
# Building Blocks Model

# River Murray Operations

Final Report for Commonwealth Department of the Environment

November 2014

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# Findings and recommendations

Synergies Economic Consulting (Synergies) has been engaged by the Murray-Darling Basin Officials Committee (BOC) to:

- conduct an efficiency review of the River Murray Operations (RMO); and
- construct a building blocks model, consistent with best practice regulatory practice and the Water Charge (Infrastructure) Rules, of RMO costs, incorporating efficient costs above.

Synergies carried out this project in conjunction with Cardno and Economic Insights, who reviewed efficiency aspects of RMO.

Our collective findings are summarised below. We also set out recommendations for improvement for BOC to consider.

## Findings

**Finding 1. RMO costs were found to be efficient.**

Cardno's review of RMO operating costs and renewals forecasts generally found those costs to be efficient, except for contingency applied to infrastructure enhancement projects (a $400k reduction over 4 years is recommended).

High-level economic benchmarking performed by Economic Insights also suggests RMO costs compared well to their peer group, though this should only be considered indicative and preliminary given the data constraints (refer below).

**Finding 2. RMO asset management practices are sound.**

While in overall terms the MDBA and SCAs have robust asset management and delivery practices, a number of improvement opportunities have been recommended (below).

**Finding 3. Ongoing benchmarking would require a structured and comprehensive framework.**

Our terms of reference asked us to consider a framework for long-term benchmarking. The economic benchmarking performed for this review is only an initial trial of methods relying largely on existing data collected by the NWC. The aim was mainly to demonstrate a method of benchmarking that could be used to complement other methods of analysis within a regulatory or cost control framework.

The current data set for Australian rural water businesses is inadequate for benchmarking purposes. To develop economic benchmarking further requires an investment of effort in further data gathering.

**Finding 4. The long term, minimum building block revenue requirement for RMO is above historic funding / expenditure levels.**

The long-term minimum revenue requirement (lower bound) calculated under the building blocks model shows that the recent level of funding for RMO will need to increase. For example, the lower bound revenue requirement is around $72M for 2014-15 using the building blocks model, compared to the $55M cash budget (recurrent operating costs and renewals) for RMO. The difference is attributable to the renewals annuity, which is higher than the current levels of renewals expenditure indicating overall renewals spending will need to increase over the next 30 years.

## Recommendations

**Recommendation 1. An ongoing efficiency target of 1% per annum should apply.**

Cardno recommend a 1% per annum efficiency target be applied for operating costs, which total $2.8M over 4 years.

**Recommendation 2. An industry-wide approach is adopted for benchmarking.**

Our terms of reference asked us to consider a framework for long-term benchmarking. There are merits of continuing the economic benchmarking work to provide more and better information to the JV participants about RMO efficiency. However this requires an industry-wide approach and commitment.

We recommend further development of the benchmarking database for rural water businesses with comparable operations to RMO, building on the existing framework established by the NWC, and including some businesses not currently covered.

**Recommendation 3. Implement enhancements to the RMO asset register.**

The current asset register could be enhanced by assigning a condition rating score and consequence of failure scope (criticality[1]), to produce an asset risk score. This information would be useful to inform and augment the current processes for prioritising renewals and other expenditure.

[1] Articulated service standards are important for developing criticality.

The various 'natural assets', such as river banks and channels, could be added to the asset register, and assigned the rating scores above to ensure a common approach across all areas of expenditure, regardless if the JV technically owns the asset or not.[2]

**Recommendation 4. Implement enhancements to the Asset Management Plan.**

Improvements to the next version of the Asset Management Plan could be made, particularly the inclusion of:

- the standards of service expected;
- summary financial information;
- renewals, planned maintenance and renewals annuity projections;
- high level statistics on the condition of assets; and
- a summary improvement action plan over a three-year horizon.

**Recommendation 5. Develop a consolidated set of explicit service standards.**

A more formal, consolidated specification of service standards and obligations should be developed for RMO assets. In the first instance, these requirements could be set out (or at least summarised) in the Asset Management Plan (refer above), with performance reported periodically (e.g annually). Once consolidated, standards should be reviewed with items that are quasi-service standards removed.

**Recommendation 6. Implement additional service standard and asset performance metrics.**

Specifying service standards for RMO assets enables trade-offs to be assessed between the standard required, and the cost of meeting that standard. Opportunities may exist to accept slightly lower service standards, with significant cost savings. Articulating the current standards and costs, and analysing the changes in cost from standards, would help ensure the JV's expectations for service outcomes were well informed. Additional metrics could be developed to include:

- Asset availability;
- Percentage of assets in various condition grades;
- Percentage of critical assets in various condition grades;

[2] Rather, we understand the JV has some obligations for water delivery or other environmental obligations that are affected by the condition of streams and channels.

- Percentage of assets with various risk ratings.

**Recommendation 7. Provide budget and cost information to clearly separate recurrent operating costs from project expenditure, over multiple years.**

The building blocks elements separate recurrent operating costs, which are relatively stable and can be tracked from year to year, from renewals costs which are lumpy and project-specific. The current budgeting structure, which mixes the two, does not give this information making it hard for JV participants to see trends in costs and assess changes in costs over time.

We therefore recommend that the JV construct its actual and forecast cost information into recurring operating and renewals costs in addition to the current approach (which is done to support cost sharing calculations). This information can also be updated into the building blocks model each year.

These forecasts should involve firm expenditure proposals over the 4-year corporate plan horizon. Guiding forecasts of recurrent operating costs should also be undertaken over a 5 – 10 year horizon. Renewals should continue to be forecast over 30 years.

**Recommendation 8. Improvements to cost forecasts**

The base year (e.g. year 1 recurrent operating cost) forecasts should be established, and variances from that base year for the future year forecast (e.g. years 2 – 10) showing real changes in cost. These real changes should be based on real changes in input costs (e.g. price or quantity). Where real increases are proposed, they should be justified and the efforts to minimise the increase document. Increases should also be linked to a driver.

Proposals for new expenditure should also be linked to a driver or drivers and service levels.

**Recommendation 9. Streamline expenditure governance processes**

The current expenditure governance arrangements are cumbersome and we understand variation to budgets often require changes to the Corporate Plan. A review should be undertaken to determine the feasibility of implementing a less onerous budget (corporate planning) process while maintaining accountability and transparency.

The approach should also provide more certainty about a longer-term expenditure program on assets (e.g. over the 4-year cycle of the corporate plan).

**Recommendation 10. Improve consultation regarding RMO expenditure and activity plans.**

Consideration should be given to wider and more formal consultation regarding forecast RMO expenditure and activities, including the interaction between MDBA, SCAs and customers. We would expect SCAs would lead customer consultation.

# Executive Summary

Synergies Economic Consulting (Synergies) has been engaged by the Murray-Darling Basin Officials Committee (BOC) to:

- conduct an efficiency review of the River Murray Operations (RMO); and
- construct a building blocks model, consistent with best practice regulatory practice and the Water Charge (Infrastructure) Rules, of RMO costs, incorporating efficient costs above.

The RMO assets are held under the River Murray Operations Joint Venture (the JV), comprising New South Wales, Victoria and South Australia state governments, the Australian Capital Territory, and the Commonwealth (the JV participants). The RMO assets and activities are managed by the Murray-Darling Basin Authority (MDBA) who subcontract certain activities to state agencies, or State Constructing Authorities (SCAs).

Our engagement has been initiated to address concerns amongst the various participants about RMO costs and operating efficiency. Synergies is leading a consortium which includes Cardno and Economic Insights, who are together undertaking the efficiency review. These consultant's reports are in

The purpose of this review is twofold:

- to address the limitations of the current reporting system by undertaking a new assessment of the costs and efficiency levels of RMO using what would now be regarded as best practice methodology consistent with the National Water Initiative (NWI) and the Water Charges (Infrastructure) Rules (WCIR); and
- to be the first in a series of regular reviews of RMO costs that, by using the Building Blocks methodology, will improve transparency, ensure that the MDBA reports its costs in a manner that is consistent with the NWI and the WCIR, and enables decisions about RMO funding to be made by the states on the basis of a transparent, efficient and sustainable cost base.

This report presents the Maximum Allowable Revenue (MAR) for River Murray Operations (RMO), under a renewals annuity, over the period 2014-15 to 2017-18. A separate MAR is calculated for three services: river regulation; salt interception; and environmental management services. Synergies previously provided a pricing principles paper to ROJAT (Review of Joint Activities Taskforce) and scoping reports. These discussions with ROJAT confirmed the broad approach to be taken, including

adopting an annuity approach for future renewals expenditure, for the purpose of providing information to the JV about long term renewals costs.[3]

Under a renewals approach, the elements to the building blocks are:

- a return on existing assets[4];
- a renewals annuity for infrastructure assets, and depreciation of non-infrastructure assets; and
- operating costs.

### Return on assets

The value of the assets required for RMO have been reviewed by Cardno. Unlike past valuations (e.g. by SMEC), a regulatory valuation adopts the Optimised Replacement Cost. Applying this methodology results a 6% reduction to the prior SMEC valuation. Land values were not included, but would be under a normal regulatory valuation.

A rate of return was calculated in accordance with the Water Charge Infrastructure Rules (WCIR), of 6.92%.

### Efficient renewals expenditure

Cardno undertook a review of renewals expenditure, and generally found that asset management and delivery processes where appropriate and robust. Cardno accepted the JV's forecast of renewals expenditure. However, Cardno found that the contingency set aside for enhancements to infrastructure assets was excessive, and reduced the budget by around $400k to $5.4M, across the four years.

The renewals annuity calculated from this expenditure profile is set out below.

[3] The cash funding arrangements for RMO activities among JV participants was outside the scope of our review.

[4] And a return on future capital expenditure on non-infrastructure assets and enhancements to infrastructure assets.

**Renewals annuity ($nominal)**

Asset renewal annuities by type and Headline Service

| Service | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| River Regulation | | | | |
| Planned Maintenance | $11,701,853 | $11,856,265 | $12,052,733 | $12,261,346 |
| Asset Replacement | $17,315,140 | $17,563,557 | $17,816,199 | $18,053,340 |
| Salt Interception | | | | |
| Planned Maintenance | $1,230,837 | $1,255,234 | $1,265,261 | $1,282,409 |
| Asset Replacement | $2,423,308 | $2,543,725 | $2,624,588 | $2,669,474 |
| Environmental works and measures | | | | |
| Planned Maintenance | $60,522 | $60,986 | $61,453 | $61,923 |
| Asset Replacement | $0 | $0 | $0 | $0 |
| TOTAL | **$32,731,660** | **$33,279,766** | **$33,820,234** | **$34,328,492** |

## Operating costs

The JV presented operating cost forecasts over the four years, based on the expected requirements from the RMO assets. The Cardno review found that the forecasts for 2014-15 to 2017-18 were efficient.

In addition, Cardno recommend a 1% per annum efficiency target be applied for operating costs, which total $2.8M over 4 years. The recommended operating costs are set out below.

**Recommended operating costs ($nominal)**

| Service | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| River Regulation | | | | |
| Routine O&M | $24,217,009 | $25,364,516 | $25,382,355 | $27,919,120 |
| I&C Opex | $9,199,810 | $9,502,503 | $9,834,472 | $9,849,496 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $0 | $0 | $0 | $0 |
| RMW Admin | $0 | $0 | $0 | $0 |
| Salt Interception | | | | |
| Routine O&M | $6,138,600 | $6,510,726 | $6,425,720 | $6,687,257 |
| I&C Opex | $317,594 | $328,441 | $334,671 | $340,941 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $0 | $0 | $0 | $0 |
| RMW Admin | $0 | $0 | $0 | $0 |
| Environmental works and measures | | | | |
| Routine O&M | $1,400,008 | $1,433,866 | $1,475,299 | $1,487,799 |
| I&C Opex | $452,391 | $473,531 | $598,505 | $607,783 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $54,000 | $55,442 | $56,839 | $969,804 |
| RMW Admin | $0 | $0 | $0 | $0 |
| TOTAL | **$41,779,412** | **$43,669,025** | **$44,107,861** | **$47,862,201** |

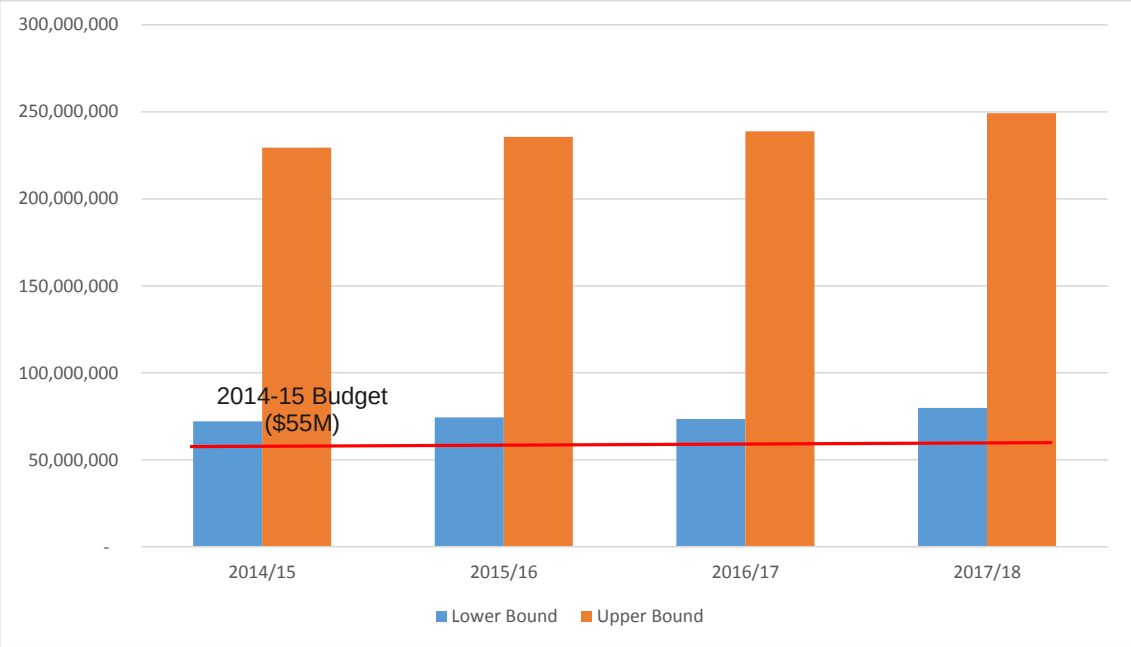
## Economic benchmarking

Indicative benchmarking prepared by Economic Insights showed that RMO was among the best performers in its peers.

## Revenue allowances

The maximum allowable revenue (MAR) for RMO were calculated based on the revised efficient asset values and operating and renewals costs. This revenue is equivalent to 'upper bound' cost recovery under the National Water Initiative. We also calculated the lower bound level of cost recovery, which excludes a return on the existing asset base. These are set out below, compared to the 2014-15 budget.

**Upper and lower bound MAR ($nominal)**

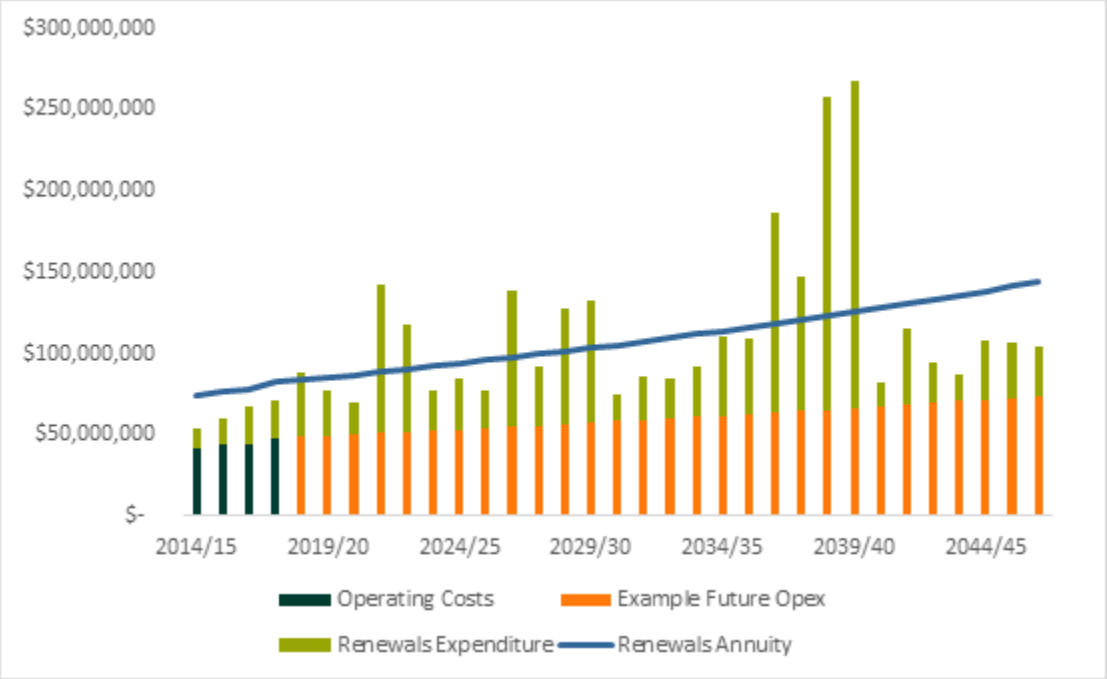



## Observations and findings

The lower bound revenue requirement calculated under the Building Blocks Model is higher than recent RMO funding, which has been budget constrained. The table below shows several years where significant renewals expenditure is required over the medium to long term (refer below). These factors indicate that funding for RMO will need to increase into the future.

Also note that the renewals annuity 'smooths' the revenue requirement, which is reflected in both the lower and upper bound revenues.

**Long-term cost projections ($nominal)**




While in overall terms the MDBA and SCAs have robust asset management and delivery practices, a number of improvement opportunities have been identified, including specification of service standards, improved asset data, and cost reporting.

Our terms of reference asked us to consider a framework for long-term benchmarking. There are merits of continuing the economic benchmarking work to provide more and better information to the JV participants about RMO efficiency. However this requires an industry-wide approach and commitment.

# 1 Introduction

River Murray Operations (RMO) comprise water storages that regulate river flows and deliver entitlements, salt interceptions schemes, and environmental works.

The assets that provide RMO services are held under the River Murray Operations Joint Venture (the JV), which comprises the state governments of New South Wales, Victoria and South Australia and the Commonwealth (the JV participants). RMO is funded by the JV participants in accordance with agreed cost shares. The JV has operated within a constrained budget for some years. At the same time the JV's asset base has grown, with the addition of environmental assets arising from The Living Murray program.

## 1.1 The review

Synergies Economic Consulting (Synergies), in conjunction with Cardno and Economic Insights, has been engaged to:

- conduct an efficiency review of the RMO, including advice on efficiency and productivity assessment methodologies; and
- construct a building blocks model, consistent with best practice regulatory practice and the Water Charge (Infrastructure) Rules (WCIR), of RMO costs, incorporating efficient costs as determined by the above review.

The purpose of this review was:

- to address the limitations of the current reporting system by undertaking a new assessment of the costs and efficiency levels of RMO using what would now be regarded as best practice methodology consistent with the National Water Initiative (NWI) and the WCIR; and
- to be the first in a series of regular reviews of RMO costs that, by using the building blocks methodology: will improve transparency; ensure that the MDBA reports its costs in a manner that is consistent with the NWI and the WCIR; and enables decisions about RMO funding to be made by the states on the basis of a transparent, efficient and sustainable cost base.

## 1.2 Our approach

In delivering this project, we have:

- recommended principles to ROJAT (Review of Joint Activities Taskforce) about specific application of the WCIR to the building blocks model. The decisions arising from ROJAT have been adopted for this report;

- prepared a data request to the Murray Darling Basin Authority (MDBA) and State Constructing Authorities (SCAs) seeking information about costs and management processes;
- conducted interviews with MDBA and SCAs to gather specific information and understandings about processes and costs;
- obtained from MDBA a baseline expenditure forecast, reflecting MDBA's view of required operating expenditure from 2014-15 to 2017-18, and renewals expenditure to 2047, to provide RMO services;
- prepared scoping reports and analysed the information and other gaps required under the WCIR to perform a building blocks cost assessment (the Building Blocks Scoping Report) and efficiency review (the Efficiency Scoping Report);
- held a teleconference with the Australian Competition and Consumer Commission to discuss certain aspects of the application of the WCIR;[5]
- sourced data for economic benchmarking, based on the National Water Commission's published National Performance Report (NPR) data;
- presented our preliminary findings to the Basin Officials Committee (BOC).

We would like to acknowledge the efforts and cooperation of the MDBA and SCAs in providing the required information, often in short timeframes and amidst competing priorities.

## 1.3 This report

This report sets out the recommended inputs to the building blocks model, and presents the results. The results incorporate the efficiencies recommended by Cardno into the cost base (the Cardno Report). This report also summarises the economic benchmarking conducted by Economic Insights.

Detailed reports by each consultant have been provided separately.

This report is structured as follows:

- section 2 provides an overview of the building blocks approach to pricing;
- section 3 briefly describes the RMO ownership and management arrangements;
- section 4 sets out the service and regulatory obligations for RMO;

[5] The Department of Environment and MDBA were present at this discussion.

- section 5 describes the regulatory valuation for existing RMO assets;
- section 6 presents the rate of return applicable to RMO assets;
- section 7 sets out the assessed efficient renewals costs and renewals annuity;
- section 8 presents the efficient operating costs
- section 9 sets out the maximum allowable revenue for RMO services;
- section 10 discusses the findings of economic benchmarking;
- section 11 provides analysis and commentary, and presents a conclusion.

# 2 The Building Blocks approach

This section provides a brief summary of the building blocks approach, and its application in accordance with the WCIR. It also discusses the NWI requirements and relevance.

## 2.1 The Building Blocks approach

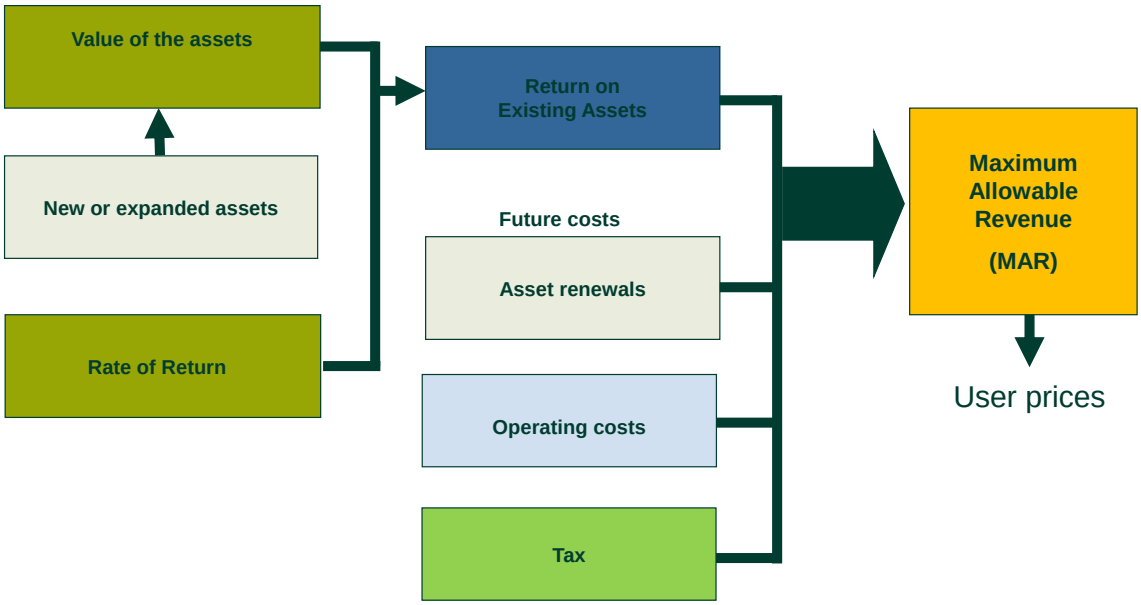
A building blocks model is normally applied in a regulatory setting to establish the efficient cost base to be recovered from user charges. The objective of the building block approach is to ensure that the infrastructure provider is adequately compensated (but not over-compensated) for the costs of providing its regulated services. The approach therefore seeks to establish an efficient cost base. Under a renewals annuity approach, the building blocks is comprised of the following elements or 'blocks':

- a rate of return on an efficient, existing asset base required to provide the service. In the context of bulk water, the asset base comprises mostly long-life infrastructure such as dams and weirs. The rate of return compensates the asset owner for their prior investment, and reflects their 'weighted average cost of capital' or WACC;
- a rate of return on any additional capital expenditure to expand the service capacity of the asset base - for example, increasing storage to increase the amount of entitlement available or adding another salt interception scheme. This is only possible where there is available water resource to do so. Asset owners also need to earn this rate of return on new capital expenditure in order to invest;
- an annuity to recover efficient renewals expenditure required to maintain the service capacity of the asset base in perpetuity – for example, to maintain storage and release/flow capacity of assets. Renewals usually comprise refurbishments, replacements and large/infrequent maintenance items (e.g. painting gates), and can be operating or capital cost in accounting terms;
- efficient year-on-year operating costs to provide the service, including operations, maintenance and administration costs; and
- an allowance for tax.

Together, these costs are usually referred to as the Maximum Allowable Revenue, or MAR. This MAR is equivalent to the revenue requirement for the service. User prices are

calculated to generate this revenue for a given demand. The building block components, under a renewals annuity approach, are set out in Figure 1.[6]

**Figure 1 Building block components (renewals approach)**




## 2.2 The WCIR

The WCIR set out regulatory requirements for various classes of water businesses or 'operators'. The WCIR is augmented by guidance material issued by the Australian Competition and Consumer Commission (ACCC), namely:

- A guide to the Water Charge (infrastructure) Rules: Pricing application for Part 6 operators (the WCIR guidelines); and
- Pricing principles for price approvals and determinations under Water Charge (Infrastructure) Rules 2010 (the WCIR pricing principles).

A key aim of this study has been to ensure that where possible the building blocks model is consistent with the requirements of the WCIR and more broadly the NWI.

[6] The building blocks elements are slightly different if the assets are to be depreciated. In this instance, capital expenditure is added to the asset base and depreciated. The rate of return applies to a depreciating asset base. The depreciation cost then forms part of the building block. In broad terms, the depreciation and renewals approaches are equivalent over the life of the asset.

The JV is not regulated under the WCIR. However, for the purposes constructing the building blocks model we have assumed that the JV, as the provider of RMO services, is equivalent to a 'Part 6 Operator', under the WCIR. That is, the JV is non-member owned, and provides services in relation to more than 250GL of entitlement in the Murray Darling Basin.

The WCIR provides for a range of approaches to specific elements of the building blocks. The application of the WCIR to RMO for asset valuation, renewals, operating costs and tax are discussed later.

## 2.3 The NWI

The NWI re-stated the boundaries for rural water pricing from the original 1994 COAG reforms. In short, the NWI requires that prices are set to recover no less than a 'lower bound' level of costs, and no more than an 'upper bound'. These two bounds are:

- Lower bound – represents the minimum level of cost recovery for a water business to be financially sustainable. In terms of the building blocks approach above (refer figure 1), lower bound costs are operating costs, renewals costs and tax.[7]
- Upper bound – is the maximum level of costs that a monopoly service provider would be able to earn, under regulated pricing. The distinguishing feature of upper bound pricing is a provision for a return on past investments.

Under paragraph 66 (v) of the NWI, states and territories agreed to achieve lower bound pricing, and move towards upper bound pricing, where practicable. [8]

## 2.4 Application

The building blocks model generates a MAR that the asset owner can recover from users. It is for each JV participant to determine how much of that MAR they wish to recover.

The annual funding or cash costs for RMO are often different to the MAR. This is because cash is already spent on existing assets, yet the MAR provides for a return on that investment. Also, the MAR usually smooths costs to avoid price shocks to users. For example, the annual cash costs of renewals are determined by individual renewals projects, which are typically lumpy and infrequent. This means cash costs can vary significantly year-on-year. A renewals annuity is one method of smoothing this cost, as

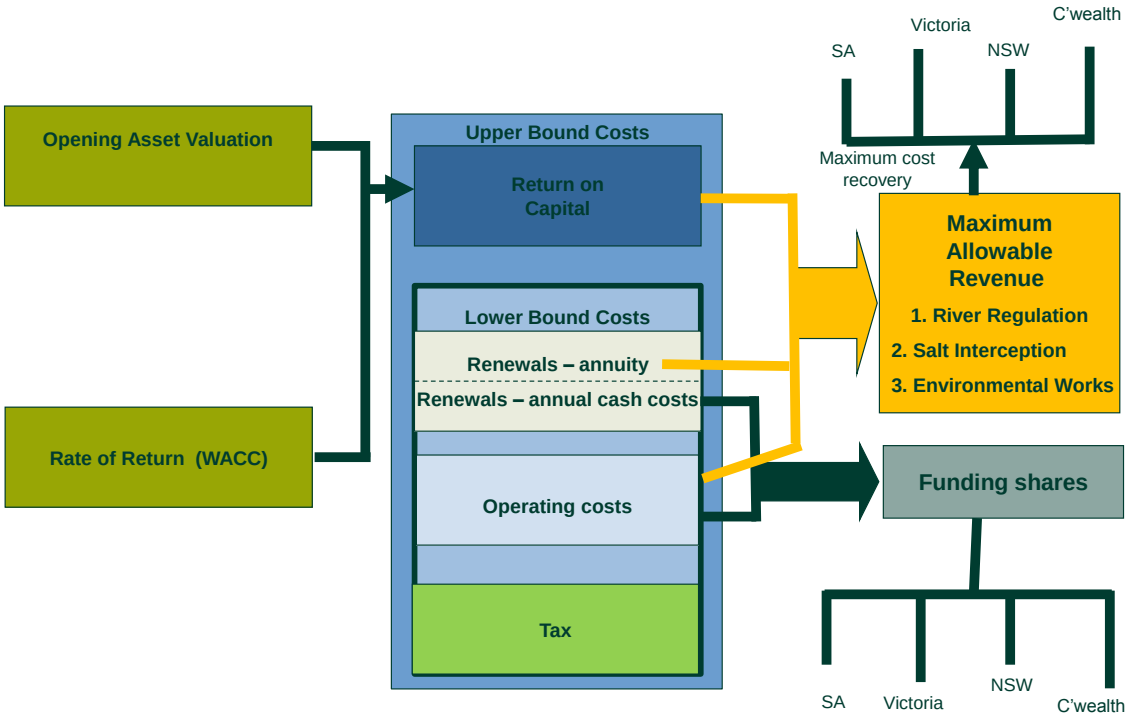
[7] The precise definition of lower bound cost since 1994 has also included other items such as interest costs, dividends and externalities.

[8] COAG. Intergovernmental Agreement on a National Water Initiative (2004). Refer paragraph 66.

it is the annual revenue required to recover a forecast renewals program over a long period (e.g. 20 to 30 years). Section 7 provides more detail.

Figure 2 below provides an illustration, and shows the approach used for each element of the model. It also presents the components of upper and lower bound costs.

**Figure 2. Building blocks model and cash funding (renewals approach)**




On the right hand side of the diagram, there are two different streams. The MAR (yellow) represents the maximum level of cost recovery from RMO (comprising river regulation, salt interception and environmental works), which is between the lower and upper bound. Each JV participant would be able to recover their share of this MAR from users in their jurisdiction.[9]

The funding shares (grey box) are the cash costs of RMO, which are the annual operating and renewals costs, as well as any additional capital expenditure to expand RMO services (e.g. new environmental works and measures). The JV participants provide this funding in accordance with their agreed cost shares. No cash funding is required to recover previous capital expenditure or the pre-existing asset base, as this money is already spent.[10]

[9] We are not aware of a mechanism for the Commonwealth to do so.

[10] Moreover, there is no debt associated with this expenditure and hence no interest costs.

As set out above, the MAR is a 'smoothed' representation of costs, as it incorporates a renewals annuity. Cash costs however will be lumpy given renewals projects and costs will year-on-year.

# 3 River Murray Operations

This section provides an overview of RMO ownership, governance and operations. The Cardno Report provides more detailed information about the operating environment and governance of RMO.

## 3.1 Ownership

The Murray Darling Basin Agreement (MDB Agreement) details how control of the assets is exercised. Under the agreement:

- an unincorporated joint venture was established to exercise control of the assets by mutual agreement of the joint venture partners;
- all governments agreed that control of transitional assets are in the following proportions (we assume these percentages remain today):[11]
  - Commonwealth – 20%
  - South Australia – 26.67%
  - New South Wales – 26.67%
  - Victoria – 26.67%

## 3.2 Operations and management

The four governments share the costs of the RMO assets, which include major storages, weirs, locks, environmental structures and salinity mitigation works on the River Murray.

The MDBA manages the assets on behalf of the JV to account for State water shares and meet water delivery, environmental, navigation, flood mitigation and salinity mitigation requirements. The MDB Agreement requires that day to day management, operation, maintenance and renewal of the physical assets is undertaken by the State Contracting governments via their SCAs:

- New South Wales – State Water Corporation and the NSW Office of Water
- Victoria – Goulburn-Murray Water
- South Australia – SA Water

[11] Refer to Section 150(4). These shares can be altered by the Asset Agreement.

## 3.3 Funding and cost sharing

Funding for RMO relies upon contributions from each JV participant in accordance agreed cost shares. These cost shares are summarised below.

### 3.3.1 Investigations and Construction

Under Part IX of the MDB Agreement:

- the Commonwealth Government must contribute one-quarter of all investigations, construction and administration costs after first deducting any contribution to those costs made by Queensland and the Australian Capital Territory; and
- the State Contracting Governments must together contribute three-quarters of all investigations, construction and administration costs relating to river operations, in the relevant proportions determined by the Ministerial Council on the recommendation of the Authority.

These costs are known as Investigations and Construction (I&C) costs within the JV.

### 3.3.2 Annual O & M funding

State Contracting Governments must contribute to operation and maintenance costs in the relevant proportion determined by the Ministerial Council on the recommendation of the Authority.

While the distribution of the cost shares between the three states is regularly reviewed, the funding shares currently agreed reflect a combination of cost sharing principles including 'user pays' and 'shared responsibility'. Specific allocators include water use and water entitlements and in some instances include a local benefit component.

These costs are known as Operations and Maintenance (O&M) within the JV.

## 3.4 Cost recovery

The JV does not directly charge consumers for water delivery, and plays no role in recovering costs from water users. Recovery of costs of RMO is a matter for each JV participant.

# 4 Service and regulatory obligations

This section sets out the service and regulatory obligations for RMO.

## 4.1 RMO service definition and scope

### 4.1.1 Scope

The MDB Agreement offers a very broad definition for the scope of RMO services. For example, it defines River Operations as activities relating to:

- construction, operations, maintenance and renewal of work on, adjusted to, or connected to the upper River Murray or the River Murray in South Australia;
- sharing water between the states; and
- the provision of other services relating to water, to the states and other persons.

RMO assets are defined to mean River Murray operations assets, being:

- transitional assets, which are essentially the pre-existing storage and other assets in existence at the time of the MDB Agreement;
- further works constructed, as authorised by the Ministerial Council, to promote the equitable, efficient and sustainable use of the water and other natural resources of the MDB.[12]

### 4.1.2 Service types

We have categorised three types of RMO service, namely:

- River Regulation, including ancillary activities such as recreation and navigation.
- Salt Interception; and
- Environmental Management.

These services are assumed to be 'regulated services' under the WCIR.

The JV also forecast revenues associated with other activities, such as hydro-electricity generation, salinity recoveries, and other operating income. These revenues (around $3M - $5M per annum) are shared between the Commonwealth and States according to an agreed formula. We raised this issue with ROJAT, and it was decided that rather than

[12] Refer Clause 56.

considering these services 'unregulated' and allocating a share of common costs, we have instead applied these revenues to offset the building blocks costs . The total revenue offsets are set out in tables 8 and 9, in Section 9.

## 4.2 RMO service and regulatory obligations

The obligations and service requirements for RMO exist in a range of documents, as set out below.

The service and regulatory regime is irregular in so far as it does not involve separate licensing / regulatory obligations for the JV, as exists for other bulk water providers (e.g. Goulburn-Murray Water, State Water and SunWater). Rather, obligations and service standards reside within the JV, and are largely agreed among the JV participants.

### 4.2.1 Murray Darling Basin Plan

The Basin Plan specifies a range of parameters that the MDBA must achieve in the operation of the Basin. These parameters include:

- water quality targets (Chapter 9, Division 3 of Part 4)
- salinity targets (Chapter 9, Division 4 of Part 4).

There does not appear to be any specific obligation in relation to the JV or for RMO in the Plan, though the JV assets would need to be managed and operated consistent with the requirements of the Plan.

### 4.2.2 MDB Agreement

The MDB Agreement prescribes a number of matters, including how water is to be shared between the states, distribution of water during extreme or unprecedented circumstances, and minimum water levels at certain storages / locks.

### 4.2.3 Objectives and outcomes

Objectives and outcomes (O&O) are set by BOC annually, and relate to:[13]

- Water storage delivery and accounting – in relation to, among other things, efficiently delivering the states' water entitlements, and timely provision of information about water shares and availability;

[13] Murray-Darling Basin Authority (2014). Objectives and Outcomes for River Operations in the River Murray System.

- RMO assets – ensuring assets provide fit-for-purpose services, efficiently, effectively and safely;
- People and communities – contributing to the safety of people along the River Murray, and the economic, social, environmental and cultural activities of people using the River Murray System;
- Environment – contributing to the protection and, where possible, restoration of priority environmental assets and ecosystem functions;
- Communication and information management – providing information to stakeholders and accurately collecting and reporting data (e.g. hydrometric data).

### 4.2.4 Memoranda of Understanding

A memoranda of understanding (MOU) exists between the MDBA and individual SCAs. Schedule 4 sets out expected performance standards for a range of matters, including documentation, safety, flood management, operations, financial management/budgets, and asset information. These are not service targets set externally to the JV, but set within the JV (i.e. as between MDBA and SCAs).

### 4.2.5 Service level agreement

A Service Level Agreement (SLA) has been established between the Ministerial Council and the MDBA. This SLA is essentially about governance matters, and seeks to prescribe the various roles and accountabilities between the JV participants and the MDBA.

# 5 Valuation of pre-existing assets

This section sets out the valuation of RMO assets for the purposes of the determining an upper bound MAR. The value of these assets is referred to as the Regulatory Asset Base (RAB).

## 5.1 Valuation method

A variety of valuation methods exist and can be adopted under the WCIR guidelines and the NWI. The WCIR only mandate a certain value to be adopted when that value has already been set previously by a state regulator. This is not the case for RMO.[14]

The WCIR guidelines[15] require:

- the initial value of the RAB should not result in price shocks to users;
- the RAB value should lie somewhere between scrap value and its replacement cost;
- the RAB valuation approach should balance allocative efficiency objectives and signals for efficient investment; and
- the regulator setting the initial RAB should have regard as to the whether the resulting charges will contribute to achieving the Basin water charging objectives and principles, and in particular, avoid perverse or unintended pricing outcomes such as price shocks.

The WCIR requires that where no value has been set, the RAB should be determined by applying a recognised valuation methodology, ranging from scrap value to replacement cost. We adopted a valuation based on the optimised replacement cost (ORC) of RMO assets, in accordance with our recommendations accepted by ROJAT. The ORC methodology requires the ORC is set to reflect the value of a modern asset constructed to meet current day service requirements. Appendix 2 provides more background to the approach adopted.

We acknowledged that if prices were set to recover a full rate of return at the ORC value, then price shocks would occur if applied straight away. However, we have recommended a RAB that provided the JV participants with information about the likely maximum level of cost recovery that could be achieved or foregone if not recovered. We also noted that the RAB value itself need not translate to price shocks – JV participants

[14] Refer to the WCIR, Schedule 2, as well as ACCC. Pricing principles for price approvals and determinations under the Water Charge (Infrastructure) Rules 2010. (July, 2011). pp23-24.

[15] ACCC. Pricing principles for price approvals and determinations under the Water Charge (Infrastructure) Rules 2010. (July, 2011). p24.

could forego a rate of return or implement a long-term glide path. Moreover, establishing the maximum level of cost recovery is consistent with the NWI requirements for transparency about cost recovery (see Section 11.2).

Non-infrastructure assets are essentially assets that support, or are ancillary to, the services provided by infrastructure assets. These assets can include IT systems, plant and equipment, buildings etc. These assets are easily replaced or substituted, and are not renewable. Hence they are not relevant to a renewals approach. Accordingly, these assets are valued at their depreciated ORC value (DORC).

## 5.2 The JV asset valuation

The JV commissions a revaluation of its assets on a regular basis. The most recent revaluation was undertaken by SMEC. The SMEC valuation was based on the replacement cost of the assets as constructed. This is a slightly different approach to that required for an ORC value, where the replacement cost of a modern equivalent asset is required. Nonetheless, the SMEC valuation useful data for the asset valuation review.

The SMEC valuation does not include the value of the land related to the RMO assets, such as the land inundated by dams, and we understand no land valuation information exists.

## 5.3 Infrastructure assets

Cardno reviewed the SMEC asset value to determine an ORC value for infrastructure assets that would be applied under regulatory conditions. This is summarised below. The Cardno Report sets out the basis of their assessment in more detail.

### 5.3.1 Replacement cost

Cardno broadly concurred with the SMEC replacement cost values. However, Cardno's assessment of the modern equivalent replacement cost for Hume Dam found that a modern equivalent dam would be constructed in a different manner and would not require the extensive remedial works undertaken to date at the structure. Cardno also applied a different (lower) unit rate for mass concrete, compared to the SMEC value. Together these adjustments reduced the replacement cost of Hume Dam by around 22%.

The overall reduction to the replacement cost of the total asset base was 6%, or some $220M. [16]

[16] In $2013.

The value of land is normally included in an ORC valuation. Accordingly, the asset value used for calculating the maximum level of cost recovery (the upper bound) is less than it should be. Section 9 sets out this maximum.

### 5.3.2 Optimisation

The ORC value requires optimisation of the asset base to remove any excess spare capacity that would not be utilised in the foreseeable future, and other redundant or service features not required under current service obligations.

Cardno found evidence of the above issues and therefore no reason to optimise the asset base.

### 5.3.3 Adjustments for contributions and gifted assets

The WCIR pricing principles require that the initial RAB value should exclude assets contributed by governments or third parties where there was no expectation of a rate of return. These assets are generally known as contributed assets.[17]

Recovery of existing asset values for rural bulk water has been contentious and a variety of approaches have been adopted in other states. We consider these approaches below and present our findings for RMO assets.

*Approaches in other jurisdictions for contributed assets*

In NSW, IPART determined a $0 value for bulk water assets (dams and weirs owned by the Department of Land and Water Conservation) as at 1 July, 1997.[18]

IPART noted that reasons for investment in rural water infrastructure have varied over time, and between regions:[19]

> Much irrigation infrastructure in Australia was created in the late 19th century and the first half of the 20th century. At the time, governments were heavily involved in promoting irrigation. Much irrigation was constructed by governments with the explicit purpose of pioneering the development of agriculture…

[17] Refer p24.

[18] Originally determined in IPART (1996). Bulk Water Prices: an Interim Report.

[19] IPART (1996). pp55-56

IPART went on to explain how subsidised water charges had been capitalised into the value of land to which water licenses (then) were attached. Properties had changed hands and gaining a return on existing assets would:[20]

> … reduce the value of private infrastructure invested on the assumption of a particular level of cost recovery and water charges.
>
> The fact that private investments have taken place on the basis of expectations of indefinitely subsidised prices is not, in the Tribunal's view, a good reason for maintaining the status quo.

The 1996 IPART report does not refer to documents that support an observation that irrigators had expectations of indefinitely subsidised prices. Notably, IPART adopted a $0 asset value on the basis that the existing assets were sunk and had no opportunity cost, rather than based on irrigator expectations or government intentions.

In Victoria, the Government required the Essential Services Commission (ESC) to adopt a $0 value for Goulburn-Murray Water and Lower Murray Water's pre-existing assets, as at 1 July, 2004. The ACCC noted this 2004 decision was on the basis that the assets were sunk rather than by government intentions at the time of funding the infrastructure many year ago:[21]

> The Victorian government policy of the time was that rural water authorities would not be required to generate a return on investments made before 1 July 2004, in recognition of the fact that these costs were borne many years ago and are largely sunk. The ESC also noted that many assets were funded directly by government either directly or through debt forgiveness.

The Queensland Competition Authority (QCA) also considered the issue of government intentions and irrigator expectations in its assessment of the appropriateness of a rate of return for assets in its 2002 review of the Burdekin-Haughton Water Supply Scheme (the Scheme). Among the QCA's findings were:

> The Authority accepts that that the issue of a return on capital was not discussed during the period leading up to the commencement of the Scheme. In addition, the Queensland Government has not always clearly articulated its future pricing policy, particularly in respect to matters such as the rate of return on capital.

[20] Ibid. p56

[21] ACCC (2008). Issues Paper – Bulk Water Charge Rules. p38

> However in the absence of any actual or implied contractual arrangements, the government has the power to alter existing pricing arrangements even though they may adversely impact on a particular individual or group of individuals.

The QCA also addressed the approach to valuing pre-existing assets at $0 on the basis they were 'sunk':

> Exclusion of assets on the grounds that they are sunk fails to provide management with the incentive to enhance shareholder value and does not provide incentives for the better management of assets or for future investment…
>
> Moreover, to automatically value assets with no alternative use at zero is inconsistent with normal commercial practice. For example, neither mines nor major plant used for specific processing activities are valued at zero simply because the resources employed can no longer be used for another purpose and the investment was undertaken in the past.

In summary, past decisions about setting asset values at $0 in NSW and Victoria have been made on the basis those assets were sunk, rather than on evidence that governments had no expectations for earning a rate of return at the time of funding construction.

In relation to sunk assets, the WCIR states:

> As the existing asset base on an operator is a sunk investment, a RAB valuation somewhere between the scrap value of the asset base and its replacement cost will be appropriate on efficiency grounds…

Accordingly, the WCIR pricing principles do not state that sunk assets should be valued at $0. Indeed it is highly unusual for a regulator to value a pre-existing asset at $0 on the basis it is sunk.[22] Regulatory asset valuations in other sectors, and for urban water in some states, recognise and incorporate the value of the existing efficient asset base into the MAR and consumer prices. [23]

[22] The IPART approach is a rare exception, when considered alongside asset valuations in other jurisdictions and for other regulated industries.

[23] This is well evidenced in regulatory decisions, and the reasons for doing this are well documented. Hence we have not re-stated the rationale for assigning a value to pre-existing assets in other sectors (e.g. port, gas, rail, energy, telecommunications etc), but rather have focussed on consistency with the WCIR.

*Our review of contributed assets*

As indicated above, we have valued the RAB at ORC, which is the upper limit of value as set out in the WCIR pricing principles. This approach provides information to JV participants about the maximum cost recovery to JV participants.[24]

We requested information and documents from the MDBA that might reveal assets that were funded up front by customers or gifted by government or other third parties with no expectation of a rate of return. The MDBA provided the following documentation:

- River Murray Waters Act (1915). Commonwealth of Australia. 15 November 1925.
- Buckley, M. Review of Cost shares for joint activities. 15 April 2014.
- SMEC. MDBA Asset register and revaluation of River Murray assets. 5 September, 2012.
- Origins of the River Murray System Assets (word document provided by MDBA).
- MDBA. Corporate Plan - 2013-2014 to 2016-2017. July 2013.

We did not find evidence of an explicit intention that the RMO assets were funded with an expectation that a rate of return would never be sought. Hence, there was no need to exclude any assets from the RAB on the basis of the WCIR requirements for contributed assets.

### 5.3.4 Adjustments for past renewals funding

Any assets previously funded by a renewals annuity should be excluded from the opening RAB. To do otherwise would result in double-recovery of past expenditure. The WCIR and NWI also mandate this requirement.

We are not aware of any funding for past asset expenditure using a renewals annuity approach. Rather, we understand that funding would have occurred through annual appropriations from the JV participants. Hence no adjustments are necessary.

## 5.4 Non-infrastructure assets

Non-infrastructure assets identified for RMO from the SMEC valuation are plant and equipment. These assets are included at the depreciated optimised replacement cost, or DORC, as they are not renewed. The DORC value of these assets is $3.46M. Given these assets are immaterial to the asset base, the values were not reviewed in detail.

[24] Notwithstanding the value of land is not included in the RAB.

## 5.5 Opening RAB

Table 1 below shows the opening RAB for each service. As indicated above, these values exclude land values.

**Table 1 Opening RAB at 1 July, 2014 (excluding land)**

| Infrastructure Assets (ORC) | Value |
|---|---|
| River Regulation | $3,352,129,309 |
| Salt Interception | $178,212,424 |
| Environmental works and measures | $21,070,908 |
| **Sub-total** | **$3,551,412,641** |
| **Non-infrastructure assets (DORC)** | **$3,462,790** |
| **TOTAL Opening RAB** | **$3,554,875,431** |

Note: The values include one year's inflation (3.02%)[25] for infrastructure assets from the 2013 values set out in the Cardno Report, to $2014.

[25] CPI, weighted average of the eight capital cities, June-June.

# 6 Rate of return

The building blocks model provides for the JV to earn a rate of return on the value of existing and future investments. This rate of return is set at the asset owner's weighted average cost of capital (WACC), reflecting the expected return on the cost of debt and equity weighted by their contributions to total asset financing. The cost of equity is calculated using the capital asset pricing model (CAPM).

The WACC is applied to calculate:

- the rate of return on the RAB; and
- the renewals annuity.

## 6.1 The JV WACC

The JV does not use a WACC for pricing purposes. However, the MDBA adopted a notional rate of 3% when calculating its indicative renewals annuity, from its renewals projections. However, this rate wasn't intended to be used for a building blocks revenue calculation.

## 6.2 Recommended WACC

The WCIR and related guidelines and pricing principles are highly prescriptive about the values and approach to be adopted for calculating the WACC (refer Appendix 3).

This lack of discretion means the WACC calculation is simply a matter of adopting the values and methodology already prescribed. We have calculated a WACC using this approach, and have also referred to the ACCC's Final Decision regarding the charges to be applied by State Water from 2014/15 to 2016/17 (published June 2014[26]).

We have adopted a post-tax nominal rate of 6.92%, which is the same as the WACC adopted by the ACCC for State Water. The table below sets out the detailed values adopted.

[26] This used an averaging period for the risk-free rate and debt margin over the forty business days ending on the 23rd of May 2014. We consider that this time period complies with the WICR requirements, noting that the ACCC's decision for State Water is intended to apply from the same start date as the building block model for RMO. The fact that the RMO modelling horizon is one year longer than State Water's horizon (which ends in 2016-17) is of no consequence to the WACC assessment. Refer: http://www.accc.gov.au/system/files/Attachments%20to%20final%20decision%20on%20State%20Water%20Pricing%20application%202014-15%20to%202016-17_0_0.pdf

**Table 2 RMO WACC parameters**

| Parameter | Value |
|---|---|
| Risk free rate | 3.98% |
| Debt margin | 2.1% |
| Gearing | 60% |
| MRP | 6% |
| Equity beta | 0.7 |
| Return on debt | 6.08% |
| Return on equity | 8.18% |
| **Post tax nominal (vanilla) WACC** | **6.92%** |

# 7 Future renewals expenditure

The above asset valuation (ORC) has been adopted on the presumption that the service potential of that asset base will be maintained in perpetuity, through asset renewals expenditure. Asset renewals are projects that are infrequent (i.e. not routine maintenance) and essential for keeping the asset in a state that it can continue to provide its service in perpetuity. Renewals projects are not necessarily determined by accounting definitions – some renewals projects would be considered capital expenditure and others operating expenditure in accounting terms.

A renewals annuity recovers a return on and of future renewals expenditure required to maintain the service capacity of the asset. The annuity is an annual constant payment to recover future renewals expenditure forecast for a future period. The annuity is calculated using WACC.

We recommended to ROJAT that a renewals annuity approach be adopted in order to provide information to the JV participants about long-term asset costs. ROJAT accepted this recommendation.

Renewals is not necessarily the superior approach for pricing services to users – in fact entitlement holders in some states have objected to the renewals annuity approach on the basis it results in the service provider gathering funds well in advance of the expenditure being required. In these states, a depreciation approach is adopted instead, which results in project costs being recovered only when they are completed.[27] These projects are added to the asset base and depreciated. A rate of return on the assets and depreciation is recovered in prices.

Asset enhancements are projects that expand the service capacity of an asset – for example an additional SIS project or environmental work. These projects are usually capital in nature. Regardless, such projects are added to the RAB. The increase in the value of the RAB reflects the increase in service capacity. Decisions to increase capacity should be linked to demand forecasts[28]. However, for river regulation services, water entitlements are capped and therefore consumptive use (demand) must remain within existing limits. Hence demand forecasts of little relevance.

Non-infrastructure expenditure is also required from time to time - for example capital expenditure for plant and equipment, IT systems et al.

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[27] Strictly speaking the costs can be included in prices when projects fall within the forthcoming regulatory period.

[28] The WCIR guidelines require demand forecasts to be considered, however the application is generally limited to forecasting revenue and any variable costs.

## 7.1 The JV renewals forecast

The MDBA provided a forecast of RMO renewals expenditure over the period 2014-15 to 2046-47. Forecasts were sought based on MDBA's view of RMO expenditure needs, and without any budget constraints. The MDBA's forecasts were split into planned maintenance and asset replacements. Planned maintenance items are generally operating costs in terms of accounting definitions, and are shared between the JV participants as O&M costs. Asset replacements tend to be capital cost in terms of accounting definitions, and are shared between the participants as I&C.

We worked with the MDBA to reclassify its forecasts of planned maintenance and asset replacements, as well as other expenditure such as new environmental assets into: [29]

- Renewals costs for infrastructure assets for each of its planned maintenance and asset replacement forecasts;
- Asset enhancements, which add to the service capacity of the infrastructure asset base; and

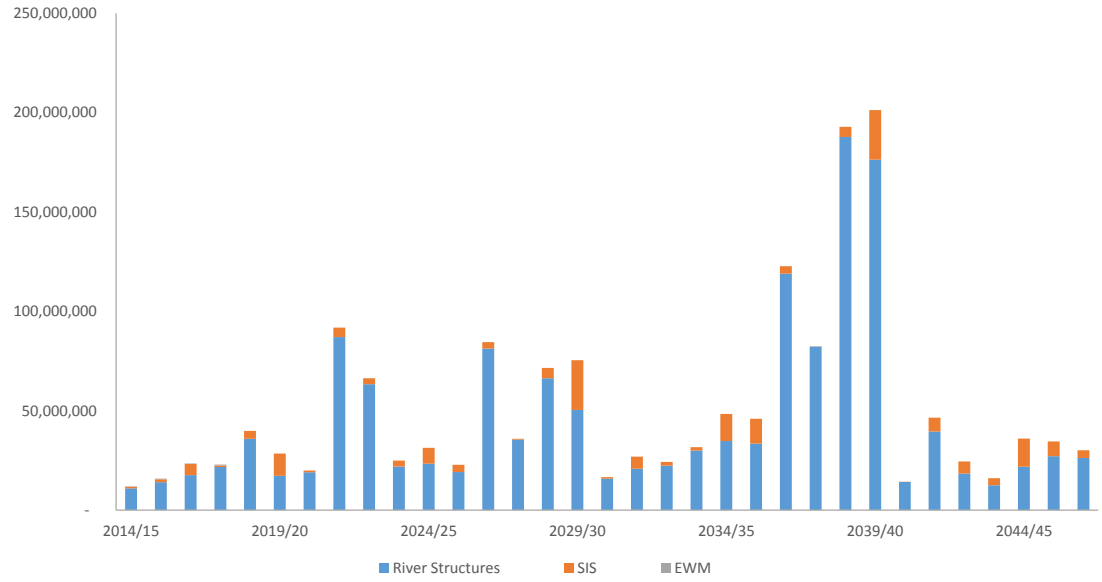
Non-infrastructure capital expenditure. We also distinguished projects that were part of a regular maintenance cycle that should be classified as operating expenditure (see section 8).

### 7.1.1 Infrastructure renewals

The MDBA renewals profile, by service category, is set out below in Figure 3.

[29] We also conducted a detailed reconciliation, which was reviewed by MDBA.

**Figure 3. Renewals forecast by service category ($nominal)**




Note: forecasts are for the sum of planned maintenance and asset replacements.

### 7.1.2 Infrastructure enhancements

The JV also forecast around $5.8M of infrastructure enhancements over the 2014-15 to 2017-18 period.

### 7.1.3 Non-infrastructure capital expenditure

No non-infrastructure capital expenditure was forecast over the 2014-15 to 2017-18 period.

## 7.2 Recommended expenditure

### 7.2.1 Infrastructure renewals

Cardno have reviewed the renewals forecasts, and a sample of renewals projects. Cardno did not find any evidence to suggest those forecasts involved items or cost levels that were inefficient or imprudent. Accordingly, we have accepted the renewals forecasts as forecast by the JV into the renewals annuity calculation.

### 7.2.2 Infrastructure enhancements

Cardno found there was excessive contingency in budgets for infrastructure enhancements. Cardno recommended removing around $90k of contingency per annum from these forecasts, reducing the capital enhancements over the four-year period from

$5.8M to $5.4M. This amount is added to the infrastructure RAB reflecting enhancement of the capacity of the asset base.

Cardno also identified some improvements to asset management that may enhance decision making into the future. These are briefly summarised at the end of this report.

## 7.3 Calculation of the renewals annuity

The method for calculating the renewals annuity is set out below, along with the parameter assumptions adopted. Appendix 4 provides an overview of the WCIR guidance for renewals annuities.

### 7.3.1 Term

The WCIR principles provide no specific guidance as to the term of the renewals expenditure used for the annuity, apart from requiring the term is longer than the regulatory period (in this instance, 4 years). The selection of the term should be informed by the confidence in the forecasts, particularly if large expenditure items are expected in the outer years. Annuity terms have ranged from 20[30] to 100[31] years.

MDBA already generates a renewals forecast over a 30 year period. Given MDBA have systems in place to gather forecasts over this timeframe, we believe that this period is appropriate and accordingly it has been adopted in the building blocks modelling, under a rolling annuity. A rolling annuity uses forecast renewals for 30 years from each year of the model period from 2014-15 to 2017-18, resulting in a different annuity each year taking into an extra year each time. A rolling annuity is normally preferred as it reduces variations between pricing periods.

### 7.3.2 Discount rate

A cost of capital is used to calculate the present value of the forecast renewals cost and to calculate the annuity based on the present value.

Contemporary practice is to adopt a discount rate at the WACC for the asset owner.[32] This is consistent with the NWI requirements for water businesses to recover a rate of return (at WACC) on new capital investment.

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30 For example, accepted by the Queensland Competition Authority for SunWater's irrigation prices.

31 As recommended by the McDonald Review in the 1992 review of the Victorian water sector.

32 For example, the QCA adopted SunWater's WACC for calculating the renewals annuity for irrigation pricing (2012). The same approach was adopted for Seqwater (2013).

Accordingly, we have adopted the discount rate equivalent to the WACC rate discussed earlier.

### 7.3.3 Opening annuity balance

A renewals annuity approach requires the business to maintain financial accounts showing the annuity 'balance'. This balance is the cumulative difference between annuity collections (revenue), and costs. These differences arise because the annuity is by definition a smoothed version of a lumpy expenditure profile. Balances may be positive or negative depending on the timing of the major expenditure.

The annuity calculation not only takes account of the forecast renewals expenditure, but it must also incorporate the cumulative balance at the start of the period. If the balance is negative, then the annuity needs to increase to recover the deficit. If the annuity balance is positive, then the accumulated (notional) cash is used to offset future renewals expenditure, thus reducing the annuity requirement. An assumption is required about the opening balance as at 1 July, 2014, for the annuity calculation in the building blocks model.

The approach to the RAB above involves setting a 'line in the sand' for the valuation of the existing assets. It was also assumed that the assets that comprise the RAB were not funded from a (prior) renewals annuity. It is therefore reasonable to assume that the opening balance at 1 July, 2014 for the renewals annuity is $0.

### 7.3.4 Renewals annuity

The resulting renewals annuities are set out in the table below, in aggregate across all services. An annuity is calculated each year for each service, based on the 30-year renewals profile from each of the four years (a rolling annuity). We have retained the MDBA's split between planned maintenance and asset replacements, and presented a separate annuity for each, to align with the MDBA's current data. Note the annuity is a smooth or constant representation of renewals expenditure. Both the annuity and renewals expenditure are equal in net present value terms.

**Table 3. Renewals annuities ($nominal)**

| Asset renewal annuities by type and Headline Service | | | | |
|---|---|---|---|---|
| **Service** | **2014/15** | **2015/16** | **2016/17** | **2017/18** |
| River Regulation | | | | |
| Planned Maintenance | $11,701,853 | $11,856,265 | $12,052,733 | $12,261,346 |
| Asset Replacement | $17,315,140 | $17,563,557 | $17,816,199 | $18,053,340 |
| Salt Interception | | | | |
| Planned Maintenance | $1,230,837 | $1,255,234 | $1,265,261 | $1,282,409 |
| Asset Replacement | $2,423,308 | $2,543,725 | $2,624,588 | $2,669,474 |
| Environmental w orks and measures | | | | |
| Planned Maintenance | $60,522 | $60,986 | $61,453 | $61,923 |
| Asset Replacement | $0 | $0 | $0 | $0 |
| **TOTAL** | **$32,731,660** | **$33,279,766** | **$33,820,234** | **$34,328,492** |

The figures below show the annuities against the total renewals expenditure over the period, for asset replacement and planned maintenance.

**Figure 4. Total Planned Maintenance expenditure and annuity ($, nominal)**

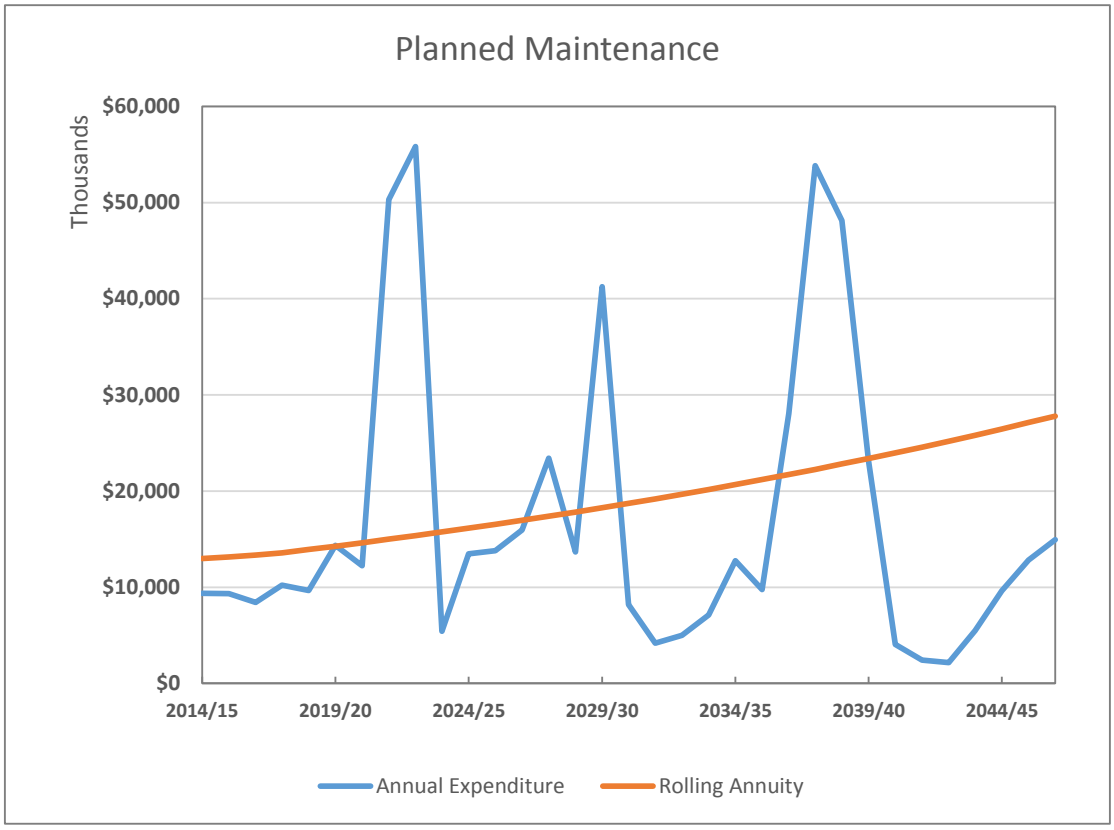


**Figure 5. Total Asset Replacement expenditure and annuity ($, nominal)**

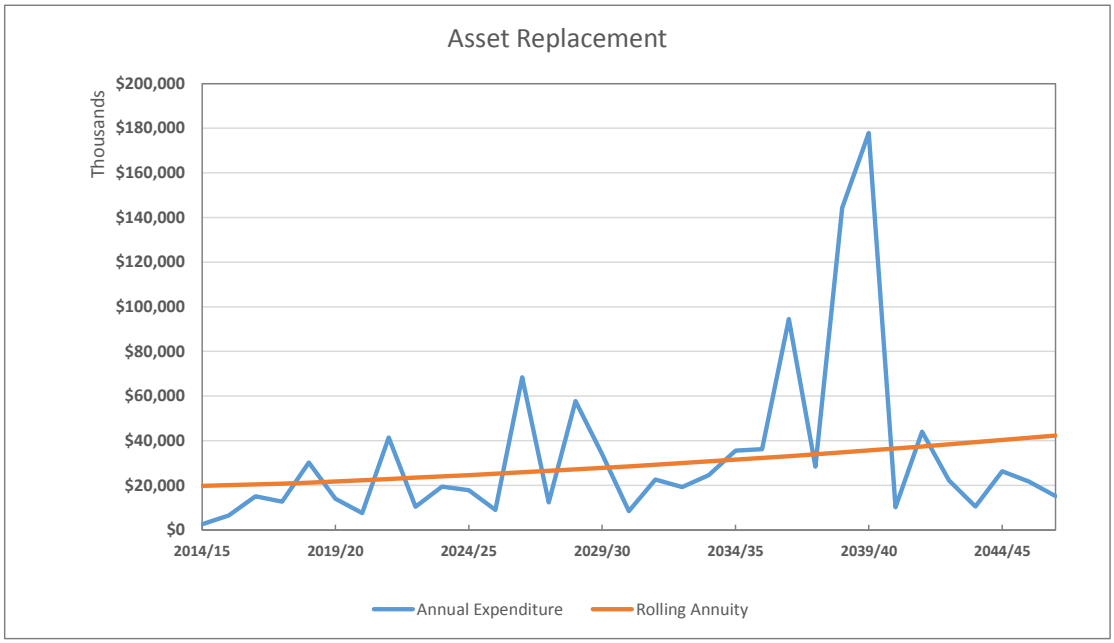



Table 4 below shows how the annuity balance is calculated, in aggregate, across the four years to 2017-18. .

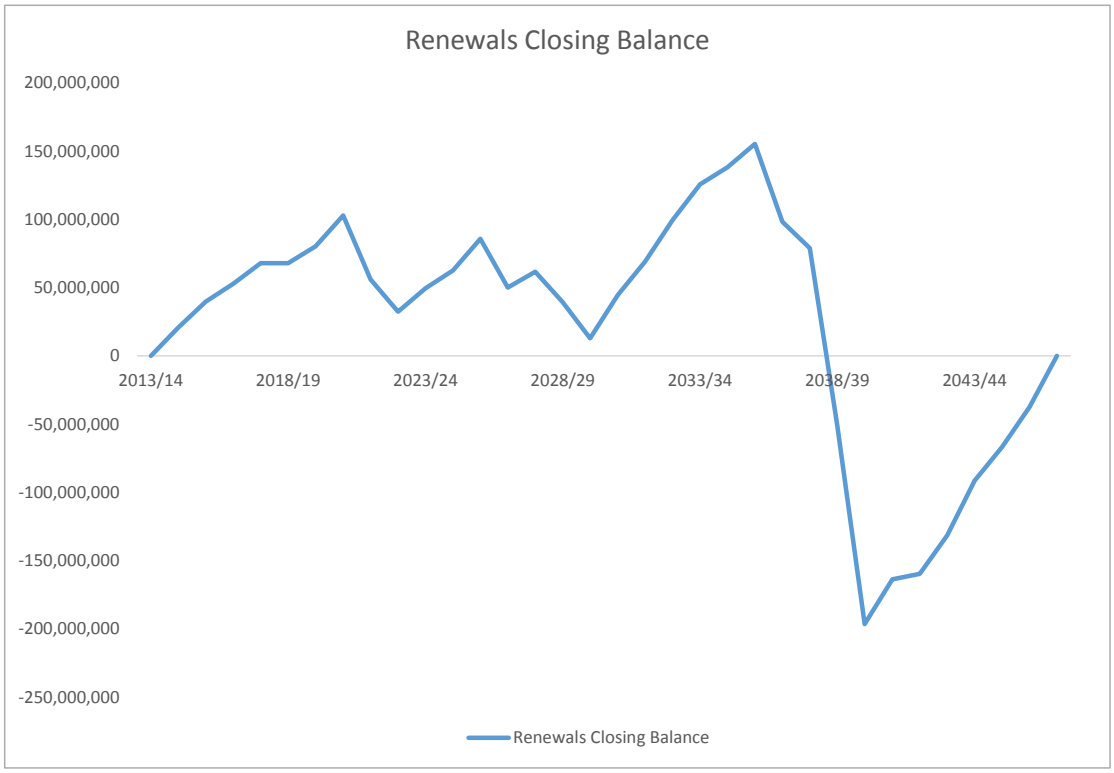
**Table 4. Projected (notional) renewals annuity balances – 2014-15 to 2017-18**

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| **Opening Balance** | $0 | $20,793,880 | $39,732,458 | $52,785,924 |
| **Renewals Spend** | -$11,937,780 | -$15,780,125 | -$23,516,253 | -$22,883,997 |
| **Rolling Annuity** | $32,731,660 | $33,279,766 | $33,820,234 | $34,328,492 |
| **Interest** | $0 | $1,438,936 | $2,749,486 | $3,652,786 |
| **Closing Balance** | **$20,793,880** | **$39,732,458** | **$52,785,924** | **$67,883,206** |

Notes:
Interest is applied at the WACC used to calculate the annuity, in this case 6.92%.
All values are nominal.

Figure 6 shows the notional annuity balance over the 35 years of the analysis. This demonstrates that the annuity is primarily a price smoothing mechanism, and not a cash financing mechanism, since the balance can be negative from time to time. Indeed, the notional annuity cash balance for all RMO services goes to negative in later years, but returns to $0 in the final year as the annuity collection repays the 'debt'. This profile is entirely normal for a renewals annuity.

**Figure 6. Notional annuity balances – all RMO services ($, nominal)**




## 7.4 Future renewals accounting

A renewals approach normally requires the business to maintain a renewals account, to determine the balance each year (refer Table 4 for the calculation).

Whether this is done or not is largely a matter for the JV, considering how it would like to track renewals expenditure against the annuity over time, and whether it wants to periodically recalculate an annuity into the future. If so, then it would be best to recalculate the balance each year, based on the actual renewals expenditure.

## 7.5 RAB roll forward

The WCIR requirements for the RAB roll-forward are set out in Appendix 4. This approach has been adopted for the building blocks model, modified to a renewals annuity approach (for example, the infrastructure value of the RAB (at ORC) is not depreciated in the roll-forward).

The pricing period (or regulatory period) for the building blocks model spans the period of the current corporate plan, namely from 2014/15 to 2017/18. Hence the RAB was established as at 1 July, 2014 and rolled forward over the four years to produce a closing RAB at 30 June, 2018.

The building blocks model uses nominal (as opposed to real) values. That is, the data and output from the model are in the dollars of the year in which they occur. Under this approach, the RAB was indexed each year. [33] The values used in this indexation were:

- for past years, actual inflation rates based on ABS CPI data for the average of eight capital cities – percent change June quarter to June quarter; and
- for future years, a forecast inflation set at the mid-point of the target range for inflation set for the Reserve Bank of Australia, i.e. 2.5%.

### 7.5.1 Infrastructure RAB

The ORC value at 1 July, 2014 represents the opening RAB. As indicated above, the ORC represents the value of the assets at their full service potential. This means that the RAB should only increase in real terms for expenditure that changes that service potential. Hence renewals expenditure - which occurs to simply maintain service potential – is not added to the RAB. Similarly, no depreciation was applied to the future ORC value as the assets' service potential does not decline.

The $5.4M of forecast capital expenditure (across 4 years) to enhance the infrastructure asset capacity was added to the infrastructure RAB in the building block model in the year it was forecast to occur.

Table 5 below shows the RAB roll forward for infrastructure assets.

[33] The inflation growth in the RAB is then deducted from the cost base, to avoid double counting when a nominal rate of return is applied.

**Table 5. RAB Roll Forward – Infrastructure Assets**

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| **Opening Value** | | | | |
| River Regulation | $3,352,129,309 | $3,437,303,450 | $3,524,964,256 | $3,614,509,899 |
| Salt Interception | $178,212,424 | $182,667,735 | $187,234,428 | $191,915,289 |
| Environmental works and measures | $21,070,908 | $21,597,681 | $22,137,623 | $22,691,064 |
| **TOTAL** | **$3,551,412,641** | **$3,641,568,866** | **$3,734,336,307** | **$3,829,116,251** |
| **Capex** | | | | |
| River Regulation | $1,354,087 | $1,707,014 | $1,404,093 | $953,574 |
| Salt Interception | $0 | $0 | $0 | $0 |
| Environmental works and measures | $0 | $0 | $0 | $0 |
| **TOTAL** | **$1,354,087** | **$1,707,014** | **$1,404,093** | **$953,574** |
| **Inflation** | | | | |
| River Regulation | $83,820,054 | $85,953,792 | $88,141,549 | $90,374,594 |
| Salt Interception | $4,455,311 | $4,566,693 | $4,680,861 | $4,797,882 |
| Environmental works and measures | $526,773 | $539,942 | $553,441 | $567,277 |
| **TOTAL** | **$88,802,138** | **$91,060,428** | **$93,375,851** | **$95,739,752** |
| **Closing Value** | | | | |
| River Regulation | $3,437,303,450 | $3,524,964,256 | $3,614,509,899 | $3,705,838,066 |
| Salt Interception | $182,667,735 | $187,234,428 | $191,915,289 | $196,713,171 |
| Environmental works and measures | $21,597,681 | $22,137,623 | $22,691,064 | $23,258,340 |
| **TOTAL** | **$3,641,568,866** | **$3,734,336,307** | **$3,829,116,251** | **$3,925,809,578** |

### 7.5.2 Non-infrastructure RAB

Since the non-infrastructure assets have a finite life, the non-infrastructure RAB (which is based on a DORC value) is rolled forward by adding additional capital expenditure (nil forecast) and depreciating the value of the assets based on their expected lives. Table 6 below shows the RAB roll-forward for non-infrastructure assets.

**Table 6. RAB Roll Forward – Non-Infrastructure Assets**

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| **Opening Value** | | | | |
| River Regulation | $3,015,997 | $2,473,118 | $1,901,209 | $1,299,160 |
| Salt Interception | $337,636 | $276,862 | $212,838 | $145,439 |
| Environmental works and measures | $109,156 | $89,508 | $68,809 | $47,020 |
| **TOTAL** | **$3,462,790** | **$2,839,487** | **$2,182,856** | **$1,491,618** |
| **Capex** | | | | |
| River Regulation | $0 | $0 | $0 | $0 |
| Salt Interception | $0 | $0 | $0 | $0 |
| Environmental works and measures | $0 | $0 | $0 | $0 |
| **TOTAL** | **$0** | **$0** | **$0** | **$0** |
| **Inflation** | | | | |
| River Regulation | $75,400 | $61,828 | $47,530 | $32,479 |
| Salt Interception | $8,441 | $6,922 | $5,321 | $3,636 |
| Environmental works and measures | $2,729 | $2,238 | $1,720 | $1,175 |
| **TOTAL** | **$86,570** | **$70,987** | **$54,571** | **$37,290** |
| **Depreciation** | | | | |
| River Regulation | $618,279 | $633,736 | $649,580 | $665,819 |
| Salt Interception | $69,215 | $70,946 | $72,720 | $74,537 |
| Environmental works and measures | $22,377 | $22,936 | $23,510 | $24,098 |
| **TOTAL** | **$709,872** | **$727,619** | **$745,809** | **$764,454** |
| **Closing Value** | | | | |
| River Regulation | $2,473,118 | $1,901,209 | $1,299,160 | $665,819 |
| Salt Interception | $276,862 | $212,838 | $145,439 | $74,537 |
| Environmental works and measures | $89,508 | $68,809 | $47,020 | $24,098 |
| **TOTAL** | **$2,839,487** | **$2,182,856** | **$1,491,618** | **$764,454** |

# 8 Future operating costs

Under the building blocks approach, future (efficient) recurrent operating costs are recovered through annual charges. This section examines the JV's forecast recurrent operating costs over a four-year period.

## 8.1 The JV Forecast

The MDBA provided a forecast of RMO expenditure over the period 2014-15 to 2017-18. As for renewals, forecasts were sought based on MDBA's view of RMO expenditure needs, without any budget constraints. We worked with the MDBA to re-classify its budget line items to establish the underlying recurrent operating costs under a building blocks model, and to categorise those costs by service type. Infrequent or periodic operating costs (e.g. major planned maintenance) are captured under the planned maintenance renewals annuity, and were excluded.

The JV forecast includes an allocation of MDBA's corporate costs to RMO (Corporate Commitment). The MDBA allocates these costs based on MDBA FTEs providing RMO services, as a percentage of total MDBA FTEs. The corporate costs allocated are around $2.1M per annum. SCA's allocate their own corporate and other shared costs to their RMO activities. We understand this allocation occurs in accordance with a pre-existing agreement between the SCAs and the JV.

The chart below shows the JV forecast of operating costs, and the components relating to MDBA and SCAs. The four SCAs together account for around 80% of operating costs.

**Figure 7. Operating cost – composition by MDBA and SCAs ($nominal)**

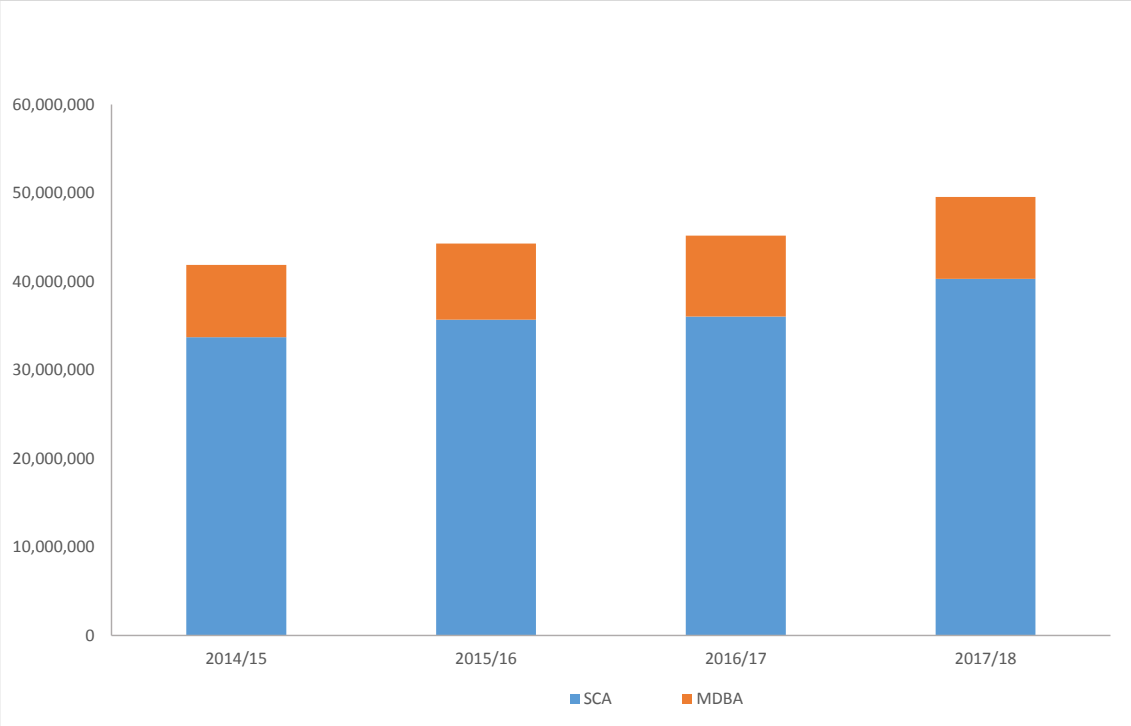
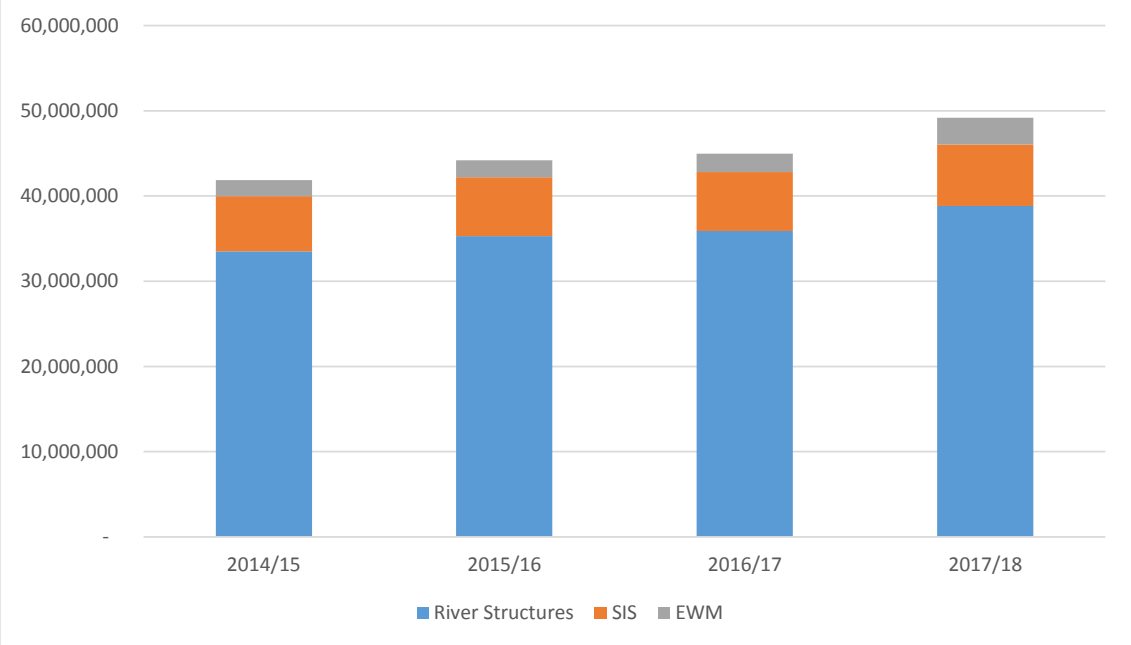



Figure 8 below shows the break-up of operating expenditure, by service type. Most expenditure relates to River Regulation, which also accounts for most of the growth in expenditure.

**Figure 8. JV Forecast Operating Costs by service ($ nominal)**



## 8.2 Efficient operating costs

Cardno examined operating costs to arrive at an efficient cost forecast.

Overall, Cardno found that the MDBA and SCA operating costs were generally efficient.

Cardno then considered the extent to which the JV could achieve ongoing efficiencies into the future, and based on corroborating evidence from recent regulatory decisions, recommended a 1% per annum efficiency target be set for operating costs for 2015-16 to 2017-18. This translates to a cumulative reduction of $2.8M over these three years. The total reduction to operating cost over the 2014-15 to 2017-18 period was $3.4M.

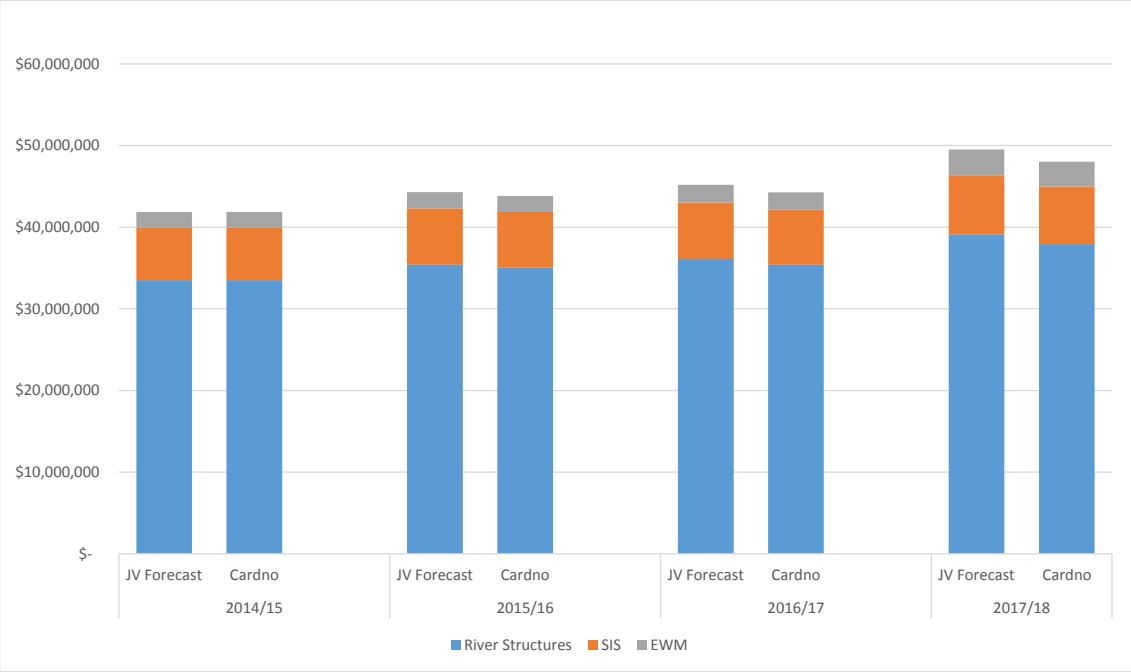
Table 7 presents Cardno's recommended efficient operating costs over the period.

**Table 7. Efficient operating costs ($nominal)**

| Service | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| River Regulation | | | | |
| Routine O&M | $24,303,187 | $25,535,867 | $25,552,711 | $28,088,421 |
| I&C Opex | $9,199,810 | $9,502,129 | $9,833,702 | $9,848,425 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $0 | $0 | $0 | $0 |
| RMW Admin | $0 | $0 | $0 | $0 |
| Salt Interception | | | | |
| Routine O&M | $6,138,600 | $6,510,470 | $6,425,217 | $6,686,530 |
| I&C Opex | $317,594 | $328,428 | $334,645 | $340,904 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $0 | $0 | $0 | $0 |
| RMW Admin | $0 | $0 | $0 | $0 |
| Environmental works and measures | | | | |
| Routine O&M | $1,400,008 | $1,433,810 | $1,475,184 | $1,487,637 |
| I&C Opex | $452,391 | $473,513 | $598,459 | $607,717 |
| Murray Mouth (O&M) | $0 | $0 | $0 | $0 |
| Murray Mouth (I&C) | $54,000 | $55,440 | $56,834 | $969,699 |
| RMW Admin | $0 | $0 | $0 | $0 |
| **TOTAL** | **$41,865,590** | **$43,839,656** | **$44,276,752** | **$48,029,334** |

Figure 9 shows the JV forecast and compared to the Cardno recommendations.

**Figure 9. JV Forecast and Cardno Efficient Operating Costs ($ nominal)**




## 8.3 Cost allocation

We considered the merits of the MDBA's approach to allocating corporate costs based on FTEs, and accepted MDBA's approach on the following basis:

- it is already accepted among JV participants, who bear the costs associated with the allocation of corporate costs;
- the Corporate Commitment amount is already agreed for 2014-15 budget, and there is no strong evidence of a materially superior approach;
- the amount of corporate costs allocated to RMO are not material; and
- there does not appear to be any strong causation for corporate costs that would justify a different approach.

Each SCA's overhead costs are treated as direct costs to the RMO, and hence do not need to be allocated in the building blocks model.

## 8.4 Other items

### 8.4.1 Debt raising costs

The WCIR pricing principles provide for debt raising costs to be including in the MAR, where they are incurred. Any debt raising costs are to be included as part of the operating expenditure allowance.

To our knowledge the JV does not raise debt for its activities. Hence we have not included any debt raising costs in the building block model.

### 8.4.2 Tax

The building blocks model (and regulatory pricing generally) recognises the corporate income tax is a legitimate part of the MAR, and recoverable from users.[34] The WCIR pricing principles require a post-tax building block model, with corporate tax calculated based on the annual actual corporate income taxation to be paid by the operator (adjusted for any imputation credits). The forecasts of the actual taxation bill to be incurred by the firm over the regulatory period should be made in accordance with either Australian tax law, or provisions such as the NTER (Tax equivalence regime).

It is difficult to apply the provisions of the WCIR in the context of MDBA in its current form, as unlike other services providers (including Government Owned Enterprises[35]), there is no actual tax upon which to set a cost allowance into the MAR.

Accordingly, ROJAT decided to set the tax cost in the building blocks model to $0.[36]

[34] Other taxes and levies which effect input costs (e.g. payroll tax) are included in the cost base, to the extent they are incurred.

[35] Who operate under a tax equivalence regime, which is normally accepted by regulators as a legitimate tax cost.

[36] Accordingly, there is no need for an assumption about the value of imputation credits (gamma), which is used to determine the net tax costs to equity.

# 9 Maximum allowable revenues

The building blocks model is used to determine the MAR from an asset that could be recovered from users. This section sets out this MAR.

It also shows the MAR in terms of an upper bound level of cost recovery, and a lower bound.

## 9.1 Lower bound cost recovery

Lower bound pricing recovers the minimum level of costs for a water business to be viable, namely future operating costs, renewals expenditure, and any tax costs. This concept was first considered as part of the 1994 COAG reforms.[37] In a conventional supply relationship, customers would pay charges that would enable the asset owner to recover these lower bound costs.

Given the lumpy nature of renewals expenditure, lower bound costs are usually 'smoothed' to avoid year-on-year price shocks to users. Renewals annuities provide this smooth profile.[38]

In order to fund large renewals expenditures, the business must build up cash reserves. One way is to hold the cash difference between renewals annuity income and lesser renewals expenditure in early years (e.g. if large expenditure is not forecast for some years). Other financing methods such as raising debt or equity can also be used, and usually required when the business' accumulated cash is not sufficient to fund large 'lumps' of renewals expenditure.

Accordingly, the lower bound level of cost recovery below is a 'smoothed' representation of lower bound costs. Table 8 shows the lower bound costs, calculated under the building blocks approach. The components are:

- a return on assets, which is set to $0 for lower bound MAR;
- the renewals annuity for infrastructure assets;
- the annual depreciation of the non-infrastructure DORC;
- efficient operating costs; and

[37] The various COAG definitions of lower bound pricing also include interest costs, although this is only relevant to the extent a water business is debt funded. Recovery of interest costs would of course be critical to ongoing viability.

[38] This can also be achieved through a depreciation approach. For example, by adding the capital expenditure to the RAB and charging user for depreciation of, and a return on, that expenditure. This is sometimes preferred by users who may not want to provide cash today for uncertain future expenditure. This issue is also discussed in our Pricing Principles paper.

- deduction of revenue offsets (e.g. hydro).

**Table 8. Lower Bound MAR ($nominal)**

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| **Return on Assets** | | | | |
| River Regulation | $0 | $0 | $0 | $0 |
| Salt Interception | $0 | $0 | $0 | $0 |
| Environmental works and measures | $0 | $0 | $0 | $0 |
| **TOTAL RETURN ON ASSETS** | **$0** | **$0** | **$0** | **$0** |
| **Renewals Annuity** | | | | |
| River Regulation | $29,016,993 | $29,419,822 | $29,868,932 | $30,314,686 |
| Salt Interception | $3,654,145 | $3,798,958 | $3,889,849 | $3,951,883 |
| Environmental works and measures | $60,522 | $60,986 | $61,453 | $61,923 |
| **TOTAL RENEWALS** | **$32,731,660** | **$33,279,766** | **$33,820,234** | **$34,328,492** |
| **Inflation (capital growth)** | | | | |
| River Regulation | $0 | $0 | $0 | $0 |
| Salt Interception | $0 | $0 | $0 | $0 |
| Environmental works and measures | $0 | $0 | $0 | $0 |
| **TOTAL INFLATION** | **$0** | **$0** | **$0** | **$0** |
| **Depreciation** | | | | |
| River Regulation | $618,279 | $633,736 | $649,580 | $665,819 |
| Salt Interception | $69,215 | $70,946 | $72,720 | $74,537 |
| Environmental works and measures | $22,377 | $22,936 | $23,510 | $24,098 |
| **TOTAL DEPRECIATION** | **$709,872** | **$727,619** | **$745,809** | **$764,454** |
| **Opex** | | | | |
| River Regulation | $33,502,997 | $35,037,996 | $35,386,413 | $37,936,847 |
| Salt Interception | $6,456,194 | $6,838,898 | $6,759,862 | $7,027,434 |
| Environmental works and measures | $1,906,399 | $1,962,763 | $2,130,476 | $3,065,053 |
| **TOTAL OPEX** | **$41,865,590** | **$43,839,656** | **$44,276,752** | **$48,029,334** |
| **Revenue Offsets** | | | | |
| River Regulation | -$2,000,000 | -$2,024,000 | -$2,024,000 | -$2,024,000 |
| Salt Interception | -$975,861 | -$1,152,465 | -$3,081,800 | -$1,120,100 |
| Environmental works and measures | $0 | $0 | $0 | $0 |
| **TOTAL REVENUE OFFSETS** | **-$2,975,861** | **-$3,176,465** | **-$5,105,800** | **-$3,144,100** |
| **Lower Bound MAR** | | | | |
| River Regulation | $61,138,269 | $63,067,554 | $63,880,925 | $66,893,352 |
| Salt Interception | $9,203,693 | $9,556,337 | $7,640,630 | $9,933,755 |
| Environmental works and measures | $1,989,299 | $2,046,685 | $2,215,439 | $3,151,074 |
| **TOTAL Lower Bound MAR** | **$72,331,261** | **$74,670,576** | **$73,736,994** | **$79,978,181** |

## 9.2 Upper bound cost recovery

The upper bound level of cost recovery is the lower bound, plus a return on the existing asset base. Upper bound cost recovery is conventional practice across regulated businesses in the energy, port, rail and telecommunications sectors, and to some extent in the water sector (though typically not so in the irrigation sector[39]).

This return on existing assets is not a future funding cost to the JV participants, but does represent the maximum level of revenue that could be earned by the JV.[40]

Table 9 below shows the components to the upper bound level of cost recovery. The components are:

- a return on the RAB (infrastructure and non-infrastructure assets), excluding the value of land;
- the renewals annuity for infrastructure assets;
- deducting the inflation of the value of the infrastructure and non-infrastructure assets. This is a standard building-blocks adjustment, and is necessary to ensure the MAR does not include both the nominal rate of return on the assets, while also allowing for growth in the asset base due to inflation;
- the annual depreciation of the non-infrastructure DORC;
- efficient operating costs; and
- deduction of revenue offsets (e.g. hydro).

[39] For example, where line-in-the sand values for existing assets were set to $0, or if the asset owner foregoes a return on the pre-existing asset base. Refer to the Section 5 for a discussion of asset values in state jurisdictions.

[40] The actual maximum may be limited by the capacity of users to pay above the lower bound.

## Table 9. Upper Bound MAR ($nominal)

| | 2014/15 | 2015/16 | 2016/17 | 2017/18 |
|---|---|---|---|---|
| **Return on Assets** | | | | |
| River Regulation | $232,222,123 | $238,090,613 | $244,106,859 | $250,246,429 |
| Salt Interception | $12,355,664 | $12,659,766 | $12,971,351 | $13,290,602 |
| Environmental w orks and measures | $1,465,660 | $1,500,753 | $1,536,685 | $1,573,475 |
| **TOTAL RETURN ON ASSETS** | **$246,043,448** | **$252,251,133** | **$258,614,895** | **$265,110,506** |
| **Renewals Annuity** | | | | |
| River Regulation | $29,016,993 | $29,419,822 | $29,868,932 | $30,314,686 |
| Salt Interception | $3,654,145 | $3,798,958 | $3,889,849 | $3,951,883 |
| Environmental w orks and measures | $60,522 | $60,986 | $61,453 | $61,923 |
| **TOTAL RENEWALS** | **$32,731,660** | **$33,279,766** | **$33,820,234** | **$34,328,492** |
| **Inflation (capital growth)** | | | | |
| River Regulation | $83,895,454 | $86,015,620 | $88,189,079 | $90,407,073 |
| Salt Interception | $4,463,752 | $4,573,615 | $4,686,182 | $4,801,518 |
| Environmental w orks and measures | $529,502 | $542,180 | $555,161 | $568,452 |
| **TOTAL INFLATION** | **$88,888,707** | **$91,131,415** | **$93,430,422** | **$95,777,043** |
| **Depreciation** | | | | |
| River Regulation | $618,279 | $633,736 | $649,580 | $665,819 |
| Salt Interception | $69,215 | $70,946 | $72,720 | $74,537 |
| Environmental w orks and measures | $22,377 | $22,936 | $23,510 | $24,098 |
| **TOTAL DEPRECIATION** | **$709,872** | **$727,619** | **$745,809** | **$764,454** |
| **Opex** | | | | |
| River Regulation | $33,502,997 | $35,037,996 | $35,386,413 | $37,936,847 |
| Salt Interception | $6,456,194 | $6,838,898 | $6,759,862 | $7,027,434 |
| Environmental w orks and measures | $1,906,399 | $1,962,763 | $2,130,476 | $3,065,053 |
| **TOTAL OPEX** | **$41,865,590** | **$43,839,656** | **$44,276,752** | **$48,029,334** |
| **Revenue Offsets** | | | | |
| River Regulation | -$2,000,000 | -$2,024,000 | -$2,024,000 | -$2,024,000 |
| Salt Interception | -$975,861 | -$1,152,465 | -$3,081,800 | -$1,120,100 |
| Environmental w orks and measures | $0 | $0 | $0 | $0 |
| **TOTAL REVENUE OFFSETS** | **-$2,975,861** | **-$3,176,465** | **-$5,105,800** | **-$3,144,100** |
| **UPPER BOUND MAR** | | | | |
| River Regulation | $209,464,938 | $215,142,547 | $219,798,705 | $226,732,708 |
| Salt Interception | $17,095,606 | $17,642,488 | $15,925,800 | $18,422,839 |
| Environmental w orks and measures | $2,925,457 | $3,005,259 | $3,196,963 | $4,156,097 |
| **TOTAL UPPER BOUND MAR** | **$229,486,001** | **$235,790,294** | **$238,921,468** | **$249,311,644** |

Note: Asset inflation is deducted from the MAR under a nominal pricing approach. The inflation adjustment shown here relates to the non-infrastructure and infrastructure RAB. Technically, the return on assets in the Upper Bound is the WACC x RAB, less the inflation (capital growth) of the RAB.

# 10 Economic benchmarking

The terms of reference for our review included a requirement to provide advice on efficiency and productivity assessment methodologies for evaluating the efficiency of RMO. This section sets out the use of economic benchmarking in a regulatory context, and provides the indicative results for RMO. A detailed report has been separately provided to the Department.

## 10.1 Use of economic benchmarking

A range of economic benchmarking methods can be used to augment the more conventional efficiency reviews, like that performed by Cardno. This reflects what is emerging as contemporary practice in Australian regulation. For example, in 2012 the Australian Energy Market Commission (AEMC) examined the application of economic benchmarking within energy network regulation and concluded it has a crucial role in assessing the efficiency of energy network service providers and informing the public about their performance.[41]

Indeed, the Australian Energy Regulator (AER) is now required to produce an annual benchmarking report. In doing so, the AER has highlighted two forms of benchmarking that it intends to use as an integral part of future energy infrastructure price reviews. The first involves benchmarking a network business' expenditure when disaggregated into cost categories, termed 'category analysis'. The second is economic benchmarking of the efficiency of a network business' regulatory operations as a whole. The latter permits a comparison of the efficiency of peer network businesses and can be used for 'top down' forecasting of a network business' expenditure and productivity growth. The analysis in this report is a preliminary application of economic benchmarking in this sense.

The AER has indicated that it intends to have regard to benchmarking techniques including multilateral TFP analysis, data envelopment analysis (DEA) and econometric modelling such as stochastic frontier analysis. It is expected to implement such analysis to assess regulated businesses' expenditure proposals as part of its current access arrangement reviews.

[41] Australian Energy Market Commission (AEMC) (2012) 'Economic Regulation of Network Service Providers, and Price and Revenue Regulation of Gas Services, Final Position Paper'. Sydney

## 10.2 Approach

Our analysis, undertaken by Economic Insights, is only intended to represent a starting point for further development of the benchmarking techniques. The analysis is confined to Australian water businesses that manage reservoirs and regulated rivers. RMO has significant salt interception and environmental works programs that do not have close comparisons with other peer businesses, and the costs and assets associated with these activities have been excluded from RMO's data for the purposes of this analysis.

The initial benchmarking analysis was carried out using data envelopment analysis (DEA) which is used to quantify:

- the comparative technical efficiency of each water business in the sample with respect to its water reservoir and regulated river management functions
- comparative cost efficiency of the same water businesses, and their comparative degrees of allocative efficiency.

Associated with the DEA analysis is the calculation of Malmquist TFP indexes which show the productivity trends for each of the businesses over the period 2006-07 to 2012-13.

## 10.3 Results

This study derives some preliminary economic benchmarking results for RMO. That said, the analysis in this report is an initial trial with the primary aim of demonstrating a method of benchmarking that could be used to complement other methods of analysis within a regulatory or cost control framework. Further work is needed to improve the scope, detail and comparability of the available data and to facilitate further refinement of the benchmarking techniques.

### 10.3.1 Initial DEA analysis

Data was gathered from NWC reports, for six businesses, including: RMO, Sydney Catchment Authority, State Water (not including SCA functions), SunWater, Goulburn-Murray Water (not including SCA functions) and Southern Rural Water. SunWater provided further data, particularly for 2011-12 and 2012-13, which was not previously reported by the NWC. Data was available for each of the six businesses for the seven years from 2006-07 to 2012-13 — a total of 42 observations. This data was pooled in the DEA analysis for the purpose of obtaining a single efficiency frontier relevant to the whole of that period.

In the preferred specification presented here the outputs include the following variables:

- Quantity of water delivered to customers via regulated river systems (ML)
- Length of regulated rivers (km)
- Combined storage capacity of reservoirs (GL)

The inputs are defined as follows:

- Capital inputs (2011-12 $): The nominal written down replacement value of fixed assets deflated by the ABS net capital stock deflator for Electricity Gas Water & Waste
- Non-capital inputs (2011-12 $): Nominal operating expenditure (not including depreciation).

The results are presented in Table 10 for the preferred variable returns to scale specification, and showing measures of technical efficiency, cost efficiency and allocative efficiency.[42] The results shown here are averages of the scores obtained by each business over each of the years 2007 to 2013, which are all assessed against a common efficiency frontier. For this reason, none of the scores shown in Table 10 is equal to 1.0 because none of the businesses were fully efficient in every year.

**Table 10. DEA Results[1]**

| | | *Business* | | | | |
|---|---|---|---|---|---|---|
| **Model & Efficiency Measure** | **RMO** | **A** | **B** | **C** | **D** | **E** |
| Input-oriented technical efficiency[2] | 0.955 | 0.981 | 0.938 | 0.755 | 0.677 | 0.555 |
| Cost efficiency[2] | 0.925 | 0.944 | 0.779 | 0.853 | 0.093 | 0.510 |
| Allocative efficiency[2] | 0.968 | 0.963 | 0.823 | 0.700 | 0.144 | 0.917 |

Notes:

1. Outputs include water delivered (ML), length of regulated river (km) & storage capacity of reservoirs (GL).

2. *Technical efficiency* refers to the degree to which the firm is producing the maximum quantity of outputs given its prevailing input use, or is minimising its use of inputs in producing its current amounts of outputs. Cost efficiency refers to the degree to which the firm is minimising its cost in producing its current amounts of outputs. A*llocative efficiency* refers to the degree to which the firm has adopting the best mix of inputs given their marginal productivities and the prevailing set of input prices.

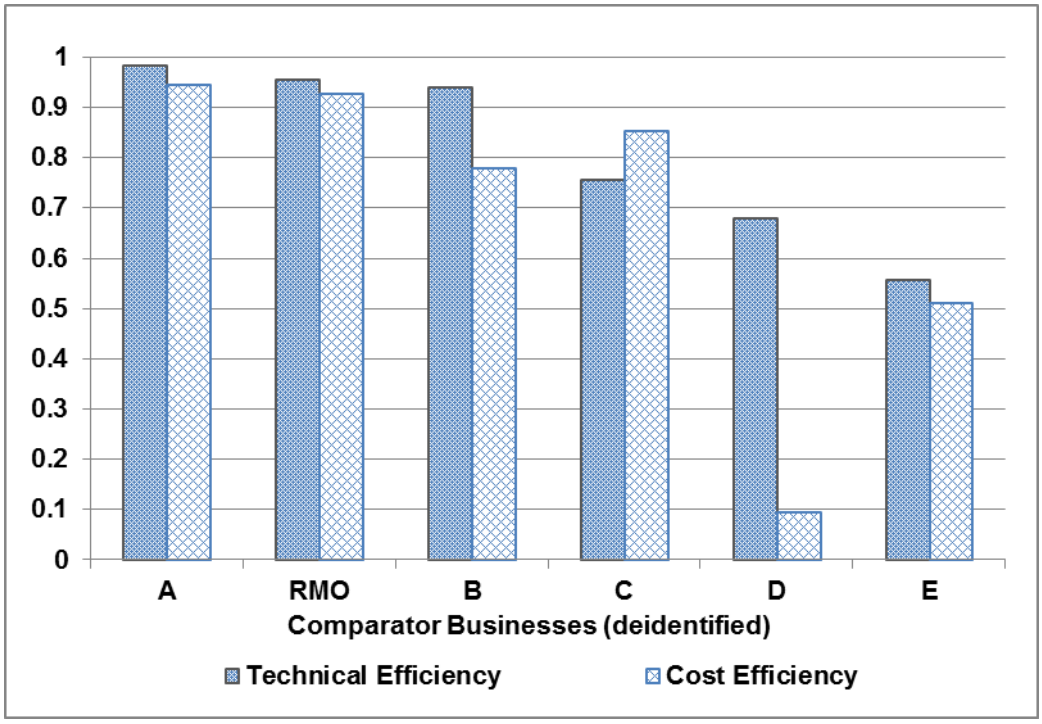
The preliminary results for technical and cost efficiency, under the preferred variable returns-to-scale specification, suggest that RMO has scores of over 90%, and is comparable to the more efficient businesses in the sample. The results under the more restrictive constant returns-to-scale model suggests a lower degree of technical and cost efficiency for RMO, but there are insufficient grounds for imposing the constant returns-to-scale constraint. RMO's comparatively good efficiency scores are likely due to an

[42] The DEA and Malmquist index analysis presented here was carried out with LIMDEP v 9.0 (Econometric Software Inc).

operational focus on input and cost minimisation. We also need to be aware that some of the less efficient businesses may face special operating environment conditions. For example, one of these businesses is actually dissimilar to the others, as it is not a rural water business and mainly manages reservoirs for metropolitan use.[43] This might require a higher level of activity and cost compared to rural bulk water.

Figure 10 summarises the comparative technical efficiency and cost efficiency results for the preferred variable returns-to-scale case. Figure 10 shows that RMO is ranked second in terms of technical efficiency and has the same ranking for cost efficiency. Its closest peers in terms of technical efficiency are State Water and Southern Rural Water.

**Figure 10 DEA Efficiency Scores**




It needs to be emphasised that these measures of technical and cost efficiency are not assessed against an external standard of efficiency. The estimated efficiency frontier is derived from the observations on outputs and inputs for the businesses and periods included in the sample. The quality of the estimate of the frontier is crucially dependent on the size of the sample of comparator businesses and also depends on the validity of the definitions of outputs and inputs.

[43] Notwithstanding this difference, this business was included to maximise the sample size and check for such differences.

Ideally, a second-round analysis would be carried out to test whether some of the operating environment differences may explain the comparative efficiency findings. For example, these factors might in principle include topography, weather and institutional structure. However, in this context measures and data for operating environment factors are currently severely limited or not available at all, and the sample is also unlikely to be large enough to identify any effects of this kind. In future analysis this may be possible, if the data sample were expanded and with collection of measures relevant to different operating environments.

### 10.3.2 Malmquist Indexes

DEA analysis can also be used to produce total factor productivity (TFP) indexes based on a method that assesses changes in each business' technical efficiency scores over the period 2007 to 2013. Table 11 shows the results of the Malmquist TFP index analysis in detail. In Figure 11, the TFP index for RMO is plotted against the average index for all businesses in the sample.

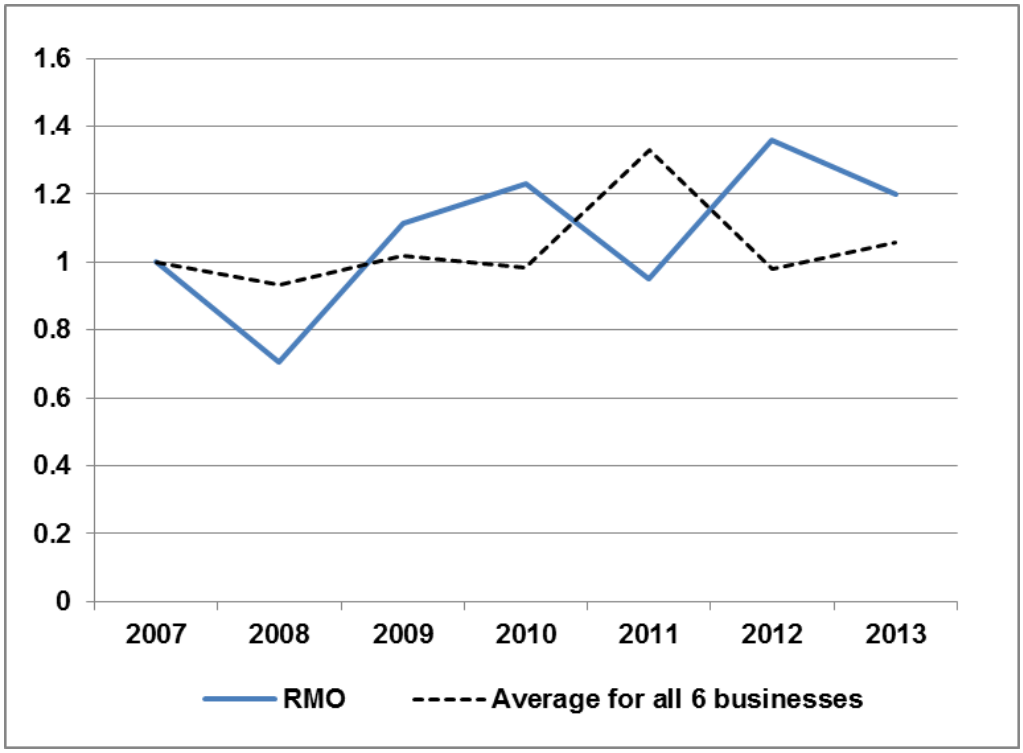
The key results of the Malmquist index analysis are:

- The preliminary estimate of RMO's average growth of TFP between 2007 and 2013 is 3.1% per year. Only one comparator business has enjoyed a higher rate of productivity growth.
- The average TFP growth for the sample was 1.0% per year over the same period.

**Table 11 Malmquist Productivity Indexes***

| *Year ending June* | *Business* | | | | | | |
|---|---|---|---|---|---|---|---|
| | **RMO** | **A** | **B** | **C** | **D** | **E** | **Average** |
| 2007 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| 2008 | 0.704 | 0.737 | 1.073 | 1.117 | 0.876 | 1.098 | 0.934 |
| 2009 | 1.114 | 1.165 | 0.912 | 0.963 | 0.945 | 1.012 | 1.018 |
| 2010 | 1.232 | 0.949 | 1.034 | 1.025 | 0.945 | 0.705 | 0.982 |
| 2011 | 0.949 | 1.260 | 2.080 | 1.654 | 0.924 | 1.121 | 1.331 |
| 2012 | 1.359 | 1.059 | 0.936 | 0.570 | 1.000 | 0.961 | 0.981 |
| 2013 | 1.200 | 1.240 | 1.070 | 0.980 | 1.001 | 0.861 | 1.059 |
| **Avg. Growth** | **3.09%** | **3.65%** | **1.13%** | **-0.34%** | **0.02%** | **-2.46%** | **0.95%** |

**Figure 11 Malmquist TFP Indexes**



# 11 Analysis and commentary

This section presents our overall analysis and commentary arising from the building blocks model information, the efficiency review and economic benchmarking.

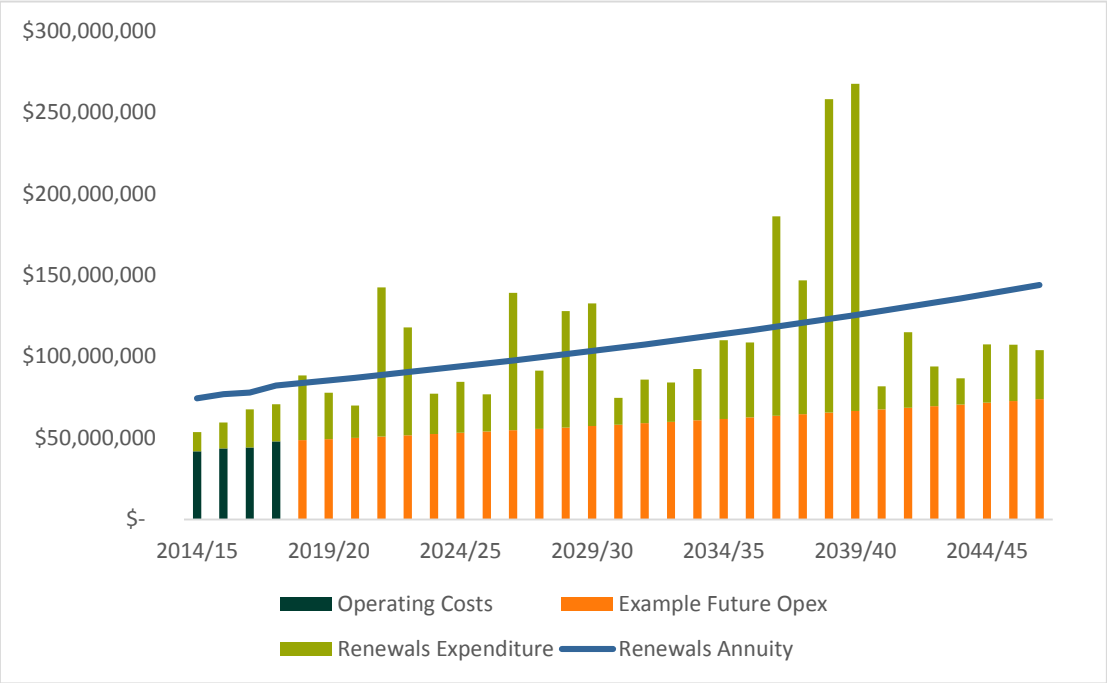
## 11.1 Long-term cost profile

The building blocks assessment provides important information to the JV participants about the long-term cost profile for RMO. In particular, funding (in nominal terms) will need to increase to meet forthcoming renewals expenditure. Renewals costs are relatively low over the next four years but significant spikes are forecast in the medium to long term.

Figure 12 shows the total forecast expenditure. The year-on-year funding requirement from JV participants would vary from year to year. For example, in 2039-40 the cash required to fund operating and renewals costs is around $267M, compared to 'smoothed' operating costs plus renewals annuity of $125M (in nominal terms).

This long-term 'smoothed' level of cost is represented by the blue line, which is the sum of operating costs and the renewals annuity. The renewals expenditure and renewals annuity are the sum of the planned maintenance and asset replacement annuities (figures 4 and 5). Operating costs are the efficient costs set out in Table 7 to 2017-18, and are assumed to increase at inflation minus 1%, from then on. This recurrent operating cost projection purely been provided for illustrative purposes.

**Figure 12. Long-term cost projection ($nominal)**




Note: the example future opex is presented for illustration purposes. This is projected at the 2017-18 efficient operating cost, indexed at CPI-1%. Operating costs will change in real terms over time.

In our Building Blocks Pricing Principles paper we acknowledged that the MDB Agreement included provision for an annuity to fund renewals expenditure. This is a matter for JV participants to decide. The long-term cost profile above may be useful to inform any future decision about moving to an annuity basis of funding among the JV participants. However it is important note that while the renewals annuity calculated under the building blocks model will generate sufficient cash over a 35 year period to recover renewals expenditure, some additional short-term cash funding will still be required in years with large expenditure (refer to Figure 6). Hence in theory, any move to fund RMO under a renewals annuity would need to be accompanied by an ability for the JV to:

- retain, and ideally invest[44], annuity funds (in years where renewals spend is less than the annuity); and
- source external finance (e.g. debt) to finance renewals expenditure when the accumulated cash was insufficient. The annuity income received in later years would enable the JV to 'repay' the deficit.

[44] This would require strict governance controls.

## 11.2 Cost recovery

Under paragraph 66 (v) of the NWI, states and territories agreed on full cost recovery for all rural systems, including:[45]

> Achievement of lower bound pricing, in line with national competition policy commitments.
>
> Continued move towards upper bound pricing, where practicable.
>
> Where full cost recovery is not likely to be achieved in the long term, and a CSO is deemed necessary, it should be transparent with consideration given to alternative arrangements aimed at removing the need for an ongoing CSO.

Figure 13 below compares the upper and lower bound levels of costs.

**Figure 13. Upper and Lower Bound Cost Recovery ($nominal)**

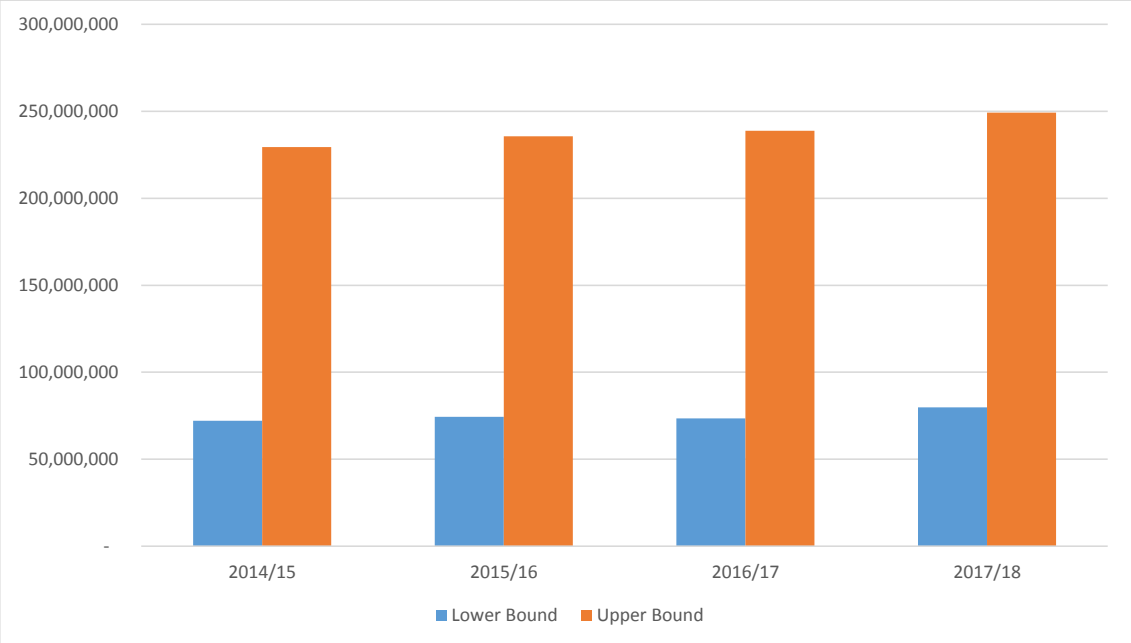


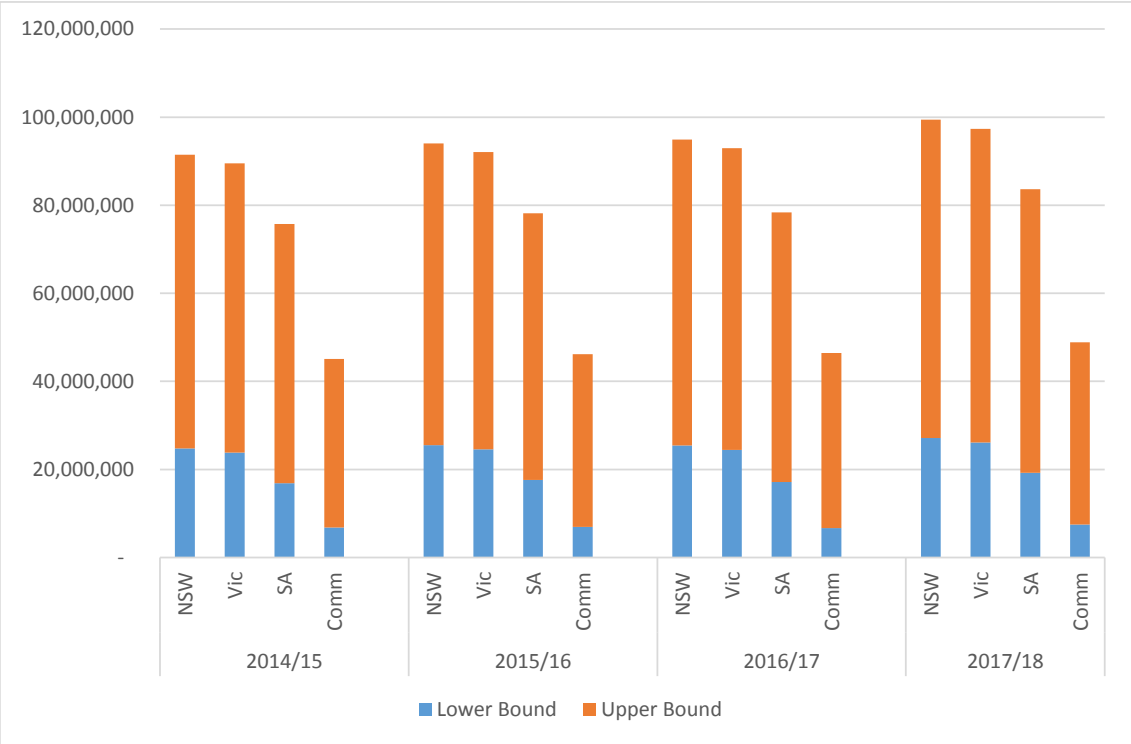

Figure 14 shows each JV participant's share of lower and upper bound costs, using the same cost sharing arrangements as currently exist. Return on existing assets[46] is shared

[45] COAG. Intergovernmental Agreement on a National Water Initiative (2004). Refer paragraph 66.

[46] This includes depreciation on the non-infrastructure RAB. The offset for asset inflation under the RAB roll-forward is also shared on this basis.

on the same basis as the JV participants' shares in the JV 'transitional' assets as specified in the MDBA Agreement.[47]

**Figure 14. JV Participant share of upper and lower bound costs ($nominal)**




Operating and renewals costs are shared consistent with the current cost sharing arrangements for Operations & Maintenance and I&C. Return on assets is shared based on JV equity shares.

It is a matter for each State as to how it wishes to recover its share of costs for RMO, and we understand different arrangements exist in each State. The long-run cash costs of RMO are effectively the same as the lower bound costs. However, the states' share of cash costs do not include the Commonwealth's share[48]. Hence in total, the lower bound costs of RMO are not being recovered from users, even if the states recovered 100% of their respective cost shares (unless the states also recovered the Commonwealth's share).

Finally, a decision to not achieve or move toward upper bound cost recovery is also contrary to the NWI. Moreover, there is an implicit subsidy from the JV participants to users that should ideally transparent.

[47] Section 150(4). If a return on assets were to be recovered by the JV, the JV participants may wish to update their agreement in relation to these proportions so all parties are satisfied the shares are current and appropriate.

[48] To our knowledge, there are no legal or institutional mechanisms to enable the Commonwealth to recover its share of RMO costs from users.

## 11.3 Improvement opportunities

The Cardno Report identified a number of improvement opportunities. These are summarised below.

### 11.3.1 Asset Management

*Asset register*

The current asset register could be enhanced by assigning a condition rating score and consequence of failure scope (criticality[49]), to produce an asset risk score. This information would be useful to inform and augment the current processes for prioritising renewals and other expenditure.

The various 'natural assets', such as river banks and channels, could be added to the asset register, and assigned the rating scores above to ensure a common approach across all areas of expenditure, regardless if the JV technically owns the asset or not.[50]

*Asset Management Plan*

An Asset Management Plan is developed from time to time, as required under the MDB Agreement. The Cardno Report sets out a number of possible improvements to the next version of the Asset Management Plan, particularly the inclusion of:

- the standards of service expected;
- summary financial information;
- renewals, planned maintenance and renewals annuity projections;
- high level statistics on the condition of assets; and
- a summary improvement action plan over a three-year horizon.

### 11.3.2 Service standards and regulatory obligations

Service standards and regulatory obligations for RMO are defined rather broadly, and there is not always a clear separation between policy, regulatory and operator aspects to RMO. Improvements could be made that would help facilitate ongoing efficiency and help prepare for any future regulation.

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[49] Articulated service standards are important for developing criticality.

[50] Rather, we understand the JV has some obligations for water delivery or other environmental obligations that are affected by the condition of streams and channels.

*Service standard specification and reporting*

Service standards and obligations are currently set out in a range of documents, including the Objectives and Outcomes document, and the MOU between MDBA and SCAs.

Cardno recommended a more formal, centralised specification of service standards and obligations is developed for RMO assets. In the first instance, these requirements could be set out (or at least summarised) in the Asset Management Plan (refer above), with performance reported periodically (e.g. annually).

*Additional metrics*

The Objectives and Outcomes document includes a detailed specification of requirements for RMO assets. As indicated in the Cardno Report, additional metrics could be developed to include:

- Asset availability;
- Percentage of assets in various condition grades;
- Percentage of critical assets in various condition grades;
- Percentage of assets with various risk ratings.

*Service-cost trade-offs*

Specifying service standards for RMO assets enables trade-offs to be assessed between the standard required, and the cost of meeting that standard. Opportunities may exist to accept slightly lower service standards, with significant cost savings.

We note that the institutional and cost recovery arrangements are not conducive to setting service standards, as the end user is somewhat remote to the RMO activities. That is the JV does not have a direct relationships with users, rather this occurs via the State agencies. Moreover, users do not always meet the costs of their service, inhibiting meaningful engagement about cost-service trade-offs. Articulating the current standards and costs, and analysing the changes in cost from standards, would help ensure the JV's expectations for service outcomes were well informed.

### 11.3.3 Data and cost reporting

The MDBA prepares budgets and reports costs in a way that enables cost shares to be calculated between the JV participants. This is both reasonable and practical.

However, our review has highlighted that this form of budgeting and cost reporting does not support a building blocks model, which instead requires costs split into recurrent operating costs, renewals and other capital expenditure categories.

This study has provided a framework and approach for cost capture that could be adopted by the JV, to augment its current budgeting and reporting approach. For example, the building blocks elements separate recurrent operating costs, which are relatively stable and can be tracked from year to year, from renewals costs, which are lumpy and project-specific. The current budgeting structure, which mixes the two, does not give this information. For example, some operating costs exist within I&C, and others are in Operations and Maintenance budget cost categories. Similarly, renewals costs are budgeted as Operations and Maintenance (Planned Maintenance), and other renewals projects exist in the I&C budget.

Separating out recurrent operating and renewals costs will enable the JV to see trends in operating costs and assess changes in costs over time. Variations from recurrent costs can then be tracked and controlled (with accompanying justification, linked to a driver). Cardno also recommend that base-year recurrent operating costs are only increased in real terms where the change can be linked to an underlying input cost (price or quantity). Budgets and SCA expenditure proposals should therefore be presented in real terms (before inflation) to reveal real increases in cost.

Cardno also recommended that MDBA and SCAs identify and document productivity improvements and quantify the budget impacts, and that new expenditure proposals are clearly linked to an expenditure driver (e.g. compliance or service level).

We recommend that the JV construct its actual and forecast cost information into recurrent operating costs and renewals costs (supported by clear business rule definitions), consistent with the building blocks model used for this report. This information can also be updated into the model each year. We also suggest that robust four-year projections of recurrent operating costs, supported by a guiding 5 to 10 year forecast. A firm four-year renewals program should also be prepared referenced to the updated long-term (e.g. 30 year) renewals forecast.

The updated model could also be used as a set of 'regulatory accounts' held by JV to assess its historic and future costs through a building blocks lense. Comparisons of historic and actual costs, and cost trends, will also provide supporting information to the JV participants about future budget and funding proposals.

Current regulatory accounts would also assist the JV to respond to any future regulation under the WCIR, if this were to occur. Alternatively, the JV could publish these

regulatory accounts annually to increase transparency. This is a matter for the JV participants to decide.

### 11.3.4 Expenditure governance

The Cardno Report recommends that the JV consider more streamlined governance arrangements, such as providing an overall budget for 1 to 4 years, and allowing the MDBA to manage amendments within that period in accordance with defined levels of authority, and triggers for variance to an approved plan.

First, separate governance arrangements could be set for recurrent operating expenditure and renewals / capital enhancement projects. For example, recurrent operating expenditure should be relatively stable and significant variation (increase) might require substantial control / approvals.

The renewals / asset enhancement budget could be based on a rolling 4-year program of work, with each JV committing to funding over that forward period. Governance arrangements would still be required at a program level and for annual to control for cost blow outs, changes in project scheduling and changes in program scope. Specific governance arrangements may also be required for major projects within the program.

### 11.3.5 Other improvements

The Cardno Report identifies a range of other improvements, including many that would be required to prepare for any future regulation.

## 11.4 Economic benchmarking

The economic benchmarking performed for this review is only an initial trial of methods relying largely on existing data collected by the NWC. The aim was mainly to demonstrate a method of benchmarking that could be used to complement other methods of analysis within a regulatory or cost control framework.

Our terms of reference also asked us to consider a framework for long-term benchmarking. The robustness of the results of economic benchmarking analysis depends on the quality, quantity and consistency of the comparative data available. It would be desirable to extend the coverage to other rural water businesses and include measures not currently available. To develop economic benchmarking further will require an investment of effort in further data gathering. Experience in other industry sectors, such as energy, suggests that this can take time, as it is important to have industry-wide agreement on all of the elements of the data collection process. Although there is effort involved in getting stakeholder support and participation, there are a

number of positive spin-offs from having a robust and consistent database available. These include providing a better starting point for more detailed benchmarking studies and providing a more informed basis for policy analysis and evaluation.

We recommend further development of the benchmarking database for rural water businesses with comparable operations to RMO, building on the existing framework established by the NWC, and including some businesses not currently covered.

## 11.5 Conclusions

The Cardno review of RMO efficiency found that the forecasts for 2014-15 to 2017-18 were efficient, except for contingency applied to infrastructure enhancement projects (a $400k reduction over 4 years was recommended).

In addition, Cardno recommend a 1% per annum efficiency target be applied for operating costs, which total $2.8M over 4 years.

Indicative benchmarking prepared by Economic Insights showed that RMO was among the best performers in its peers.

The lower bound revenue requirement calculated under the Building Blocks Model shows that the recent level of funding for RMO will need to increase. The renewals profile shows several years where significant renewals expenditure is required over the medium to long term.

While in overall terms the MDBA and SCAs have robust asset management and delivery practices, a number of improvement opportunities have been identified.

Our terms of reference asked us to consider a framework for long-term benchmarking. There are merits of continuing the economic benchmarking work to provide more and better information to the JV participants about RMO efficiency. However this requires an industry-wide approach and commitment.

# Appendix 1. Application of the WCIR

A number of different options exist under the WCIR to apply the building blocks model. The following approaches have been adopted:

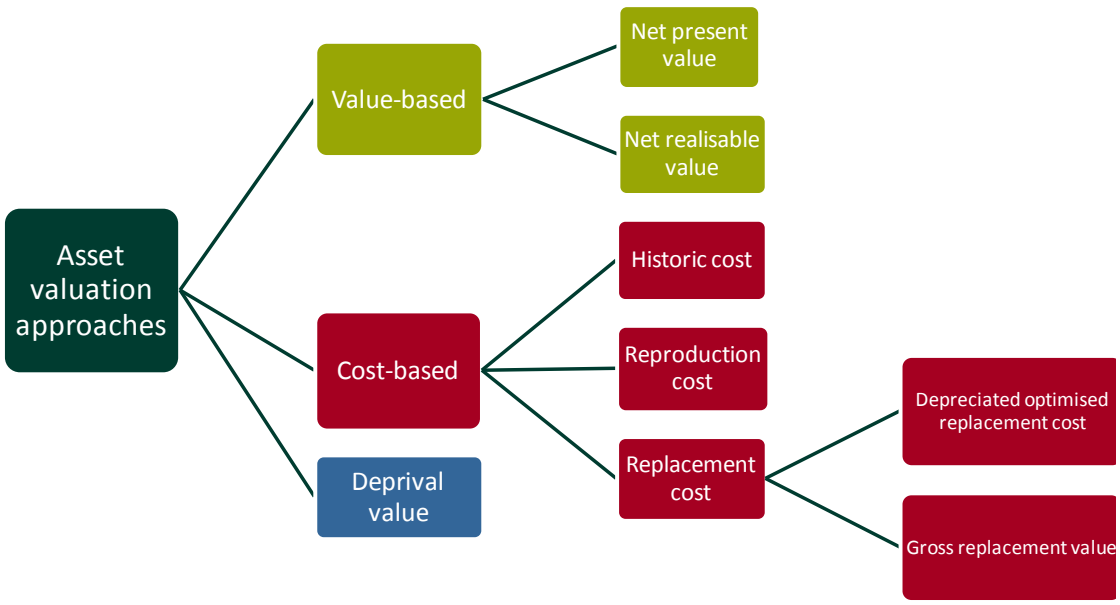
- in relation to the value of pre-existing RMO assets (assets that existed as at 30 June 2014):
  - that the value for these assets should be determined to establish the maximum costs (upper bound costs) that states could recover from users, should they choose to do so in the future; and
  - the appropriate value, in relation to the above is Depreciated Optimised Replacement Cost (DORC), subject to adjustments for past capital contributions, noting this should not preclude each state making its own decisions about the recovery of these existing assets in user prices.
  - The Water Charge (Infrastructure) Rules 2010 guidelines will be applied when determining the appropriate treatment for gifted assets.
- future costs should be forecast, and reviewed for efficiency as follows:
  - recurrent operating cost – over a short period (say four years, consistent with the corporate plan), to provide information about any short-term variations to costs to the States and Commonwealth, and potentially water users.
  - Renewals / capital costs – over a longer timeframe (say 30 years), to provide information about long-term cost profile for the assets and provide transparency for long-term asset decisions, noting that in terms of the building blocks model, these costs will be converted to a renewals annuity, which signals the long-term, smoothed cost of maintaining the service capacity of RMO assets.
- the building blocks model will include a corporate tax setting of $0, or in other words, no tax costs are assumed.

The following sections set out the rationale adopted.

# Appendix 2. Valuation of pre-existing assets

There are two main categories of approaches that can be used, being value-based and cost-based approaches. There are a number of alternative methods within each category, as summarised in the following figure.

**Asset valuation approaches**




Value-based approaches seek to estimate the economic value of the asset, based on either the expected future cash flows (Net Present Value method) or the cash proceeds that would be received if the asset was sold in the open market (Net Realisable Value method). While such an approach is theoretically appealing, they are not commonly used in practice to value major infrastructure that has no alternative use (particularly natural monopoly infrastructure).

Value-based approaches can be difficult to implement given the assumptions that need to be made, including the difficulties in ascribing a market price to infrastructure. The Net Present Value method has the significant problem of circularity, to the extent that the expected future cash flows that will be generated by the asset depend on the upfront valuation of those assets. This is particularly the case for regulated infrastructure where a building blocks approach is used to set allowable revenues (as the allowable revenue includes a return on, and return of, capital). This circularity problem can be overcome if the value is based on current prices. However this locks in current pricing policies and any subsidies or under-recovery, thereby removing discretion for future policy makers.

Cost-based approaches are more commonly used as they are easier to implement in practice. The easiest approach to implement is historical cost, which is based on the actual book value of the asset. However, one of the main problems with using a cost-based approach for infrastructure with long economic lives (or a potentially infinite life, in the case of the channel assets) is that the valuation can become less relevant to future pricing and investment decisions, particularly if the asset (or components of the asset) is subject to technological change or there are periods of high inflation.

Current cost approaches are more relevant to current and future pricing decisions as they can allow for changes in technology (with the exception of reproduction cost) and are more reflective of current costs. The most commonly used approach in establishing prices for regulated infrastructure is Depreciated Optimised Replacement Cost (DORC).

Gross Replacement Value (GRV) is based on the same principle as DORC. GRV assumes a Modern Equivalent Asset approach that has a similar effect to optimisation, although it will not necessarily arrive at the same starting value. If no optimisation is necessary, the two approaches are more likely to arrive at the same or a similar value.

A third approach that combines value- and cost-based approaches is deprival value. Value is assessed as:

- the loss that might be expected if consumers were deprived of the asset's future benefits; or,
- the amount representing the loss of service potential from the asset if it was de-commissioned.

It is estimated as the lesser of DORC and the economic value of the asset, where the latter is based on the maximum of Net Present Value or Net Realisable Value.

A set of Pricing Principles were developed by COAG as part of the National Water Initiative.[51] These Pricing Principles favour the use of deprival value to value new water assets. Existing (or 'legacy') assets can be valued using Depreciated Replacement Cost, DORC, the (undepreciated) Optimised Replacement Cost (ORC), indexed actual cost, Optimised Deprival Value or some other recognised valuation method.[52]

Deprival value was initially favoured by the Council of Australian Governments (COAG) in established the pricing principles to apply to electricity and water

[51] http://www.environment.gov.au/water/publications/action/pubs/nwi-pricing-principles.pdf. {Accessed 8 March 2001}

[52] This remains the case today. Refer: Steering Group of Water Charges (2010). National Water Initiative Committee. National Water Initiative Pricing Principles, April.

infrastructure as part of National Competition Policy reforms. However, there are significant with value-based approaches, as outlined above. In particular, in a policy environment where prices have historically been less than the upper bound, value-based approach will entrench current prices into the future, depriving Governments of future policy flexibility.

DORC is also the most common methodology that has been applied in valuing energy network assets (that is, electricity and gas transmission and distribution). COAG also originally recommended the use of deprival value when considering the pricing principles to apply to these assets. However in the development of its *Statement of Principles for the Regulation of Transmission Revenues*, the ACCC subsequently expressed concerns about the circularity of this methodology and noted that "one approach would be to interpret the methodology as an optimised replacement cost (ORC) valuation"[53], noting that depreciation would need to be applied (resulting in a DORC). The use of DORC was subsequently ratified in its Final Decision.[54]

DORC has been the most common methodology applied in rail access pricing. As outlined above, the exception to this is the Western Australian Railways Access Regime, which has GRV. This methodology was prescribed in the legislation and hence the ERA is prevented from reviewing this approach.

The DORC valuation includes depreciation of the assets. However, depreciation is not relevant if the assets' service potential are being maintained in perpetuity – for example through ongoing renewals expenditure funded from a renewals annuity. Hence the undepreciated value (ORC) applies under a renewals approach.

[53] Australian Competition and Consumer Commission (1999). Draft. Statement of Principles for the Regulation of Transmission Revenues, May, p.24.

[54] Australian Competition and Consumer Commission (2004). Decision. Statement of Principles for the Regulation of Electricity Transmission Revenues – Background Paper, December.

# Appendix 3. WACC calculation under the WCIR

This appendix sets out how the rate of return (WACC) for RMO has been calculated. We have not included a detailed and extensive discussion about the components to the WACC in this appendix. This information is highly technical, and is extensively published by regulators (including the ACCC) and others. Instead, we focus on the approach adopted to determine the values for calculating the WACC.

The WACC follows the WCIR guidelines and pricing principles, which are summarised below.

## Form of the WACC

The WACC can be expressed in various forms. In theory, in perpetuity, all forms should produce the same outcome in net present value terms, provided the form of the WACC is applied to the correct asset base and cash flows. The options are:

- Real or nominal – a real rate of return is the return after the inflationary effects have been removed. It is applied to the non-indexed value of the RAB. Conversely, a nominal rate of return is the return inclusive of inflationary effects, and is applied to the nominal or indexed value of the RAB; and
- Pre or post tax – in a building blocks model the pre-tax rate of return is the required return which includes an allowance for tax. A post-tax WACC, on the other hand, excludes such an allowance because the tax provision is included explicitly as a component to the building blocks model, and recovered as a cash item rather than as part of the rate of return. Hence a pre-tax WACC is higher than a post-tax WACC as it provides for recovery of tax in the rate of return.

The WCIR pricing principles requires that a post-tax, nominal WACC be used as do most regulatory bodies in Australia. Hence, we have also adopted this approach in the building blocks model.

## A.1 Parameter values

The parameters for calculating the WACC can be characterised as market-sensitive parameters and industry or firm-sensitive parameters.

The WCIR pricing principles are heavily prescriptive about the values to be adopted for these parameters. Indeed all firm-sensitive parameters are pre-determined, such as the capital structure and equity beta.

The guidelines also prescribe other market values, such as the Market Risk Premium (MRP), and the approach to be taken to determine values that change regularly due to changes in interest rates, including:

- the risk free rate, which is an input in the return on debt and equity; and
- the additional margin charged by lenders to a BBB+ rated firm (debt risk premium).

The table below sets out the WCIR requirements.

**WCIR requirements**

| | |
|---|---|
| Form of WACC | Post-tax WACC |
| Risk free rate | Based on the yield of a 10 year Commonwealth Government Securities (CGS) bond, using an averaging period of between 10-40 business day period commencing as close as practically possible to the start of the regulatory period. |
| Market risk premium | 6 per cent |
| Equity beta | 0.7 |
| Debt risk premium | Based on the yields of BBB+ rated corporate bonds with 10 year maturity. |
| Gearing level | 60 per cent |

**Source:** ACCC. Pricing principles for price approvals and determinations under the Water Charge (Infrastructure) Rules 2010. (July, 2011). p28.

# Appendix 4. RAB Roll Forward

The box below sets out the RAB roll forward requirements under the WCIR.

**RAB roll-forward**

**First regulatory period**

The RAB of the first regulatory period must be rolled forward in accordance with the formula:
{(A-B}+C}-(D+E), where:

**A** is the value of the operator's assets that were used for the preceding period

**B** is the value of those assets that were not used by the operator to provide infrastructure services during the preceding period and any assets contributed by customers or government

**C** is the actual (or, in the case of the last year of the preceding period, forecast) capital expenditure on assets used by the operator to provide infrastructure services (net of actual customer and government capital expenditure contributions) in respect of each year of the preceding period

**D** is the regulatory depreciation in respect of assets used to provide infrastructure services (as determined for each year of the preceding period)

**E** is the actual (or, in the case of the last year of the preceding period, forecast) revenue received by the operator from disposal of assets used to provide infrastructure services in the preceding period.

**Subsequent regulatory periods**

For all subsequent regulatory periods, the RAB must be rolled forward in accordance with the formula:
(A+B)-(C+D), where:

**A** is the regulatory asset base of the operator determined in respect of the preceding regulatory period

**B** is the total of the actual (or, in the case of the last year of the preceding regulatory period, forecast) capital expenditure on assets used by the operator to provide infrastructure services (net of customer and government capital expenditure contributions) in respect of each year of the preceding regulatory period

**C** is the regulatory depreciation in respect of assets used to provide infrastructure services in respect of each year of the preceding regulatory period

**D** is the actual (or, in the case of the last year of the preceding regulatory period, forecast) revenue received by the operator from disposal of assets used to provide infrastructure services in respect of each year of the preceding regulatory period.

**Source: ACCC. Pricing principles for price approvals and determinations under the Water Charge (Infrastructure) Rules 2010. (July, 2011). pp.25-26.**

# Appendix 5. WCIR requirements for renewals annuities

The WCIR state that if a renewals annuity is used, the following details must be provided:

- the nature of the assets included in the annuity calculation;
- the basis of long-term capital expenditure forecasts that support the annuity calculation;
- the service levels that underpin the capital expenditure forecasts;
- the term of the annuity;
- the discount rate used to calculate the annuity; and
- the current and forecast balance of the annuity.

In addition, the WCIR pricing principles state that where an annuity is used, the regulator must be satisfied that it provides sufficient revenue to fund all required expenditure, reflect efficient forecasts, be set across a long-term planning horizon, be transparently calculated and be reviewed regularly.

The WCIR pricing principles also requires that capital expenditure forecasts reflect cost effective compliance with regulatory and service standards and are based on sound engineering and management practices. The guidance material also sets out the information requirements to support an application to the ACCC.