implications of alternative decisions, recognising that in practice the original agreement was a pragmatic method of meeting the requirements of the various stakeholders.

It is useful to consider the application of the building block regime firstly on the basis that dam safety expenditures will a) conform to original expectations and b) exceed expectations by up to \$130m. We examine also the implication of the change in the value of the water, occasioned by the current drought.

### **2.1 Outturns unchanged from original expectations**

If a building block approach had been instituted as the basis of the first bulk water agreement, the key issue would have been the determination of the appropriate regulatory asset value.

#### **DORC**

A DORC approach would mean that Harvey Water would not automatically be expected to remunerate all of the expenditures made by Water Corporation. Prices would increase only if the costs facing a new entrant would have increased. This implies that increases in real construction costs, for example, would lead to increased charges to Harvey Water as they would increase the optimised replacement cost. However where repairs are required to address a deficiency in the existing assets, this would not result in an increase in the asset

base for revenue requirement purposes unless a new entrant would also face these expenditures.

Given the low level of existing prices, a DORC value (reflecting the contestable market approach) would have resulted in prices very much higher than those supported by the prevailing charges to irrigators. If a DORC approach were to be used, therefore, it would necessarily imply a significant level of subsidy and hence CSO payment.

The implied level of subsidy would probably be similar but slightly above the current calculation of the CSO. (The optimisation involved in DORC would be likely to result in an asset value below replacement cost. On the other hand, a DORC approach involves the use of a full cost of capital rather than the 4% used for pre-1996 assets.

Notably, had a DORC approach been used, then it seems highly likely that the implications, for pricing purposes, of the dam safety program could have been very different, and arguably a lot less. This would arise from the fact that the incremental costs to a new dam to deliver *the same level of safety* improvement as that proposed under the current dam safety program would probably be a lot less than the costs of retrofitting the existing dams to the same safety level. The DORC calculations would be affected by these new dam incremental costs, not by the retrofit costs.

Nominally, ANCOLD actually requires higher levels of safety in new dams than it requires to be delivered through retrofit to an existing dam – under its tolerability limits. As was noted in Paper 1, this is curious in relation to limits that are purported to be cost-independent limits, and exceptional circumstances provisions might be used to by-pass this feature, but the formal guidance on tolerable risks for the community has this feature. This raises the interesting question of whether the appropriate comparison in assessing the DORC is with the costs of a new dam that offers equivalent safety and function, or one that offers the higher ANCOLD nominal safety level and equivalent function. The latter would imply the greater impact on the DORC assessment of dam safety compliance, though it may well still be the case that a new dam could deliver the higher safety level at lower incremental cost than the retrofit cost for an existing dam to meet the lower limit.

Given the conceptual framework underpinning the DORC, the more appropriate approach would appear to be one that was based on the former concept – optimised delivery of equivalent safety and function, and in this case the adjustment to the DORC for the revised assessment of risks and modified Guidelines would probably imply significantly lower costs than the cost of the retrofit program.

Because of the likely very high cost of the general DORC approach relative to the line in the sand approach that has been adopted, these points probably have little direct relevance in the current setting, unless the line in the sand approach is unwound.

#### Line-in-the-sand I

Alternatively the value attributed to the existing assets could be (and has been) based on the line-in-the-sand approach.

Using the approach adopted in NSW and Victoria, the line-in-the-sand would have set the initial value to zero. This would have recognised that the existing assets represented sunk expenditure, and that irrigators were not expected to provide a return on those past expenditures. The rolling forward process for the RAV implies that prices to Harvey Water would include a return on (and depreciation of) all “allowed” capital expenditures. To the extent that such expenditures are being made for the benefit of Harvey Water and its customers, this is efficient as it ensures that prices reflect the potentially avoidable costs being incurred on their behalf.

As applied in Victoria and NSW, this approach does not imply any subsidy to Harvey Water as long as new investment is fully rolled into the RAV. Thus there would be no formal CSO payment, at least initially.

As discussed above, this line in the sand approach defines the initial customer benefit (ie the asset value on which customers are not expected to provide a return) alongside the initial value on which a return is required. One option, therefore, would be to “roll forward” the customer benefit and deduct it from a DORC valuation, rather than roll forward the RAV *per se*. This would represent a form of blending of the lower initial cost of the line in the sand approach and the lower dam safety costs that flow from a DORC perspective. We explore the equity and efficiency implications of such an approach further below.

#### Line-in-the-sand II

The methodology applied by Water Corporation for calculating the CSO associated with the bulk supply supports an alternative line-in-the-sand valuation. Under this interpretation the Government attributed an asset value of two thirds of depreciated replacement cost of pre1996 assets, with that asset value supported by CSOs where there was inability to pay the prices implied. Under this approach, the higher regulatory asset value is supported by significant CSO payments. In turn the CSO payments support Water Corporation’s ability to make higher dividend payments to Government, its shareholder.

Under this option the choice of implied asset value reflects the average economic value of assets for Water Corporation as a whole in 1996. It does not reflect the economic value of the specific assets in question, and this

creates some difficulty when seeking to analyse the efficiency properties of the outcomes.

Nonetheless, it is clear that under this approach (as with the alternative line-in-the-sand approach) all capital expenditures made post 1996 would have been rolled into the RAV and expected to earn the cost of capital. As indicated above, this would be efficient in that it would ensure that Harvey Water and its customers are prepared to cover the cost of the (additional) resources employed in providing services to them.

## 2.2 Outturns differ significantly from original expectations

A much more complex issue concerns the appropriate shape of the building block revenue requirement in the event that outturns differ significantly from original expectations. The outturns differ in terms of the greatly increased safety expenditures which are now forecast and also in terms of the alternative use which has emerged for some of the bulk water currently supplied to Harvey Water.

### DORC

Under a DORC approach to determining regulatory asset value there is no “automatic” rolling additional expenditures into the RAV.

It is likely, however, that the re-assessment of risk and the required measures to mitigate the risk will have altered the optimal configuration of assets that a new entrant would build if they were to provide dam storage services. Accordingly, there would be some impact on the DORC valuation and hence the allowed return and depreciation. However, as was flagged above, the increased cost of building the new safety standards (at least those that are asked of a retrofit program) into a new dam is likely to be very much less than the cost of taking remedial action on an existing dam. Thus the impact on both the DORC asset valuation and the implied level of subsidy would be minimal.

Whether this can be regarded as an efficient outcome depends on the view taken on whether expenditures to improve dam safety should be regarded as a legacy cost or not. This issue is covered in detail in the second ACIL Tasman paper, and involves mix of efficiency and equity considerations. If the incremental cost of remediating dam safety is regarded as a legacy cost, appropriately covered by Government on behalf of the general community, then a DORC approach to determining asset value would be appropriate.

To address the issue of the level of prices, a DORC approach could be combined with a rolled forward “customer benefit”. This would preserve the intent of the original agreement, and be consistent with the existing CSO.



However, it may be the case that the remedial expenditures are potentially avoidable, for example if the operation of the dams were altered so that they were “run dry” or run with more headroom. This might, for example, be possible if the water levels were kept low by transferring the water the IWSS, but not if the water continued to be supplied to Harvey Water and the irrigation demands required continued storage of water in these dams.

The efficient pricing principles outlined above would require that such avoidable costs – at least any difference between the necessary costs under these alternative operating regimes, be recovered through prices. This would be consistent with the rolled forward RAV approach and not the DORC approach to asset value.

We understand that Marsden Jacob are investigating this question of the scope for altering the necessary level of dam safety investment if, for example, more water were traded to Water Corporation. Significant differences would have significant efficiency implications.

#### Line-in-the-sand

The above discussion identified two alternative “lines” that could be drawn: an initial value of zero, or an initial value of two thirds of depreciated replacement cost.

In both cases the initial value is rolled forward by additional expenditures incurred since 1996. If these expenditures are properly regarded as avoidable so that a rolled forward RAV approach is appropriate, then the key questions become:

- Would the additional dam safety expenditures would be regarded as “allowable” expenditures for rolling into the RAV, and if so
- Would this imply that the line-in-the-sand should be re-drawn.

As discussed above, regulatory practice is for efficient expenditures to be “allowed” and rolled into the RAV if they:

- maintain existing levels of service,
- meet mandatory obligations, or
- provide improved standards of services (provided there is willingness to pay for that level of service).

As the expenditures are designed to improve the level of safety, they would not seem to qualify under the criteria of maintaining the existing level of service. There may be some room for discussion as to whether the costs are designed mainly to deliver the level of safety services originally envisaged for the dam and whether this should be interpreted as service maintenance or as a legacy issue. These matters are discussed in more detail in Paper 2.

If viewed as an improved level of service, the regulator would need to be confident that there was willingness to pay the proposed improvements. This leads onto issues also explored in Paper 2, regarding the beneficiaries of the dam safety expenditures and the appropriate allocation of costs. It seems likely, based on Marsden Jacob (2004), that there is only limited willingness to pay on the part of Harvey Water's customers, which would imply a limit to the level of "discretionary" expenditures that should be rolled into the RAV for pricing purposes.

An alternative view would be that the improved level of service is in the safety services being offered to the wider community. This includes flood mitigation services, with associated damage management, as well as reduction in risks of death and injury. Under this view, the dam would be seen as delivering multiple services, with the primary beneficiary and probably impacter behind these upgraded safety services being the government or broader community. In this case, the additional expenditures would not be rolled into the RAV for pricing purposes, on the grounds that the costs have been allocated to Government/the community as discussed in Paper 2.

The key issue is probably the extent to which the expenditures could be regarded as mandatory. Paper 1 considers the ANCOLD guidelines and discusses the fact that WA is not a signatory to ANCOLD. Thus the ANCOLD guidelines do not strictly qualify as a statutory obligation – rather they are in the nature of a guide to best practice. Nonetheless, the requirement to meet best practice could itself be regarded as an obligation. However there would remain an element of judgement as to whether specific proposals made by Water Corporation represented good value-for-money, or whether there was any "gold plating" in comparison with whole-of-Government risk assessment planning. Such gold plating could arise from a desire to limit the liability of directors in the event of a catastrophe coupled with limited downside for Water Corporation in incurring elevated costs, given the options available for financing. These matters are discussed in Paper 1.

Suppose that the discussion on the appropriate allocation of costs decides that a significant proportion of the proposed dam safety costs should be attributed to Harvey Water and its customers, and that the expenditures are regarded as allowable for the purpose of rolling into the RAV. What would this imply for the efficient level of prices and the implied level of subsidy?

Clearly the amount of dam safety expenditure is crucial. If, as currently forecast, the future dam safety expenditures are very significant, this implies very considerable increases in the RAV, no matter what the starting point. Unless these increases were compensated by increased CSO payments, it would imply steep and potentially unaffordable increases in the price of water to irrigators.

Whether such price increases would be efficient depends on a number of considerations. One possibility is that the impact of higher prices serves to decrease the value of farming properties and water rights but leaves water usage relatively unchanged. This would have very significant equity implications, but could be regarded as efficient as irrigators are covering the costs incurred to enable continued supply.

Another possibility would be that bulk supplies become unaffordable – or it becomes commercially attractive to trade them out of irrigation into other uses for whom the elevated costs are more justifiable. Irrigators sell their water rights, and the bulk supplies are retained by Water Corporation for use within the IWSS. If the level of dam safety expenditure is efficient and avoidable (since the necessary cost of safety compliance at the dams is lowered), then such an outcome would be efficient, albeit with heavy social and equity implications.

It may be that the safety expenditures are not strictly avoidable, in the sense that they would still be incurred if the water was used in the IWSS. The outcome would still be efficient, however, if they were being incurred on behalf of customers willing to pay. The alternative situation, of the costs being incurred for irrigators unable or unwilling to pay could result in higher-cost water supplies being sought for the Perth area – though probably still as supplies available at a competitive price for urban use. For example, re-direction of Harvey Water into the IWSS might allow the Perth de-salination plant to be run less-frequently. The saving in operating costs, less the transportation costs involved in delivering the water into the IWSS, provides a measure of the opportunity cost involved in retaining the bulk water for irrigation use.

In sum this implies that efficient dam safety costs that have been properly allocated to Harvey Water should be rolled forward into the RAV. In considering whether such an outcome would be equitable, however, a key issue is the intent of the original CSO. This brings us to the question as to whether, in the light of subsequent improvement of knowledge about dam safety, the line ought to be “re-drawn”. The issue is whether higher dam safety expenditure would have reduced the value of the assets existing in 1996, and if so whether that ought to be recognised.

Under the Vic/NSW line-in-the-sand approach, the value of the asset in 1996 would be based on its economic value (ie revenue generating ability). Assuming there is limited ability to pay increased prices on the part of irrigators, any increase in future expenditures implies that the existing asset is indeed less valuable (unless an alternative, less price constrained, use is found for the asset).

If the true cost of the future dam safety expenditures had been understood at the time, it may well be the case that no agreement would have been reached without explicit agreement by Government to underpin the future costs. This implies either a negative initial value of the asset (in recognition of the future liabilities), or that the initial RAV of zero be rolled forward by an expenditure level which is abated. Either way, the conclusion is that the assets have a certain revenue-raising capacity (ie economic value) which cannot be increased despite the (higher than anticipated) dam safety expenditures.

The same principle would apply to the alternative (Water Corporation) definition of the line-in-the-sand, whereby initial value is based on two thirds of depreciated replacement cost. If the justification for the current CSO remains, the subsidy would necessarily increase to reflect the fact that the economic value of the assets is unchanged.

#### Change in value of the water

The question has also been raised as to whether the original line-in-the-sand ought to be re-drawn in the opposite direction: namely increased to reflect the fact that the dam storage services have increased in value due to the possibility of the water being sold into Perth.

Such an adjustment would imply significantly different distributional outcomes, with a reallocation of benefit from Harvey Water customers to Water Corporation. In particular, the increase in the cost of the dam services would result in offsetting reductions in the value of the water rights held by irrigators.

In theory, the value of the water rights to irrigators has been increased by the possibility of alternative use and its increased value in that use. This would enable a reallocation of value to Water Corporation without adverse equity effects to irrigators. However, in practice Water Corporation is the monopoly purchaser of the water rights, which means that the windfall gains have not accrued to irrigators.

Moreover efficiency does not necessarily require that the change in value be reflected in the RAV and hence prices. The ability to trade water rights means that irrigators face the appropriate incentives to ensure that water moves to its most valuable use (ignoring constraints on trading).

### 3 Conclusions

There are some definitional aspects to the discussion above. For example, and given a limit to the revenue-raising ability of bulk supplies to Harvey Water, a higher initial value implies a higher subsidy.

- The NSW/Victorian approach to the line-in-the-sand has some advantages in terms of clarity, with initial value related to the economic value of the assets concerned as at 1996. Sunk assets with no revenue generating ability

were attributed as having no value, which implies a subsidy of zero. The subsidy would remain at zero provided the BWSA price covers all of the expenditures incurred subsequently that are properly attributable to Harvey Water.

- On the other hand, this approach is not consistent with the WA Government’s approach to the calculation of the CSO. Under this approach prices are regarded as involving a subsidy if they are below the level needed to remunerate two thirds of the 1996 depreciated replacement cost of the assets. Thus the benchmark against which subsidy is measured reflects the “accident” of history where prices were relative to costs for Water Corporation’s asset base as a whole.

The issues of substance relate to a choice between a DORC approach to asset value versus a rolled forward RAV, and whether all or just a portion of the allowable costs are rolled into the RAV under the latter approach.

A DORC approach fits with treating the higher cost of retrofitting dam safety as a legacy cost. However, DORC is based firmly on the theory of a contestable market. Although it can be squeezed to “fit” the current level of prices using the concept of a rolled forward “customer benefit”, it runs the risk of producing inefficient outcomes in a world that is in practice a long way from being contestable.

The rolled forward RAV approach has the advantage of providing considerable flexibility. In particular it provides a structure for examining the efficiency and equity implications of rolling forward the whole or part of the future expenditures on dam safety.

- Equity considerations may influence which costs are allocated to Harvey Water and hence rolled in the RAV.
- However there are a number of key efficiency considerations.
  - Costs that would be avoidable under an alternative use of the asset should be rolled forward;
  - Where costs are not efficient, for example as a result of the institutional and community processes involved in determining required dam safety expenditures, the “inefficient” component should not be rolled forward into the RAV.
  - To the extent that costs are efficient but not necessarily avoidable (by the actions of the irrigators), it is partly a matter of equity as to whether they should be allocated to users of the dam services or the Government/community. As discussed in paper 2, this will include considerations as to expectations at the time the original agreement was signed, but also the appropriate allocation of the implied risk at the time.



- However extent to which such costs would be affordable by other users introduces a further efficiency aspect. In particular, there are efficiency benefits from ensuring that water moves to the use best able to cover the costs involved in supply. This would favour including more rather than of such costs in the RAV.
- Under a RAV approach, the level of subsidy would be a residual, the difference between the actual price charged to Harvey Water and the price required to remunerate the rolled forward RAV.