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Response to ACCC Draft Decision on State Water Pricing Application 2014-15 to 2016-17

Metering Service Charges

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Executive summary

This paper sets out evidence which demonstrates the prudency and efficiency of the Metering Service Charges proposed in State Water's Pricing Application for the three years to 2017 (the Application).

This paper provides:

1. a comparison of the current charges approved by IPART (Current MSCs) with State Water's proposed Metering Service Charges (Proposed MSCs);
2. a comparison of Proposed MSCs with other service provider's customer charges for remote-read meters;
3. reasons why the Metering Project costs to date do not provide appropriate benchmark maintenance costs and why these costs appear to be less than Current Charges; and
4. a review and validation of the input assumptions used in the State Water Metering Charges Model.

The results of these exercises demonstrate that:

- the Proposed MSCs are based on assumptions of prudent and efficient practice and costs and are consistent with observed rates and practices;
- the Current MSCs are based on incomplete and insufficient assumptions and do not provide an appropriate benchmark for costs to be recovered by the Proposed MSCs;
- the historical costs observed through the Pilot Project are inappropriate for establishing a baseline for anticipated costs; and
- the Proposed MSCs reflect necessary operations and maintenance required to meet the national standards in particular the National Framework for Non-urban Water Metering, AS4747 and the Metrological Assurance Framework.

Comparison with the Current MSCs

The investigation of the cost estimates and assumptions for the Current MSCs, approved by IPART for the determination period 2010-2014 shows that:

- the cost estimate for the Current MSCs was made prior to the development of relevant standards and before commencement of the Murray Pilot project. The requirements of the National Standards and the project itself were not fully anticipated;
- the Current MSCs do not make any allowance for a number of necessary costs. As examples, no allowance was made for planned inspections and

basic maintenance, re-verification, unplanned "corrective" maintenance, asset planning, auditing or reporting;

- the Current MSCs are based on arbitrary cost estimates for information systems, as no system specification had been developed at the time; and
- some of the underlying maintenance planning assumptions were insufficient to meet current national standards, for example the proposed approach of validating a random sample of sites each year.

By contrast, State Water's Proposed MSCs are based on an efficient approach to meet current standards and appropriate allowances for efficient costs have been made. They are based on a much firmer understanding of the project requirements and costs involved gained from the pilot project.

Comparison with other service providers' charges

Other service providers, including large irrigation companies servicing the regions near or similar to the NSW Murray Darling Basin, have established (or are proposing) similar annual charges to State Water. The charges for remote-read meters from other service providers ranges from $554 p.a. (Coleambally Irrigation) to $750 p.a. (Goulburn Murray Water). This compares with State Water's proposed annual charges of $530 to $971 p.a. (for 80mm and 1000mm electromagnetic flow meters respectively).

The Proposed MSCs are therefore in line with other service providers.

Comparison with State Water's actual costs to date

State Water's actual average annual cost of operations and maintenance to date has been incurred as part of the Murray Pilot and Murrumbidgee Efficiency projects, and also with current charges by ABB Australia Pty Ltd under contract to SWC to maintain and calibrate a fleet of magflow meters that are part of the Fish River Scheme.

The operating and maintenance costs incurred to date for meters installed appears to be lower than the actual level of activity and cost that has been observed. The reason for this is that under the Managing Contractor Agreement for the Metering Project, the Contractor is responsible for and bears the cost of rectifying defects and omissions from the date of installation of each meter through to twenty four months after all works have been completed. Although there is no "maintenance" scope included in the contract, the defects rectification regime has motivated the Contractor to maintain and rectify meter performance issues, and has incurred the corresponding cost on State Water's behalf.

Review of cost model inputs

State Water, with assistance from KPMG and MWH Global, has reviewed the input cost assumptions developed by State Water and ADASA and used in the State Water Meter Charges Model to develop the Proposed MSCs. Wherever possible, this has been done with reference to other projects and observed industry practice. Section 4 of this paper demonstrates that input assumptions are reasonable, efficient, and reflect the requirements of the National Standards.

MWH Global has identified a range of efficient costs which are currently omitted from the forecast costs, which the Proposed MSCs recover. These are set out at Section 4 of this paper. Preliminary estimates indicate that these additional items could be in the order of $100 to $135 per meter per year. State Water is not at this late stage, proposing to revise its Proposed MSCs for this new information. However, this information further demonstrates that Proposed MSCs are based on prudent forecasts of costs.

Conclusion

The information in this paper demonstrates that State Water's Proposed MSCs meet the Basin Water Charging Objectives and Principles (BWCOP), the approval criteria of Rule 29 of the Water Charges (Infrastructure) Rules 2010 and the ACCC's pricing principles[1].

Establishing a level of charging which is sufficient to recover costs will be critical for the financial viability of the Metering Project, and for the project's ability to be implemented so that metrological accuracy can be assured in the NSW Murray Darling Basin over the longer term.

The Current MSCs approved by IPART are insufficient to recover the prudent and efficient costs of fulfilling the current metering standards and the Metering Project's requirements.

The Proposed MSCs on the other hand:

- include allowances for costs necessary to meet the National Standards requirements, and reflect an approach to maintenance and asset management in line with efficient industry practice;
- are in line with the charges applied by other service providers including a range of water authorities and irrigation companies;
- are in line with the anticipated costs over the determination period as the Metering Project is rolled out; and
- are based on prudent and efficient input assumptions which have been individually reviewed.

[1] ACCC, July 2011, WICR pricing principles, p80

1 Introduction and purpose

This paper addresses matters that have a bearing on the ACCC's Draft Decision (Draft Decision) on State Water's Metering Service Charges for the three years to 2017.

State Water notes that in its Draft Decision the ACCC stated that:

> *"The ACCC considers the cost forecast by State Water does not reflect the prudent and efficient cost of providing the service. In particular the forecast costs proposed by State Water are higher than the actual costs observed in its pilot program."*[2]

Also, the ACCC noted that:

> *". . .State Water's current charges which were determined by IPART ahead of the pilot program, are sufficient to recover operating and maintenance costs for State Water owned meters."*

This paper explains:

- why the Proposed MSCs set out in State Water's Application are based on prudent and efficient operating and maintenance costs;
- why State Water's historic costs do not provide a meaningful basis to assess the Application's forecast costs;
- why the forecast costs on which IPART's approval of the Current MSCs:
  - are not sufficient to recover State Water's prudent and efficient costs; and
  - do not provide an appropriate benchmark for the costs and charges which will apply for the period to 2017.

In particular, this paper provides additional information to assist the ACCC that:

- explains in Section 2:
  - the necessity for the standards of service on which the assumptions underpinning the forecast operating and maintenance costs are based; and
  - that the required standards have not so far been applicable (as they apply to meters under the National Framework for Non-urban Water Metering) and thus the question of historic compliance is not directly relevant to assessing State Water's Metering Service Charges;

[2] ACCC, March 2014, Draft decision on State Water Pricing Application: 2014-15 – 2016-17, p 22.

- provides in Section 3 a comparison of the costs forecast for the determination period to 2017 with the costs approved by IPART for the prior period, to:
  - explain why the activities that State Water is obliged to undertake during the determination period, cause the costs forecast for the period to 2017 to be greater than previously estimated costs; and
  - demonstrate that the forecast costs, rather than those approved by IPART provide necessary, efficient and prudent costs for determining charges for the determination period; and
- provides in Section 4 explanations of the key specific inputs and assumptions that underpin the State Water Metering Charges Model[3], to assist the ACCC to assess their prudency and efficiency and hence the prudency and efficiency of the Proposed MSCs in the Application. These explanations include comparisons to demonstrate that the forecast costs are comparable with industry benchmarks.

1.1 Professional advice sought in preparing this paper

State Water has prepared this paper with assistance from its professional advisors KPMG and MWH Global to accompany its submission to the ACCC, on the ACCC's Draft Decision on State Water's Pricing Application for the three years to 2017 (the Application).

KPMG's role was restricted to assisting State Water:

- plan the form and structure of the paper;
- highlight matters in the Draft Decision relevant to the Metering Services Charges that could benefit from commentary and input by State Water;
- manage the process of producing the draft paper for State Water's finalisation, noting that responsibility for the content of the paper itself rests with State Water;
- undertake in conjunction with MWH Global, the comparative analyses set out in Section 3 of this paper on the basis of information and assumptions provided by State Water and providing State Water with factual findings from that analysis;
- document a range of assumptions and inputs underpinning the State Water Metering Charges Model, for State Water's commentary; and

[3] http://www.accc.gov.au/regulated-infrastructure/water/state-waters-regulated-charges-2014-17-review/application#state-water-039-s-application-for-accc-approval-determination-of-its-regulated-charges

- identify matters on which MWH Global could advise State Water for the purposes of completing this paper.

KPMG's role was in an advisory capacity only, and KPMG was not responsible for formulating, nor verifying the accuracy or appropriateness of, any of the assumptions included in this paper. KPMG do not make any statement as to whether any forecasts or projections will be achieved, or whether the assumptions and data underlying any such prospective financial information are accurate, complete, or reasonable. There will usually be differences between forecast or projected and actual results, because events and circumstances frequently do not occur as expected or predicted, and those differences may be material.

MWH Global assisted State Water by providing independent commentary on a number of assumptions and inputs underlying both the forecasts included in State Water's Application and the forecast costs underlying the current metering services charges approved by IPART.

This paper is not an independent report of either KPMG or MWH Global and neither KPMG nor MWH Global are responsible to, nor owe any duty (whether in contract or in tort or under statute or otherwise) to, any person other than State Water for their roles in connection with the preparation of this paper.

1.2 Commercially confidential and redacted versions

Please note that this paper contains information about market prices for State Water's input costs which are commercially confidential to suppliers that operate in competitive markets. State Water has provided this information including the names of suppliers in this paper, to demonstrate the robustness of the evidence for the efficiency of its costs. However, State Water has done so on the basis that the information marked as commercially confidential will not be publically disclosed. To assist the ACCC with the public consultation necessary to its regulatory process, State Water can, if required, provide the ACCC with a redacted version of this submission, suitable for public disclosure.

1.3 Summary of Key Points

This paper evidences that the Metering Service Charges proposed in State Water's Application July 2013, meet the ACCC's criteria for assessing operating costs[4]. This paper:

- evidences the prudency and efficiency of the forecast costs that would be recovered by the Metering Service Charges included in State Water's Application for the determination period to 2017;
- provides reasons and evidence for the requirement for Metering Service Charges to recover increased costs in the determination period to 2017; and
- provides reasons and evidence for the changes in service standards for the determination period to 2017, from the prior period.

1.3.1 Service standards

State Water's cost forecasts are based on:

- An agreement the "*Funding and Performance Agreement – NSW Metering Scheme Pilot",* between State Water and the Office of Water (2011);
- the National Framework for Non-Urban Water Metering (came into effect 1 July 2010); and
- standards, principally AS4747, which came into effect in 2013.

Accordingly, the compliance activities and outcomes, and associated costs, experienced in prior years are not relevant to the determination period for the three years to 2017.

Sections 3 and 4 and Appendix A of this paper provide explanations that include independent advice received from MWH Global, and independent sources of comparison, that evidence how State Water's forecast costs are based on assumptions of prudent and efficient actions and costs necessary to meet its service standard obligations. The outcomes of these analyses are summarised in Section 1.2.2 and 1.2.3 below.

1.3.2 Comparison of historically approved and forecast operating and maintenance costs and underlying assumptions

The Current MSCs do not provide a valid basis for the recovery of prudent and efficient costs for the determination period to 2017. This is because the

[4] ACCC, August 2013, Information paper on State Water's 2014-17 pricing application, p 12.

Current MSCs were based on estimated costs at a time when detailed information was not available.

The Current MSCs neither reflect nor were intended to reflect, actual costs. Nayar Consulting stated that:

> *"The objective of this report is to provide a preliminary estimate of the operating and maintenance costs of the metering scheme to support the Department's pricing application to IPART."*[5]

The estimates were developed:

- before the commencement of State Water's Metering Pilot Scheme;
- at a time when the National Framework for Non-Urban Water Metering was still subject to a Regulatory Impact Statement;
- when ATS4747 had been published but had not yet been implemented; and
- before some aspects of the Metering Project specification were developed, particularly with regard to the information systems requirements.

Nayar Consulting suggested that the charges include a 20% provision to account for uncertainty. This suggestion does not however appear to have been incorporated in IPART's approved current meter service charges.

A comparison of the assumptions illustrates that the assumptions underlying the current charges are insufficient in some areas, and that the Proposed MSCs are appropriate, efficient and necessary. For example:

- in 2009, a detailed definition of the required information systems was not yet available. Nayar Consulting was unable therefore to obtain indicative quotes from suppliers. Nayar Consulting commented in its report that the resulting total average of $56 per meter per year was potentially considerably lower than the actual annual cost;
- the fundamental underlying approach to validation has changed due to requirements of the National Standards;
- no allowance was made in the Current MSCs for:
  - re-verification;
  - planned inspection and basic maintenance;
  - unplanned maintenance; or

[5] Nayar Consulting, September 2009, Assessment of Annual Operation and Maintenance Costs for the NSW (Hawkesbury Nepean and NSW Murray-Darling Basin) Metering Scheme, p2

- audit and reporting as is now required by the State and Commonwealth.

It is not realistic to exclude costs for these activities, which a prudent operator is obliged to undertake.

1.3.3 Input costs and assumptions that underpin the charges model

State Water's technical adviser, MWH Global (MWH), has undertaken a desktop review of the input assumptions to form a view regarding whether the assumptions appear reasonable and appropriate. The review involved comparing State Water Metering Charges Model[6] (the Model) assumptions to industry practice, including evidence from projects undertaken by Sydney Water and Goulburn Murray Water, and reviewing data obtained from the pilot program (1,200 meters over a 13 month period). To further inform the review, MWH also considered supplier pricing information it received from recent competitive tender processes.

MWH's review found that the majority of input assumptions are reasonable and appropriate when compared to industry practice for this type of metering service. Further, it was found that the Model erred on the side of excluding certain activities from the Model. In particular, the following omissions were identified wherein no allowance has been made for:

- a Manager to oversee and supervise field work. Recent competitive tenders reviewed by MWH have all included this type of management position;
- an Asset Operation Manager and Asset Maintenance Planner. Industry practice indicates that these positions are performed on a part-time basis;
- a Community Liaison person. The majority of recent competitive tenders reviewed included a customer relations person assigned on a part-time basis. With approximately 7,000 new telemetry enabled meters, there is likely to be an increase in the level of community engagement;
- costs associated with holdingand managing the spare parts inventory, including electromagnetic flow meters, Remote Terminal Units (RTUs), batteries, pipes and fittings, solar panels and aerials;
- replacement or minor repairs to communication modems (Next G or Satellite), RTUs, aerials and power packs. The 2013 data from pilot sites

[6] http://www.accc.gov.au/regulated-infrastructure/water/state-waters-regulated-charges-2014-17-review/application#state-water-039-s-application-for-accc-approval-determination-of-its-regulated-charges

identified that 1.63% of all types of equipment, including these items, have incurred damage that is not covered by warranty.

State Water is not proposing to recover the costs of these activities in its MSC. Rather they serve to evidence that the Proposed MSCs are based on costs that are prudent and efficient as they are much lower than is likely to be the case in practice.

2 How necessary service standards drive costs

This section sets out the policy context, relevant standards and other obligations that apply to non-urban water metering and to State Water's implementation of the project. The purpose of this section is to demonstrate that State Water is obligated to meet multiple standards and contract requirements, most of which did not apply at the time of IPART's determination in respect of the Current MSCs. State Water's Proposed MSCs have been determined in accordance with these standards requirements and other obligations.

2.1 Key Documents, Obligations and Timelines

The 2004 COAG Intergovernmental Agreement on a National Water Initiative (NWI) agreed that all parties including the NSW government would implement the following key actions in relation to metering:

- Development of metering and measurement actions; and
- Implement metering and measurement actions

In 2008 the Commonwealth and Basin states signed an Intergovernmental Agreement on Murray Darling Basin reform (IGA). The objective of the IGA was to progress the objectives of the NWI via a series of Priority Projects.

In 2009 COAG approved the National Framework for Non-Urban Water Metering

In 2010 the NSW Government signed a water management partnership agreement with the Commonwealth Government. The partnership agreement provides a framework to undertake Priority Projects within NSW.

Also in 2010 the NSW Government signed Schedule 2 – Project Schedule – NSW Metering Scheme Pilot. This required the NSW Government amongst other aspects to purchase and maintain all equipment required to undertake the priority project including meters. In addition the NSW Government were to ensure ongoing arrangements are in place to maintain the accuracy of the meters installed by the priority project.

The NSW Government in 2011 engaged SWC to undertake the meter installations on its behalf.

In 2012 the NSW Government and the Commonwealth signed Project Schedule 6 to the Water Management Partnership Agreement for the NSW Metering Project with the purpose of this Priority Project is to:

- install accurate water meters in the part of the Murray-Darling Basin that is within NSW to cover at least 95% of the total volume of licensed water extractions on active offtakes in regulated rivers, unregulated rivers and

groundwater sources, excluding those extractions which are or will be metered under the Pilot Project and the Murrumbidgee Regulated Metering Project.

- Efficiency gains will arise from replacing currently inaccurate meters, supplemented with a new telemetry-based system to provide for real-time and accurate reporting.
- The water meters must comply with the National Framework for Non-urban Water Metering (including compliance with pattern approval requirements of the National Measurement Institute, and Australian Technical Specifications ATS4747) as approved by the Council of Australian Governments on 7 December 2009.

This Priority Project will:

- assist the State to meet its commitments to the IGA;
- meet Reform Requirements;
- result in Agreed Water Savings that will be shared between the State and the Commonwealth; and
- introduce real-time telemetry for the majority of licensed water extraction.

In 2013 the most current version of the NSW Metering Implementation Plan articulates that the NSW Government will install state owned meters to replace existing customer owned meters.

2.2 Benefits and economies of scale

State Water's metering services enable an efficient state-wide standard system. By State Water being responsible for the meter selection and installation, uniformity of meter types and performance across the State can be achieved. This provides the potential for significant economies of scale and savings recognised through uniformity of units and economies of scale for spares and replacement, as well as in cost and a range of skills required for inspections and upkeep.

However to achieve these outcomes and benefits, it is critical that MSCs be set at a level that ensures the financial viability of State Water's meter operating and maintenance services. This requires State Water to be able to recover the efficient costs of it providing these services. State Water has determined these cost by reference to the minimum National Standards, which as a prudent operator it is obliged to follow.

2.3 Relevant Standards

The National Water Initiative (NWI) established the development and implementation of National Standards for non-urban water meters. The

National Framework implemented consistent national metering standards across Australia for compliance and quality assurance.

State Water has forecast its costs on the basis that as a prudent operator, it needs to fulfil the minimum requirements of the following Australian National Standards:

- AS4747.2 – Technical requirements for closed conduit meters fully charged;
- AS4747.3 – Technical requirements for open channel meters;
- AS4747.5 – Installation and commissioning of closed conduit meters fully charged;
- AS4747.6 – Installation and commissioning of open channel meters; and
- AS4747.8 – Installation and commissioning of open channel meters (including: Clause.3.6.1 After meters have been validated (as correctly installed, they shall be sealed in such a way to ensure there is no possibility of dismantling, altering or removing the water meter or adjacent components; and Clause. 3.6.2 which need to consider physical security of installed meters).

2.4 Implications of standards

State Water's cost forecasts are based on our and independent (ADASA) understanding of the relevant National and Australian Standards which in the case of AS4747 only came into effect in 2013. Accordingly, the compliance activities and outcomes, and associated costs, experienced/predicated in prior years are not relevant to the determination period for the three years to 2017.

The State (NSW) and State Water as owner of meters within our regulated water sources is obligated to comply with the National Framework for Non-Urban Water Metering (National Water Meter Standards). Under The National Water Meter Standards, non-urban water meters shall comply with the key requirements of the MAF to ensure an acceptable level of confidence in meter performance. The key requirements specify that meters must be:

- *Maintained periodically in accordance with the Pattern Approval certificate and relevant Australian Standards or Technical Specifications (eg AS4747), and*
- *Audited on a regular basis by water service providers, government agencies or independent auditors in accordance with implementation plans.*

As a consequence, State Water has relied on the requirements of AS4747 (which replaced ATS 4747 from January 2013) and specifically with respect to meter maintenance, the requirements contemplated by Clause 2.7.1 and Appendix C and Appendix D for a typical rolling 15 year maintenance schedule. This necessitates ongoing cost to maintain compliance. As a minimum, meter batteries require replacement as often as every three years (as also experienced by Goulburn Murray Water). To allow for the variability of meter sizes, State Water has adopted ADASA's recommendation for validation of larger meters (meters greater than 400mm in diameter) every three years and smaller meters (less than 400mm in diameter) every six years as prudent, based on ADASA's independent professional expertise and experience.

Sections 3 and 4 and Appendix A of this paper provide detailed analyses and explanations of the activities on which State Water has based its forecast costs, that evidence how State Water has based its forecast costs on assumptions of prudent and efficient activities necessary to meet its obligations this includes reporting and auditing as required by the MAF.

Prior to the State's decision to meet its obligations under the NWI via installing state owned and maintained meters, customers were or will be obligated to meet this requirement and cost burden. It is a condition of the landowner's water license to ensure the ongoing accuracy of a meter that is being used to determine water charges. Therefore, the costs of maintaining and operating a meter under the current standards are not costs that a landowner can avoid. By providing a meter operations and maintenance service, State Water provides efficiency benefits of economies of scale to address risks and costs which landowners may otherwise face.

The State (NSW) and State Water has taken the approach that in order to provide prudent and efficient operation and maintenance of meters, all meters installed in closed conduit applications (being the majority of installations) be pattern approved electromagnetic flow meters with telemetry. Further, meters installed will be provided from a panel of meter suppliers approved by State Water so that uniformity and consistency of meters and installation is maintained throughout the State and provide prudent and efficient asset management of spares, replacement and service. Such measures include:

1. It will be a mandated condition for any extraction license to have meters installed and complying with NWI and AS4747 and pattern approved meeting the accuracy limits for site installation of ±5%;
2. Meters installed in closed circuit conduits will be electromagnetic flow meters as contemplated under the Metering Project;

3. Excavation, installation and testing equipment required for the installation of meters will be in compliance with AS4747;
4. Meter procurement, installation, supervision, project management, commissioning and testing;
5. Access to suitably qualified design organisations to provide meter facility details for validation purposes;
6. Engaging appropriately certified validators to validate meter installation;
7. Confirmation that the meter/s installed comply with NWI and AS4747 requirements as appropriate; and
8. Asbestos removal for sites with asbestos pipes. On average, the cost of asbestos removal for such sites would be approximately $2,500.

3 Comparisons of costs

This section sets out:

- the results of comparisons of the assumptions and forecast costs on which State Water's application is based with those which underlie the IPART approved costs referred to in the ACCC's Draft Decision. This shows that:
  - the IPART approved costs were based on limited information available at the time;
  - the IPART approved costs do not provide a valid benchmark;
  - the State Water forecasts are based on significantly more thorough and realistic information, not available at the time, when the estimates were made in 2009; and
- a comparison of the Proposed MSC with other industry service providers' metering charges. This shows that State Water's Proposed MSC is comparable with market rates.

3.1 Comparisons with IPART approved costs

This section sets out comparisons of:

- the costs recovered by Current MSCs approved by IPART and State Water's Proposed MSCs; and
- the assumptions underlying these two sets of costs.

Appendix A also sets out in tabular form, a comparison of the key assumptions which underlie:

- the costs recovered by the charges for the determination period 2010 to 2014, submitted to IPART for approval in 2010. Those assumptions have been sourced from the Nayar report[7]; and
- the forecast costs to be recovered by the Proposed MSCs.

The assumptions are set out in the ADASA report[8] and should be read in conjunction with the State Water Metering Charges Model[9].

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[7] Nayar Consulting, 16 September 2009, Assessment of Annual Operation and Maintenance Costs for the NSW (Hawkesbury Nepean and NSW Murray-Darling Basin) Metering Scheme.
[8] ADASA, February 2013, Review of proposed metering charges State Water Corporation

[9] http://www.accc.gov.au/regulated-infrastructure/water/state-waters-regulated-charges-2014-17-review/application#state-water-039-s-application-for-accc-approval-determination-of-its-regulated-charges

Comparing the Current MSCs with the Proposed MSCs demonstrates:

- why the cost estimates on which the Current MSCs are based:
  - are not sufficient to recover State Water's prudent and efficient costs to meet the National Framework for Non-Urban Water Metering and AS4747 (National Standards);
  - therefore do not provide an appropriate benchmark for the costs and charges which will apply for the period to 2017; and
- that the Proposed MSCs are based on the range of activities required to provide the metrological assurance and other requirements prescribed under the National Standards.

3.1.1 Comparison of cost elements

This section compares the costs for various cost categories, including:

A. Operational costs

B. Planned Maintenance

C. Corrective Maintenance

D. Asset planning

E. Audit and reporting.

The purposes are to:

- identify areas where the Proposed MSCs differ from the current charges;
- inform where the current charges are insufficient to achieve compliance with the National Standards on prudent and efficient bases; and
- summarise the potential dollar impacts of different underlying cost assumptions.

The Current MSCs are separated into five different meter types. The Proposed MSCs are categorised into 36 separate categories. To enable a like for like comparison, the table below provides an illustrative comparison of costs for a 300mm electromagnetic flow meter above-ground meter with mobile phone telemetry. This was the meter size and configuration underlying the forecast costs for an "electromagnetic meter with mobile phone telemetry" approved by IPART.

Table 3-1 Comparison of current and proposed MSCs

Comparison of forecast costs making up current MSCs and Proposed MSCs For 300mm above ground electromagnetic flow meter with telemetry		
Cost category	**Current MSCs $2013-14 p.a.[10]**	**Proposed MSCs $2013-14 p.a.[11]**
A. Operational		
A.1. Telemetry operational costs	65	76
A.2. Information systems	60	116
Subtotal operational costs	**125**	**192**
B. Planned Maintenance		
B.1. Inspection and basic maintenance	0	66
B.2. Validation	84	66
B.3. Programmed replacements	22	28
Subtotal planned maintenance	**106**	**160**
C. Corrective Maintenance		
C.1. Replacement of meter components and minor repairs for failures	0	62
C.2. Re-verification	0	79
C.3. Other actions (telemetry malfunctions)	0	22
C.4. Meter replacement for failure/damage due to external causes	81	14
Subtotal corrective maintenance	**81**	**177**
D. Asset planning		
D. Asset planning	**0**	**15**
E. Audit and reporting		
E. Audit and Reporting	**0**	**12**
Other		
Dispute resolution	18	0
TOTAL		
Total	**320[12]**	**557**

10 Source: Nayar Consulting report "Assessment of Annual Operation and Maintenance Costs for the NSW (Hawkesbury Nepean and NSW Murray-Darling Basin) Metering Scheme" 16 September 2009 prepared for the NSW Department of Water and Energy. Figures have been restated from 2010-11 dollars to 2013-14 dollars.

11 State Water Meter Charges Model

[12] The sum of the forecast costs made by Nayar Consulting in 2010-11 dollars was $306, but the charge approved by IPART was $297 (equivalent to $320 in 2013-14 dollars). Nayar Consulting also suggested a 20% contingency given the uncertainty of cost inputs at the time. Nayar Consulting's total estimated

By inspection of the cost breakdown, it is clear that the current metering charges:

- do not allow for necessary costs for a number of cost categories, principally:
  - B.1 Inspection and basic maintenance;
  - C.1. Replacement of meter site components and minor repairs for failures;
  - C.2. Re-verification;
  - C.3. Other actions (telemetry malfunctions);
  - D. Asset Planning; and
  - E Audit and reporting; but
- assume higher levels of cost than the Proposed MSCs, for a number of other categories:
  - B.2. Validation;
  - C.4. Meter replacement for failure/damage due to external causes; and
  - Dispute resolution.

The forecast costs developed in 2009 for the purposes of submission to IPART were developed at a time when the National Framework for Non-Urban Water Metering was subject to a Regulatory Impact Statement review being conducted by the Commonwealth Government, ATS4747 had been published but had not yet been converted to Australian Standard AS4747 and State Water's metering Pilot program was yet to commence. Some aspects of the project specification were not developed at that time, particularly with regard to the information systems requirements. For these reasons, some metering requirements and costs were not fully anticipated at that time. The degree of uncertainty was recognised by Nayar Consulting which suggested the inclusion of a 20% contingency in addition to its forecast costs. This contingency is not included in Table 3-1.

State Water maintains that the costs forecast in its application are appropriate, reflective of actual costs, and are based on a prudent and efficient approach to meeting the National Standards.

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cost in $/meter/year for an electromagnetic meter with data logger and mobile data modem was $367 in 2010-11 dollars. This is equivalent to $395 in 2013-14 dollars.

3.1.2 Comparison of underlying cost assumptions

This section presents a comparison of the underlying cost assumptions for the IPART-approved Current MSCs and the Proposed MSCs.

Appendix A presents a comprehensive summary of the assumptions underlying the forecast costs approved by IPART, and the proposed costs presented in State Water's Application. The following discussion focuses on the main areas of difference in cost and where State Water Corporation has updated its cost assumptions in light of the requirements of the National Standards and an improved understanding through experience of the requirements of operating and maintaining non-urban water meters.

Comparing the cost assumptions illustrates that the assumptions underlying the Current MSCs are insufficient in some areas, and that the Proposed MSCs are appropriate, efficient and necessary.

The discussion of the underlying assumptions for cost is presented using the same categorisation of costs as presented in section 3.1.1. Further supporting evidence for the input assumptions underpinning the Proposed MSCs is provided in section 4 of this paper.

Comparison of costs assumptions underlying current and proposed MSCs
A.2 Operational Costs – Information Systems
The difference in operational costs stems from a difference in the assumed costs associated with operating and maintaining the information and data systems, referred to as Telemetered Metering Solution (TMS) in the Application. Fundamentally, State Water now has a much clearer view of the information system requirements, specification, architecture, software licensing requirements, clustering and pricing as a result of information obtained from the pilot program and through discussions with suppliers. In contrast the cost component in the current charges for information systems, do not have a firm basis. **Current MSCs:** In 2009, a detailed definition of the required information systems was not yet available. Nayar Consulting was unable therefore to obtain indicative quotes from suppliers. In the absence of industry-provided data, the NSW Department of Water and Energy (DWE) provided the indicative cost component. DWE allowed 4 x FTEs at an average salary of $114,000. (Corporate and other overheads were not included in the cost). Total assumed staff costs = $456,000 p.a. This amount was assumed to be spread over an installed meter base of 10,000 meters, resulting in $46 per meter per year. An arbitrary figure of $10 per meter was also allowed for software licensing. Nayar Consulting commented in its report that the resulting total average of $56

Comparison of costs assumptions underlying current and proposed MSCs
per meter per year was potentially considerably lower than the actual annual cost[13].
Proposed MSCs:
State Water has developed the SCADA Data Acquisition System as part of the Murray pilot program. The system specification and associated costs are now well understood for the TMS as a whole.
State Water has allowed specific FTEs at the pay scales that are appropriate for this function based on the pilot results, with appropriate overheads included, as per the following:
• SCADA administrator (100%) – Grade 5
• Network administrator (50%) – Grade 5
• DDBB Administrator (100%) – Grade 5
• Service Desk Officer (75%) – Grade 4
• Accounts Officer (50%) – Grade 3
Average salary assumptions
Grade 5 - $97k p.a.
Grade 4 - $80k p.a.
Grade 3 - $68k p.a.
Total annual cost of staff resources is $715,000.
Software license maintenance and infrastructure services have also been included. Operating costs are included to support switches, routers, backup services, software licences, Telstra network costs and power. These infrastructure support costs average approximately $333,000 p.a. over the three year determination period.
The total operating costs for the TMS is forecast at $1,063,000 p.a.
This amount is averaged over 9,402 meters including metering scheme meters plus customer-owned groundwater meters. This results in an average cost of $116 per meter per year.
B.1 Planned maintenance – Inspection and basic maintenance
Current MSCs:
The current charges are predicated on a cost breakdown which does not include any amount for inspection and basic maintenance, on the basis that if new meters are

[13] Nayar Consulting, 16 September 2009, Assessment of Annual Operation and Maintenance Costs for the NSW (Hawkesbury Nepean and NSW Murray-Darling Basin) Metering Scheme, section 8.6.

Comparison of costs assumptions underlying current and proposed MSCs

located at existing extraction infrastructure, then an annual meter read, inspection and basic maintenance would already be covered by existing charges.

Proposed MSCs:

State Water considers that failure to allow for the performance of activities required under the National Framework for Non-urban Water Metering is an omission. The National Framework for Non-urban Water Metering now requires ongoing compliance checks, at least annually for meters with capacity of more than 5,000 ML/year.

State Water has proposed the following intervals for inspection:

Inspection intervals		
Q(ML/yr)	With Telemetry	Without Telemetry
<5000	2 years	1 year
>5000	1 year	1 year

State Water has costed labour and travel costs for the following activities that are required as part of each inspection and basic maintenance visit:

- Record of meter reading
- General cleaning and housekeeping
- Compliance check
- Check meter, pipes, valves and other fittings for structural integrity
- Simple wet test to ensure correct operation of register and flow as order
- Check for leaks
- Verify the meter seals integrity
- Check condition of electrical cables
- Verify batteries / solar panel and change them as per replacement program
- Check filters / strainers
- Check for interruption of signal transfer between sensor and transmitter
- Check software version
- Check OHS compliant
- Produce Routine Maintenance Report.

The assumptions for labour rates, time taken, travel distances and travel costs combine to produce a cost of $199 per meter visit.

Comparison of costs assumptions underlying current and proposed MSCs

For meters with capacity of less than 5000ML per year, visits will only be every two years. Additionally, basic inspection and maintenance is avoided when a meter visit is for validation purposes.

To demonstrate the average annual cost calculation for a 300mm meter with telemetry, it is assumed that a meter visit for inspection and basic maintenance is required every two years, with meter validation to occur every six years. Therefore in a six year cycle, inspection and basic maintenance visits will be performed in years 2 and 4. On average therefore, meter inspection visits occur 2-6 years, and the average annual cost is (2/6) x $199 = $66.

B.2 Planned Maintenance - Validation

The fundamental underlying approach to validation has changed due to requirements of the National Standards.

Current MSCs:

The current charges were based on an approach to meter validation which involved sampling a small percentage randomly each year (approximately 1.5% of electromagnetic flow meters). A cost of $5,000 for each validation was assumed to cover meter "removal, provision of a temporary alternate meter, transportation and reinstallation." Nayar Consulting calculated an average cost of $78 per meter per year.

Proposed MSCs:

The National Framework for Non-Urban Metering requires ongoing validations for all meters after maintenance or as part of auditing processes. Random sampling is therefore no longer an appropriate approach and the costs are now higher than those incurred under the previous small-scale random sampling approach.

AS 4747 suggests scheduled validations through an example.

State Water proposes that the following are appropriate intervals to ensure metrological assurance in compliance with the National Framework:

Validation intervals		
Q(ML/yr)	with Telemetry	without Telemetry
<5000	6 years	3 years
>5000	3 years	1 year

Validation must be performed by a Nationally Certified Validator.

Assumptions for labour rates, time spent, travel distances and travel costs result in $398 per meter validation.

Comparison of costs assumptions underlying current and proposed MSCs
Although the average cost for validation of a 300mm meter with telemetry is shown as similar to the current charges in section 3.1.1, this is a result of averaging the validation cost over six years. Meter types that need to be validated more frequently have higher validation costs per annum.
C.1 Corrective Maintenance – Replacement of components and minor repairs
Current MSCs: No allowance was made for unplanned maintenance in the current charges. This was done on the basis that three year meter supplier parts and replacement warranties would cover the costs of repair due to faulty manufacture or materials. **Proposed MSCs:** Repairs and maintenance will need to be conducted as faults arise and costs will be incurred. State Water's expectation is that warranties will be obtained but these would cover only the replacement cost of meter and RTU units specifically. In addition, AS 4747 requires that meters are revalidated every time a component is replaced, the flow computer is reconfigured or cables between sensor and flow computer are rejoined. Works and costs not covered by warranty would include: • mechanical disassembly / reassembly; • transport; • validation; and • excavation and back fill in the case of buried meters. Separate annual failure rate assumptions have been applied to meters (0.91% p.a.), RTUs (0.75% p.a.), batteries and solar panels (1%), and other incidents requiring minor unplanned repairs (2%).
C.2 Corrective Maintenance – Re-verification
Current MSCs: No allowance was made for re-verification. **Proposed MSCs:** Under the National Standards re-verification of meters is required in the case of unexplained errors and water usage disputes, but is not required as part of normal ongoing maintenance. As a result of the National Standards requirements, an allowance for this cost component should be included. It is assumed that 1% of meters each year will

Comparison of costs assumptions underlying current and proposed MSCs
need to be reverified. Costs modelled include labour, equipment and consumables for: • Mechanical disassembly / reassembly; • Transport costs; • Verification in a NATA-certified laboratory; • Validation after reassembly; and • Excavation and backfill in the case of buried meters.
C.3 Corrective Maintenance – Other actions (telemetry malfunctions)
Current MSCs: No allowance has been made for unplanned rectification of telemetry and other communications issues. **Proposed MSCs:** In State Water's experience from the pilot program, telecommunications issues are relatively common given the remote rural locations of the sites, and the ability to test signal strength under all meteorological conditions prior to installation. It would be an omission not to include an allowance for fixing telemetry issues. State Water has conservatively assumed that 3.8% of sites will experience telecommunications issues requiring reactive maintenance at an average cost of $22 per meter.
C.4 Corrective Maintenance – Replacement of meters not covered by warranty
Meter replacement may be required for reasons not covered by warranty, for example due to damage caused by external factors. This cost category caters for these circumstances. We note that the proposed charges are less than those underlying current charges.
D. Asset Planning
Prudent asset management and maintenance for the metering scheme involves: • statistical data assessment; • use of predictive tools; and • design performance and flow assessment.

Comparison of costs assumptions underlying current and proposed MSCs
These activities will be aimed at optimising the maintenance plan and minimising costs, and are therefore part of efficient operation and maintenance. **Current MSCs:** No resources were allowed for this function. **Proposed MSCs:** State Water proposes 0.5 FTEs of a Grade 5 employee at $15 per meter responsible for collecting and analysing data from the metering network, using predictive tools if practicable, to predict failures, prevent equipment downtime, perform root-cause analysis of failures and follow up on warranty claims.
E. Audit and Reporting
Current MSCs: No allowance has been made for audit and reporting. **Proposed MSCs:** State Water proposes 0.5 Grade 4 FTEs at $12 per meter to meet the requirements under the MAF. The resource will be responsible for collecting, processing, reviewing and reporting the information relating to meter details, maintenance and compliance activities, costs, etc as required by the State and the Commonwealth.

3.2 Comparison of costs with other service providers

This section compares the Proposed MSCs with the costs and proposed charges of other authorities and service providers. The purpose is to show that the level of charges proposed is in line with the charges proposed by State Water.

State Water has collated the metering charges for remote read meters for a number of similar water authorities and irrigators, including:

- Goulburn-Murray Water (proposed)
- Coleambally Irrigation
- Murray Irrigation
- Murrumbidgee Irrigation
- Fish River (not a service charge but a charge under contract between ABB and SWC to maintain the fleet of magflow meters).

The table below shows actual and proposed charges for each of the service providers.

Alternative supplier	Remote read meter $	Large automated outlet with remote read meter $	Small outlets and stock and domestic outlets $
State Water Proposed MSC	530 - 971		
Goulburn Murray Water – proposed charges[1]	750	950	100
Coleambally Irrigation –actual charges[2]	554	870	222
Murray Irrigation – actual charges[3]	647	861	486
Murrumbidgee Irrigation – actual charges[4]	-	686	516
Fish River – contracted costs	[redacted]	-	-

Sources:

1. *Goulburn Murray Water, Blueprint Publication April 2013*
2. *Coleambally Irrigation , 2013-2014 Fixed Water Charges, confirmed Govt Charges – FINAL*
3. *Murray Irrigation, Annexure A from the Fees and Prices Policy 2013*
4. *Murrumbidgee Irrigation, Network Service Plan (figures shown for FY2015)*
5. *Contract between ABB Australia Pty Ltd and SWC to maintain fleet of magflow meters*

The range of proposed and actual charges collated for remote read meters ranges from $554 p.a. (Coleambally Irrigation) to $750 p.a. (Goulburn Murray Water).

This substantially overlaps with State Water's Proposed MSCs for telemetry-enabled electromagnetic flow meters which range from $530 (80mm) to $971 (1000mm) p.a. in FY15.

3.3 Comparisons of cost actually incurred with current Metering Service Charges

State Water notes that in its Draft Decision the ACCC stated that:

> *"The ACCC considers the cost forecast by State Water does not reflect the prudent and efficient cost of providing the service. In particular the forecast costs proposed by State Water are higher than the actual costs observed in its pilot program."*[14]

A comparison of actual operating costs recorded to date does not provide an accurate view of the actual level of maintenance incurred or costs incurred in the maintenance of installed meters in the Metering Project, and is therefore not a viable comparator to either the Current MSCs or the Proposed MSCs.

The reason for this is that the contractual arrangement initiated in the pilot program has effectively motivated the Contractor to respond to performance issues with installed meters, at the Contractor's cost.

Under the Managing Contractor Agreement the Contractor is responsible for rectifying all defects or omissions with installed meters until two years after all works are completed, at the Contractor's own cost. Although there is no maintenance scope, to a large degree the obligation to rectify defects has motivated the Contractor to respond to any performance issues and perform a level of maintenance on the installed meters.

With this practical situation subsisting, State Water has not therefore needed to ramp up its own maintenance and operating activities.

In addition, the national standards have only recently come into effect, and therefore the costs incurred between the Contractor and State Water to date do not reflect the future maintenance requirements and service standards.

Therefore the actual costs recorded by State Water as operational expenditure do not fully reflect the maintenance task to be performed, nor the costs that are anticipated to be incurred over the determination period ending 2017.

[14] ACCC, March 2014, Draft decision on State Water Pricing Application: 2014-15 – 2016-17, p 22.

4 Explanation of key input assumptions

The ACCC has reviewed the State Water Metering Charges Model ("the Model") submitted with the 31 July 2013 Application. The Model shows the individual components and build up of the meter service charges and includes the input assumptions on which the charges are based. This section provides further detail on the key input assumptions contained in the Model (including a descriptive commentary) which further supports that the Proposed MSCs represent the prudent and efficient cost of providing the infrastructure services.

4.1 Commentary on key model input assumptions

Table 4-2 below provides the following information on key input assumptions:

- a description of the input assumption contained in the Model. To enable traceability to the Model costs are stated in 2012/13 dollars;
- cross reference to the worksheet location within the Model (i.e. worksheet tab name, and example cell reference), allowing for ease of traceability; and
- the basis and rationale for the assumption, including where relevant its reasonableness as compared to market benchmarks or other State Water projects, and consistency with ADASA and Nayar approaches.

It is also useful to refer to the discussion at section 3.1.2, comparison of underlying cost assumptions, and section 2.3 in relation to the requirements of the National Standards.

4.2 Key findings

State Water's technical adviser, MWH Global, undertook a desktop review of the input assumptions to form a view regarding whether the assumptions appear reasonable and appropriate. The review involved comparing State Water's Model assumptions to industry practice, including evidence from projects undertaken by Sydney Water and Goulburn Murray Water, and reviewing data obtained from the pilot program (1,200 meters over a 13 month period). To further inform the review, MWH also considered supplier pricing information it received from recent competitive tender processes.

MWH's review found that the majority of input assumptions are reasonable and appropriate when compared to industry practice for this type of metering service. Further, it was found that the Model erred on the side of

excluding certain activities from the Model. In particular, the following omissions were identified and no allowance has been made for:

- a Manager to oversee and supervise field work. Recent competitive tenders reviewed by MWH have all included this type of management position;
- an Asset Operation Manager and an Asset Maintenance Planner. Industry practice indicates that these positions are performed on a part-time basis;
- a Community liaison person. The majority of recent competitive tenders reviewed included a customer relations person assigned on a part-time basis. With approximately 7,000 new telemetry enabled meters, there is likely to be an increase in the level of community engagement;
- spare parts inventory, including Mag Flow meters, RTUs, batteries, pipes and fittings, solar panels and aerials (see Table 4-3 below for further details). As the majority of the equipment has a level of lag time in deliver, it would be both efficient and prudent to maintain a spares inventory to ensure that continuity of service can be maintained as failures occur (both straight equipment failure and equipment damaged by other forces e.g. fire, flood, vandalism etc.). The costs associated with holding (warehousing) the spares and inventory management will be an operating cost that has not been allowed for;
- replacement or minor repairs to communication modems (Next G or Satellite), RTUs, aerials and power packs. The 2013 data from pilot sites identified that 1.63% of all types of equipment, including these items, have incurred damage that is not covered by warranty.

Preliminary estimates indicate that these additional items could cost in the order of $100 to $135 per meter per year. State Water does not at this late stage, propose to revise its proposed MSCs for this new information. However this information further demonstrates that proposed Metering Service Charges are based on prudent forecasts of costs and in practice the actual costs are likely to be higher.

Taking into account MWH's findings that the Model input assumptions are reasonable and appropriate, there appears to be significant support for State Water's assertion that the ADASA report is a more appropriate reference point for this particular metering project than the Nayar Consulting report. Further discussion on the ADASA findings as compared to the Nayar report is located in Appendix A of this paper.

4.3 Build up of cost per unit

To provide context for the discussion on input assumptions below, Table 4-1 shows the build up of cost per unit ($2013-14) for a 300mm electromagnetic flow meter (EFM) – with telemetry and without telemetry, and buried or above ground.

Table 4-1 Build up of cost per unit for 300mm meter

	with Telemetry ($2013-14)		without Telemetry ($2013-14)	
Cost category	**Buried**	**Above ground**	**Buried**	**Above ground**
Operational telemetry costs				
Telemetry	75.50	75.50	-	-
TMS[1] information system	116.00	116.00	116.00	116.00
Preventive maintenance				
Inspection and basic maintenance	66.30	66.30	132.60	132.60
Validation	66.40	66.40	132.70	132.70
Programmed replacements	28.20	28.20	28.20	28.20
Corrective maintenance				
Replacements and minor repairs	92.30	62.30	85.50	55.50
Re-verification	112.20	79.30	112.20	79.30
Telemetry and communications malfunctions	22.10	22.10	-	-
Meter replacement (FY15)	14.60	14.60	14.60	14.60
Asset planning – predictive activities				
Predictive activities	14.90	14.90	14.90	14.90
Audit activities				
Audit and reporting	12.20	12.20	12.20	12.20
Total cost per unit (FY2015)[2]	**620.60**	**557.70**	**648.80**	**585.90**

Source: Extracted from the Metering Charges Model
Notes: 1. Telemetered Metering Solution (TMS)
2. Numbers shown are expressed in $2013-14 but are for the period financial year 2015. No escalation between 2013-14 to financial year 2014-15 has been applied.

Table 4-2 Commentary on key input assumptions

The costs referenced in table 4-2 are stated in 2012-13 dollars to allow traceability in the Model. A cell reference has been provided as an example of where the input assumption is located in the Model.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
Average number of EFM installed • Average of 7,122 units over the three year period	Scope and Meter numbers	C3	State Water has assumed an average of 7,122 units over the three year determination period. This is calculated based on the projected cumulative number of EFMs as follows: 2014-15: 5,428 units 2015-16: 7,318 units 2016-17: 8,619 units This pattern of growth is consistent with available projections at the time of preparing the application and experience gained from the pilot programs. Meters installed will either be buried or sit above ground depending on the site infrastructure. The proportion of meters that are assumed to be buried is based on experience gained from the pilot programs, discussions with Customer Field Officers and geospatial information available at the time of the application. The Model worksheet "EFM Re-verification" shows the assumed number of above ground and buried units for each size of unit (50 – 1,000mm).
Indexation: For all cost components, an inflation factor of 2.5% has been applied to 2012-13 dollars	Submission table 15.8	C20	This rate is in line with the CPI % for the March 2013 quarter (*source: ABS*), being the time at which the Application was being developed.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
Labour - hourly rates: • Mechanical technician $108.81 • Validator $147.40 • Excavation rate $150.00	Labour rates	F41	**Nature of work and required staff Grade to perform the work***:* *Mechanical technician* • Mechanical technicians are required to carry out inspection and basic maintenance tasks, meter assembly and disassembly, verification, battery replacements, minor repairs and malfunction repairs. This type of work requires a qualified experienced mechanical technician, or Customer Field Officer (CFO) at a Grade 4, step 1. *Validator* • A Nationally Certified person is required to perform validation procedures. Validation is required on all meters after preventative maintenance or as part of auditing processes (this is a requirement of the national framework for non-urban water metering). Meter site validation is also required following flow meter and RTU replacements that are undertaken as part of corrective maintenance (The ADASA report states on page 12 "every time a meter site component is replaced, the flow computer is reconfigured or cables between sensor and flow computer are rejoined", thus validation will always be required after a replacement). This type of work requires a nationally certified person with experience of a Grade 4, step 5 CFO. *Excavation hire* • Excavators (or backhoe loaders) are required to carry out excavation works where buried meters require replacement and verification. The assumed hire rate incorporates a backhoe, operator and transport truck (for the backhoe due to the travel distances involved). Hire rates are dependent on timeframes (length of job), site location and type of machine used. Industry advice is that rates will vary between $140 -

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption

			$200/hr and a conservative estimate of $150/hr has been assumed.
			Utilisation
			• Hourly labour rates are calculated based on an annual utilised rate of 1,325 hours per FTE, calculated as 46 weeks (52 weeks less (4 weeks annual leave + 2 weeks for public holidays and sick leave)) x 3 years x 8 hour day.
			Base salaries and Model approach for the three year determination period
			• State Water's Enterprise Agreement 2012 allows for a 3.25% p.a. base salary increase from 2012 to 2014. The Model assumes that a similar increase will apply for 2015 and 2016. An average of the base salary over 2014 to 2016, indexed at 3.25%, is then applied to arrive at an average base salary over the determination period.
			• The labour rates include base salary plus on-costs (payroll tax, superannuation, workers compensation, long service leave and leave loading) and an allowance for corporate overhead recovery consistent with State Water's other projects and usual business practice.
			• Based on the averaging approach described the resultant base salaries and hourly rates inclusive of on-costs are:
			  • Validator, Grade 4, step 5: State Water's Enterprise Agreement 2012 stipulates a base salary of $89,058 at 1 July 2014. Based on 3.25% indexation and averaging over the three years, an average base salary of $91,999 is assumed. Applying an annual utilisation rate, on-costs and corporate overheads gives an hourly rate of $147.40.
			  • Mechanical technician, Grade 4, step 1: State Water's Enterprise

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			Agreement 2012 stipulates a base salary of $65,744 at 1 July 2014. Based on 3.25% indexation and averaging approach described above results in an average base salary of $67,915. Applying an annual utilisation rate, on-costs and corporate overheads results in an hourly rate of $108.81. **Staff positions for which no allowance has been made** Based on experienced gained from recent competitive tenders, State Water's technical adviser, MWH Global, has advised that the Model does not make allowance for a number of key staff positions that are highly relevant for this project and typically included in tender proposals, including field work supervisor, part-time asset maintenance planner and part-time asset operation manager. These positions have featured in the majority of recent competitive tenders for this type of project. Based on recent market rates the indicative hourly rates for these omitted positions are: field work supervisor ($132), part-time asset maintenance planner ($60) and part-time asset operation manager ($100). Given the omission of these key staff positions, the total assumed labour costs are likely to be on the conservative side.
Labour effort for Preventative Maintenance • Inspection & basic maintenance: 5.5 visits per day • Validation: 3.5 visits per day	Inspection & Basic maintenance Validation	C23 C23	*Inspection and basic maintenance* The activities involved in basic maintenance and inspections and intervals for inspections are described in section 3.2.1. In relation to the labour effort involved in carrying out these tasks, after taking into account travel times, a technician is able to service an average of 5.5 meters per day, which equates to 1.4 hours per meter. The assumed travel and inspection times are as follows: • given the geographic spread of meter locations, the initial travel time to the site and return is three hours

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			• inspection time is 40 minutes; and • travel time between sites is 15 minutes. State Water's technical adviser, MWH Global, has reviewed these assumptions and considers them to be reasonable based on information gathered from the pilot program and other similar projects. Based on the above assumptions, the labour cost for inspection and basic maintenance is $158 per meter ($108.81 labour rate x 1.4hours). Adding the travel costs associated with each site visit of $36 per visit, and applying the inspection frequency of two visits every six years (refer to section 3.2.1), produces an average annual unit cost of $64.70 for inspection and basic maintenance (with telemetry). *Validation* The frequency of meter validation is described in section 3.2.1. In relation to the labour effort involved in undertaking the validation, after taking into account travel times, a qualified validator is able to service an average of 3.5 meters per day, which equates to 2.3 hours per meter. The assumed travel and inspection times are as follows: • given the geographic spread of meter locations, the initial travel time to the site and return is three hours; • validation time is one hour 15 minutes; and • travel time between sites is 15 minutes. State Water's technical adviser, MWH Global, has reviewed these assumptions and considers them to be reasonable based on information gathered from the pilot program and other similar projects.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			Based on the above assumptions, the labour cost for validation is $337 per meter ($147.40 labour rate x 2.3 hours). Adding travel costs for each site visit of $52 per visit, and applying the validation intervals described in section 3.2.1, produces an average annual unit cost of $64.70 for validation (with telemetry).
Labour effort for Corrective Maintenance • Replacement and minor repairs • Re-verification	FM replacement; RTU replacement; SP Battery replacement; Minor repairs EFM verification unit cost	N10 V5 V5 V5 N8	*Labour effort involved in Replacement and minor repairs* In relation to Replacement and minor repairs, the following types of replacements and repairs are undertaken: Flow meter replacements; RTU replacements; Solar Panel battery replacement and minor repairs. A key driver of the costs associated with these corrective maintenance tasks is the underlying labour effort (i.e. number of hours and number of persons). The assumed labour effort is as follows: • Flow meter replacements: these replacements require mechanical disassembly, excavation (if buried), validation and backfill. The labour effort involved in performing these tasks ramps up depending on the meter size. For example, mechanical disassembly of a 50mm meter requires 2 technicians x 5 hours, and this increases to 4 technicians x 8 hours for a 800mm meter. • RTU replacements: one nationally certified CFO Grade 4, step 5 spends 4 hours on the replacement. A qualified validator then spends one hour on validation. This time effort is the same regardless of the meter size. • Solar Panel battery: one nationally certified CFO Grade 4, step 5 spends 4 hours on the replacement. This time effort is the same regardless of the meter size.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			• Minor repairs: one nationally certified CFO Grade 4, step 5 spends 4 hours on the replacement. A qualified validator then spends one hour on validation. This time effort is the same regardless of the meter size. State Water's technical adviser, MWH Global, has reviewed these assumptions and considers them to be appropriate, noting that the labour effort will vary significantly in practice due to issues such as ground conditions, site constraints and weather. MWH Global observed that the Model does not include an allowance for replacements or minor repairs to modems, aerials or power packs. In practice such replacements will be required with a labour effort similar to an RTU replacement (four hours). *Labour effort involved in re-verification and replacements* In relation to re-verification, the following activities are undertaken: Mechanical disassembly, transport to and from lab, excavation and backfill (if buried), verification in lab, mechanical assembly and on-site validation after reassembly. A key driver of the costs associated with these tasks is the underlying labour effort (i.e. number of hours and number of persons). The labour effort involved in performing these tasks ramps up depending on the meter size. Table 4-3 below shows the labour effort for re-verification and provides commentary on the assumed number of hours and number of persons.
Telemetry operating costs • Telemetry data packs annual cost of $72	Telemetry	B7	The annual cost of $72 is in line with recent pilot program monthly service costs and Next G data charges of $73.67 per site per annum. Although there is currently some satellite usage (around 10%), which attracts a higher charge of $360 per site per annum (per Nayar report), it is acknowledged that over time the Next G network will expand. Accordingly State Water has

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			prudently assumed that the entire network will use Next G and no allowance has been made in the Model for the higher satellite costs.
• TMS server infrastructure $113.20 per unit	TMS Costs	F23	*TMS support costs* Telemetry will be controlled by centralised information technology known as the telemetered metering solution (TMS). The operating costs associated with supporting this system include switches, routers, backup services, software licences, Telstra network hosting costs and power. The majority of the operating costs relate to Telstra network and software. The total costs for the pilot program have been used as a basis for estimating the TMS costs for the determination period, noting that the current number of pilot meters is around 1,250 and the total costs would most likely be higher for the projected 7,122 meters. For example, Telstra invoices in relation to network support for the metropolitan and regional areas are currently averaging $1,021 per month ($12,252 annually), and $2,760 per month ($33,120 annually) respectively for the current number of meters. The Model assumes an annual cost of $31,005 (2.5 times current costs) for the metropolitan area and $58,081(1.8 times current costs) for regional areas. With projected meter numbers of 7,122, being 5.6 times current numbers, it is likely that actual network costs will be higher than the Model assumes, even taking into account volume efficiencies. *New information on server infrastructure* An allowance for SQL enterprise software (data storage) of $44,400 has been included in the average TMS cost per unit. New information indicates that SQL software will instead be replaced with OSI PI licensing, with an indicative cost of $70,000 which is higher than the Model allowance. In addition, MWH has identified that an allowance has not been included in the Model for the software that actually presents the data such as ClearSCADA. State Water's

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			indicative estimate for the licensing support of ClearSCADA is $70,000 p.a. Based on a review of the Model's original TMS assumptions and new information available, it is now estimated that the TMS support costs (excluding staff requirements) are likely to be in the order of $420,000 p.a. (compared to the Model allowance of $333,477). Including staff allowances, this would result in a TMS cost per unit of $122.36 compared to the Model allowance of $113.20.
Programmed replacements - replacement of components • Battery replacement $60 every 3 to 4 years • Solar panel replacement $150 every 12 years	Programmed replacements	B2, B5	*Battery replacements* • The battery replacement cost of $60 is in line with the findings of the Nayar Consulting report, however, MWH has advised that in practice a larger capacity battery will be required for which the market rate is $150 per battery. • The battery replacement frequency of every three years is also consistent with the Nayar Consulting report findings and information obtained from Sydney Water and Goulburn Murray Water. However, it is noted that the pilot program has provided data showing that battery replacement within the initial 18 months is significant. For example, 5.9% of batteries have failed in their second year prior to reaching their expected useful life of three years. The Model assumption of replacement every 3-4 years is therefore conservative, and is highly likely to underestimate the true cost of replacements. *Solar panel replacements* State Water's technical adviser, MWH, has advised that: • the replacement frequency of solar panels is consistent with industry practice (e.g. Sydney Water), noting that failure rates will initially be higher but will settle down as has been seen on the pilot.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			• the assumed replacement cost of $150 is lower than recent market rates of $250.
Equipment hire: • Crane hire – $150 for meter sizes 150-500mm – $250 for meter sizes 600-1,000mm • Excavator hire • $150 for all meter sizes	EFM Verification unit cost	G8, P5	*Crane hire* • State Water's technical adviser, MWH, has advised that the assumed rates for crane hire are appropriate based on its market knowledge, noting that actual costs may be slightly higher due to regional travel distances and the availability of suitable size equipment in rural areas. *Excavator hire* • MWH has advised that the excavator hire rate of $150 per meter is reasonable compared to market rates.
Vehicle allowance: • $0.7/km, equating to $105 for a 150km round trip	EFM Verification unit cost	E5	The Australian Tax Office (ATO) allowance for work related car expenses under the 'cents per kilometre method' is 74 cents (2012/13) per kilometre (km) for an ordinary car with 1.6-2.6 litre engine capacity. The typical engine size across State Water's vehicle fleet is 2.0 litre. The Model uses a rate of $0.7/km which is lower than the ATO allowance of $0.74/km. A travel distance of a 150km return trip has been assumed due to the regional locations serviced. The vehicle allowance per unit is therefore $0.70/km x 150km = $105.
Transport hire • Hire rate $200 per meter depending on the size of meter	EFM Verification unit cost	J5	The assumed cost of $200 per meter represents market rates for low loader transport (or similar) for transporting meters and/or crane/excavators. A minimum call out of four hours applies with a rate of $200 which increases depending on the size of transport – as the size of meter and associated equipment to undertake the work ramps up, there is likely to be a need for larger sized transport, for example; due to the size of meter and associated

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			crane/excavator equipment, larger meters that are 600-1,000m are usually four times more expensive than transport required for small meters 50-150mm which cost $200.
Verification in lab • $750 for sizes 50-200mm • $1,250 for sizes 250-450mm • $1,950 for sizes 500-1,000mm	EFM Verification unit cost	R5	*Verification in lab* Verification in a National Association of Testing Authorities (NATA) accredited laboratory is required to address unexplained measurement errors and to assist with dispute resolutions. Manly Hydraulics Lab (MHL), a NATA accredited lab, recently provided MWH Global with an indicative cost estimate for meter validation (email dated 11 April 2014). MHL has indicated that the estimated cost of in-lab verification testing of meters below 700mm is in the order of $2,500-$3,000 per meter (excluding freight). MHL commented that if more than one meter at a time is sent for testing, some of the setup costs can be offset and hence fees reduced. MHL advised that meters greater than 700mm require individual set-up and can cost significantly more than $3,000. Based on the MHL estimate for meters smaller than 700mm, the Model cost assumptions are in the range of 2-3 times lower than the advised market rate of $2,500-$3,000. In relation to the meters greater than 700mm, the Model assumption of $1,950 ($1,998 in 2013-14 dollars) per meter is well within MHL's estimate for the *small* meters. State Water's verification in-lab cost assumptions appear therefore to be significantly understated.
Corrective maintenance - replacements and minor repairs Rates of replacement per annum: • Flow meter – 0.91%	Scope RTU replacement FM Replacement	G52 M5 AI 5	*Rates of replacement* As part of corrective maintenance the Model assumes that a certain percentage of components (flow meters, RTUs, batteries and solar panels) will need to be replaced each year due to reported damage or malfunction. It is assumed that the meter and RTU capital cost are covered by warranty;

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
• RTU – 0.75% • Battery & solar panel – 1% • Minor repairs – 2%	Unit		however the note below regarding warranties shows that this is a conservative assumption. • RTUs: MWH has advised that industry participants (e.g. Sydney Water) have experienced a failure rate of 3-4% p.a., and notes that the climatic conditions in western NSW regions will be more adverse than the Sydney metropolitan area and therefore this failure rate would be a minimum level for the regions covered by State Water. The Model assumes 0.75% failure which is conservative compared to industry and taking the weather conditions into account. • Batteries: The assumed allowance of a 1% replacement rate is likely to be conservative based on the findings of the pilot program where battery replacement within the initial 18 months is significant where 5.9% of batteries have failed in their second year (prior to them reaching three years when they are planned to be replaced). • The failure rate assumptions for flow meters, and for minor repairs are considered to be reasonable based on the pilot program. For example approximately 1.6% of pilot meters have experienced some form of damage and 5.5% have experienced some form of fault over the 2012/13 period. *Conservative estimate for equipment supplier warranty duration* The Model assumes that flow meter and RTU replacements are covered by warranty over the three year determination period. This assumption is conservative as it is unlikely that warranties can be obtained for more than two years. Warranties for equipment installed in the pilot program or early in the determination period will expire before the end of 2017. Therefore any failures in the third year which are not attributable to vandalism/fire/flood etc. will need to be replaced at a cost to State Water.

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			No allowance for modem replacement • State Water's technical adviser has identified that the Model does not make an allowance for the replacement of Next G modems at a market replacement cost of $300 per unit, nor satellite modems at $1,500 per unit. Industry participants have indicated that the failure rate of the modems are similar to that of their RTUs at 3-4%. Using State Water's conservative failure rate of 0.75%,
Sample size for re-verification • 1% of meters re-verified each year	EFM re-verification	B4	*Number of meters re-verified* AS4747 does not provide specific guidance on the frequency of re-verifying meters as part of ongoing maintenance, however re-verification is required in the case of unexplained errors and water usage disputes. The Model assumes that 1% of meters will need to be re-verified each year. MWH has advised that this rate appears prudent and is consistent with the experience of other industry participants including Goulburn Murray Water and Sydney Water.
Telemetry malfunctions • 3.8% of meters require corrective action			*Percentage of telemetry malfunctions* Each time a malfunction in telemetry is identified or reported, a corrective action should be undertaken. The Model assumes that 3.8% of meters will experience telecommunication issues that require corrective action. MWH has advised that industry participants (e.g. Sydney Water) are experiencing RTU failure rates of 3-4% per annum, and therefore the Model assumption of 3.8% appears to be valid, but is likely to be on the conservative side when the harsh weather conditions that the units will be exposed to in western areas of NSW are taken into account.

<table>
<tr><th>Description of item (2012/13 dollars)</th><th>Worksheet location</th><th>Cell reference</th><th>Rationale for the assumption</th></tr>
<tr><td>Preventive maintenance frequency of validation
<table>
<tr><td colspan="3">Validation Interval</td></tr>
<tr><td>Meter size</td><td>with Telemetry</td><td>without Telemetry</td></tr>
<tr><td><450mm</td><td>6 years</td><td>3 years</td></tr>
<tr><td>>400mm</td><td>3 years</td><td>1 year</td></tr>
</table></td><td>Scope</td><td>D39</td><td>Frequency of validations
The National Framework for Non-urban Water Metering requires ongoing validations for all meters after maintenance or as part of auditing processes. Due to the variability of meter sizes, State Water has adopted ADASA's recommendations for periodic validation of larger meters (greater than 400mm) every three years (with telemetry)and smaller meters (less than 450mm) every six years (with telemetry) and considers that this is an appropriate and efficient approach to ensuring metrological accuracy and ongoing technical function.
MWH has advised that this validation frequency appears acceptable when compared to the experience of other industry participants (for example, Goulburn Murray Water performs validation at every site, every year, however its fleet has reached a level of maturity and State Water's new fleet would not require this same level of validation).</td></tr>
<tr><td>Preventive maintenance frequency of inspections
<table>
<tr><td colspan="3">Inspection Interval</td></tr>
<tr><td>Meter size</td><td>with Telemetry</td><td>without Telemetry</td></tr>
<tr><td><450mm</td><td>1 years</td><td>1 year</td></tr>
<tr><td>>400mm</td><td>2 years</td><td>1 year</td></tr>
</table></td><td>Scope</td><td>D15</td><td>Frequency of inspections
The National Framework for Non-urban Water Metering requires ongoing compliance checks of at least annually for meters with capacity of more than 5,000mL/yr (>400mm diameter). State Water has adopted ADASA's approach to inspection intervals, the frequency of which depends on the meter capacity and presence of telemetry.
MWH Global has advised that ADASA's meter compliance checking and inspection approach is consistent with good industry practice and is reflective of the approach adopted by some other industry participants (e.g. Goulburn Murray Water).</td></tr>
</table>

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
Asset Planning • Asset planning: $14.50 per meter, based on 0.5 FTE	Asset Planning	B10	*Asset planning activities and FTE requirements* The Model includes an allowance of 0.5 FTE, Grade 5, to perform asset planning activities such as analysing data from metered networks, using predictive tools to predict failures, perform root-cause analysis of failures and follow up on warranty claims. MWH has reviewed the FTE allowance and considers that, in practice, the Model assumption of 0.5 FTE is likely to be insufficient due to a range of extra tasks that need to be performed in addition to those already identified. With an average of 7,122 meters there will be a requirement to manage asset creation; asset write-offs and disposals; manage asset revaluations for accounting purposes; and engage with field officers to check accuracy of data and track asset information. These additional tasks are necessary to ensure the quality and integrity of asset data. It would therefore be reasonable for one FTE to be assumed, rather than 0.5FTE. On this basis, the Model assumption is conservative at $14.50 compared to the more reasonable cost of double this ($29).
Channel measurement meters • Preventive maintenance $2,327.50 per meter • Validation $6,896 per meter	Inspection & B. Maintenance CM Validation CM	I6 I6	The Model assumes an average annual cost per meter for inspection & basic maintenance of $2,327. This is based on the following key input assumptions: • Inspection time per meter = 2 hours • Number of technicians per inspection = 2 • Number of visits per day = 2.2 • Number of annual visits: FY 2015: 4 visits

Description of item (2012/13 dollars)	Worksheet location	Cell reference	Rationale for the assumption
			FY 2016: 2 visits FY 2017: 2 visits The number of people and allowances for time have been checked by reference to external pricing by an experienced contractor. In particular, as channel meter maintenance and gauging involves working in or over water this is a WHS issue and hence two people are mandatory. The frequency of visits for inspection and basic maintenance has been set at the same frequency as deemed necessary for validation (see below). The average cost of validation in the Model is $6,896. This is based on the following key input assumptions: • Validation time per meter = 5 hours • Number of technicians per inspection = 2 • Number of visits per day = 1 • Number of annual visits: FY 2015: 4 visits FY 2016: 2 visits FY 2017: 2 visits The validation or calibration frequency is based on the fact that these devices are typically in channel situations where profiles etc change over time. This is particularly the case in the first year as the unit is bedded in. The need for 2 validations per year thereafter is an assumption based on experience

Table 4-3 Corrective maintenance: Labour effort input assumptions

<table>
<tr><th>Input assumptions in relation to labour effort for flow meter replacements and for re-verifications tasks</th><th>Commentary</th></tr>
<tr><td>

Mechanical disassembly and assembly

Meter size mm	Hours*	Number of persons
50-150	5	2
200-350	6	2
400-750	8	3
800-1,000	8	4
* Includes travel time to and from site		

</td><td>

Mechanical disassembly and assembly labour effort

State Water's technical adviser, MWH Global, has reviewed the labour effort involved in these tasks and advised that the Model assumptions are reasonable.

</td></tr>
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Excavation

Meter size mm	Hours*	Number of persons
50-150	3	2
200-350	4	2
400-600	5	2
600-750	6	2
800-1,000	8	2
* Includes travel time to and from site		

</td><td>

Excavation labour effort

State Water's technical adviser, MWH Global, has reviewed the excavation hours and has advised that excavation hours are impacted by many variables, such as soil type, site constraints, weather, clear identification and location of underground assets, and therefore the assumed hours as an average are suitable.

</td></tr>
<tr><td>

Validation

Meter size mm	Hours*	Number of persons
50-500mm	4	1
600-1,000mm	5	1
* Includes travel time to and from site (3 hours)		

</td><td>

Validation at site

MWH Global has advised that meter validation typically takes around 1.5 -2.0 hours. This is in line with the Model assumption of one hour for smaller meters and two hours for the larger meters.

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<table>
<tr><th>Input assumptions in relation to labour effort for flow meter replacements and for re-verifications tasks</th><th>Commentary</th></tr>
<tr><td>

Backfill

<table>
<tr><th>Meter size mm</th><th>Hours*</th><th>Number of persons</th></tr>
<tr><td>50-500mm</td><td>4</td><td>2</td></tr>
<tr><td>600-1,000mm</td><td>5</td><td>2</td></tr>
<tr><td colspan="3">* Includes travel time to and from site (3 hours)</td></tr>
</table>

</td><td>

Backfill

State Water's technical adviser, MWH Global, has reviewed the labour effort involved in these tasks and advised that the Model assumptions are reasonable and fair.

</td></tr>
</table>

Table 4-4 Spares inventory

As noted in section 4.3 the Model does not include an allowance for holding and managing spares inventory. MWH has advised that inventory items are likely to include the following items:

- **MagFlow meters** (1-3 per meter size and type)
- **Typical Spares**: Sydney Water typical holds between 5-10% spares for RTUs, modems, They hold minimal battery spares as they have ready access to local supplies. It is likely that State Water will not be able to manage their battery spares in a similar fashion. It was also stated by Goulburn Murray Water that access to batteries can be an issue and they hold a significant level of battery spares.
- **RTU:** It is proposed to run with 2% spares for the RTUs. This is lower than some other industry users such as Sydney Water due to a larger number of RTUs held by State Water and it is likely that they will be working with fewer models than Sydney Water
- **Batteries:** Currently the pilot is showing a failure rate in 2013 of 5.6% per annum. Assuming it is prudent to hold two months of replacement batteries then 1% should be held. (This may need to be reviewed and increased if lag times for supply become an issue.)
- **Modems**: Due to the large number of modems held by State Water and that it is likely that they will be working with 2 models (NextG 90% ; Satellite 10%) it is proposed to run with 2% spares.
- **Solar Panels:** It is proposed to hold 1% as spares. This is driven mainly by the history from the pilot and the higher level of vandalism and theft that occurs with solar panels.
- **Aerials** It is proposed to hold 0.5% which will match demand for replacement on a 1 to 2 month cycle.

Appendix A: Comparison of assumptions underlying Current and Proposed MSCs

Summary of approach and assumptions for pricing of MSCs

- Report prepared by Nayar Consulting for the NSW Department of Water and Energy, 16 September 2009, titled "Assessment of Annual Operation and Maintenance Costs for the NSW (Hawkesbury Nepean and NSW Murray-Darling Basin) Metering Scheme" for the submission to IPART for the regulatory period 2010-2014
- SWC Submission costs as reviewed by ADASA.

Prior to examining the basis of the costs for each of these, it is worthwhile pointing out some differences in the basis and context under which they were developed.

Cost consideration	Current MSCs - Nayar Report	Proposed MSCs - ADASA Review
Context	2009 for submission to IPART for 2010 – 2014 determination period.	2013 SWC Submission for the period 2014-2017
Method	"Bottom-up" estimate developed by Nayar Consulting in consultation with contractors and industry.	"Bottom-up" estimate developed by State Water with ADASA review of assumptions and rates
Price base	2010-2011 dollars	2013-2014 dollars
Standards development	National Standards were in development and did not prescribe the level of maintenance and operations required to assure metrological accuracy	AS4747 and Metrological Assurance Framework developed with examples of level of maintenance required.
Status of project	Project had not commenced.	Pilot project was nearly complete.

Cost consideration	Current MSCs - Nayar Report	Proposed MSCs - ADASA Review
Categorisation of meter costs	5 categories: • Mechanical • Mechanical w data logger • Electromag w data logger • Electromag w data logger and mobile telephony modem • Electromag w data logger and satellite phone modem	36 categories: • 17 different diameters for closed conduit meters from 50-1000mm, plus open channel • With and without telemetry SWC proposed MSC is based on: • Electromag w data logger/ RTU and Next G mobile communication for 90% of sites. • Electromag w data logger/ RTU and satellite phone modem for 10% of sites.

Basis of costs

The cost estimates have been categorised and matched via the following categories:

A. Operational costs
   a. Telemetry costs
   b. Information Systems
B. Planned Maintenance
   a. Inspection and Basic Maintenance
   b. Validation
   c. Replacement of parts e.g. batteries / solar panels etc.
C. Unplanned / Corrective Maintenance
   a. Replacement of components and repairs
   b. Re-verification

c. Telemetry and communications malfunctions

d. Meter replacement (damaged by external forces and not covered under warranty)

D. Asset Planning

E. Audit and reporting

F. Other

a. Dispute resolution

b. Project management

G. Contingency

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
1a. Operations costs Telemetry Network charges	Telemetry data plans Mobile phone modem on Telstra Next G • $5 / month for 5MB – sufficient for daily transmission of meter reading and basic meter status Total = $60 p.a. Satellite plan for Iridium Short Burst Data service also costed at $30 / month = $360 / year	Telemetry charges based on RTU via 3G. Cost based on access to public wireless network data plans. $5 SIM purchase spread over three years = $1.67 Plus $6 per month = $72 pa. Total $73.67 p.a. Pricing submission did not consider potential additional costs from satellite connection. Could be about 10% sites on satellite. Prudent to assume all 3G.

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
1b. Operations costs Systems support, maintenance and upgrades	System specifications did not exist. Department of Water and Energy provided estimate. 4 FTEs @ $114,000 p.a. each = $456,000 Overheads were NOT included. (Indicative figure of $163,000 p.a. from DWE if overheads included.) $10 / meter p.a. for software licensing costs Assume 10,000 meters. Cost per meter = $456,000/10,000 + 10 = $56 per meter. Note: this estimate acknowledged by Nayar as potentially being considerably low.	Support team configuration: • SCADA administrator (100%) – Grade 5 • Network administrator (50%) – Grade 5 • DDBB Administrator (100%) – Grade 5 • Service Desk Officer (75%) – Grade 4 • Accounts Officer (50%) – Grade 3 Software license maintenance and infrastructure services have been included also. Average salary assumptions Grade 5 - $97k p.a. Grade 4 - $80k p.a. Grade 3 - $68k p.a. Infrastructure opex costed to support: servers, switches, firewall, routers, backup, software, power, network Telstra = ~$333k TMS infrastructure opex to be included in MSC average over three year determination period Total TMS costs = $1.063m p.a. Averaged over 9,402 meters including metering scheme meters plus customer-owned groundwater meters. Total allowance = $113 per meter p.a.
2a. Planned Maintenance: Inspection and Basic Maintenance	For "existing extraction sites" i.e. where the meter is inserted into existing extraction infrastructure: Zero allowance. Assumption is that State Water would already need to fund annual meter reading trips so no need for additional meter service charge.	National Framework for Non-urban Water Metering requires ongoing compliance checks, at least annually for meters with capacity more than 5,000 ML/year. ADASA proposes that telemetered meters with capacity less 5,000 ML/year are checked every two years. All others annually. i.e. • < 5000 ML/year

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
	For "Greenfield extraction sites" i.e. where the meter is installed as part of new extraction infrastructure: Manual reading – once per year Quoted price from AMRS (meter reading contractor) $60 per site + $1.50/km travelled Assumed average 10kms between sites Meter reading price = $60 + 10 x $1.50 = $75 per site p.a. Nayar then assumes that for the same price, the following basic maintenance activities can be included (although it appears this was not explicitly priced by AMRS): • Visual check of meter seals and of the meter for tampering • Inspect meter totaliser for condensation or insect ingress • Visual check of meter pipework for structural integrity Total = $75 per meter per annum	○ With telemetry: 2 years ○ w/o telemetry: 1 years • > 5000 ML/year ○ With telemetry: 1 years ○ w/o telemetry: 1 years ADASA has included for: • Record of meter reading • General cleaning and housekeeping • Compliance check • Check meter, pipes, valves and other fittings for structural integrity • Simple wet test to ensure correct operation of register and flow as order • Check for leaks • Verify the meter seals integrity • Check condition of electrical cables • Verify batteries / solar panel and change them as per replacement program • Check filters / strainers • Check for interruption of signal transfer between sensor and transmitter • Check software version • Check OHS compliant • Produce Routine Maintenance Report Basic Maintenance and Inspection Cost assumptions

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
		Labour rate = $109/hr Initial go / back travel time = 3 hours Time per site = 40 minutes Travel between sites = 15 minutes Average 5.5 sites per day 1 technician 1.4 hours per meter = $158 per meter visit labour cost Travel of 52km per site (220km initial go/back each day, 15km btw sites and average 5.5 sites per day) $0.70 per km = $36 per meter visit travel cost Total $196 per meter visit Meters < 5000 ML/year with telemetry therefore $98, all others $196 p.a. NOTE: numbers in table 15.8 of SWC submission for Inspection and Basic Maintenance are lower as meter visits for validation avoid costs as above and not double counted.

2b. Planned Maintenance Validation	Validation by sampling.
	Assumed installed meter base of 8,000 electromagnetic flow meters.
	Validate random sample of 120 each year (approximately 1.5%) [calculation for average cost done by Nayar was based on 125]
	Assume cost for validation of $5,000 to cover meter "removal, provision of a temporary alternate meter transportation and reinstallation".
	Average cost per electromagnetic meters = 125 sample meters x $5,000 per meter test / 8,000 meter population = $78 per electromagnetic meter p.a.
	Similar logic for 2,000 mechanical meters and sampling
		National Framework requires ongoing validations for all meters after maintenance or as part of auditing process.
		AS 4747 suggests through an example, scheduled validations. ADASA proposed the following intervals for validation of each meter depending on capacity and telemetry :
		• < 5000 ML/year
		  ○ With telemetry: 6 years (16.7% of this meter population validated every year)
		  ○ w/o telemetry: 3 years (33% of meter population validated every year)
		• > 5000 ML/year

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
	80 (4%) at $1,500 per validation = $60 per mechanical meter p.a. NOTE: the cost breakdown above indicates that the concepts of validation and verification were confused. Nevertheless, the allowance has been kept here for the purpose of comparison. NOTE: although it is stated that population of meters would be replaced once sampled meters fail re-verification, no allowance was made for the replacement of population.	○ With telemetry: 3 years (33% validated every year) ○ w/o telemetry: 1 years (100% validated every year) Nationally Certified person required to do validation. Inspection and basic maintenance done during same field visit. Validation Cost assumptions Labour rate = $147/hr Initial go / back travel time = 3 hours Time per site = 75 minutes Travel between sites = 15 minutes 1 technician 2.3 hours per meter = $337 per meter validation labour cost Travel of 74km per site (220km initial go/back each day, 15km btw sites and average 3.5 sites per day) $0.70 per km = $52 per meter visit travel cost Total $388 per meter validation
2c. Planned Maintenance Replacement of parts	Only replacement of batteries included as batteries were only element with asset life (3 years) expected to expire during 5 year determination period. Mechanical meters with datalogger will require a $30 battery every 3 years = $10 per mechanical meter p.a. Electromagnetic meters with datalogger and modem will require a $60 battery every 3 years = $20 per mechanical meter p.a.	Replacement of batteries (3 or 4 year expected life, $60 per meter) and solar panels (12 year expected life, $150 per meter). Replacement of batteries will coincide with inspections / validations. 4 year battery life for <= 400 mm diameter. Following new AS 4747, replacement of batteries does not require Certified Validator, even if breaking the seal is necessary. Average for <= 400mm meter = 60/4 + 150/12 = $27.50 p.a. Average for > 400mm meter = 60/3 + 150/12 = $32.50

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
		p.a.
3a. Unplanned maintenance Replacement of components and repairs	No allowance on basis that 3 year meter supplier warranties will cover determination period.	Allowance for all works, labour and equipment hire for unscheduled replacement – only meter cost assumed to be covered by meter supplier warranty. Rates of replacement and repairs as percentage over total meter population: • Flow meter – 0.91% • RTU – 0.75% • Battery / solar panel – 1.0% • Other repairs – 2% AS4747 requires that revalidation is performed every time a component is replaced, the flow computer is reconfigured or cables between sensor and flow computer are rejoined. Nationally Certified validator is required for this. Flow meter replacement: ONLY meter unit is assumed to be covered by warranty. Works and activities not covered for flow meter replacement include: • Mechanical disassembly • Transport • Excavation (buried meters only) • Validation • Back fill (buried meters only) Cost model assumed labour rates, hours, crane and excavator costs and applied percentages above to expected numbers of meters for each diameter. Also solar panel and battery unplanned maintenance includes cost of consumables but also travel time and

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
		labour costs. No validation costed. Similar for RTU replacement, except that validation is also required and costed. Minor repairs include 4 hours labour and travel and validation 5% consumables. So, for example: Buried 300mm meter with telemetry average cost = $90 p.a. Above ground = 300mm w telemetry average = $61 p.a.
3b. Unplanned maintenance Re-verification	No allowance.	Allowance for re-verification in a NATA accredited laboratory as a result of unexplained measurement errors and dispute resolutions. Assume 1% meters per year. (Goulburn Murray Water also targeting 1%). Note: Re-verification is not mandatory as part of normal ongoing maintenance. It is required [comment: in which standard?] in case of unexplained errors and water usage user disputes. Electromagnetic flowmeter re-verification costs modelled include: • Mechanical disassembly • Transport from site • Excavation (buried only) • Verification in lab • Transport to site • Mechanical Assembly • Backfill (buried meters only) • Validation • 5% consumables

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
		1% factor applied to get cost per meter for each diameter. So, for example: 300mm buried = $109.50 p.a. 300mm above ground = $77 p.a.
3c. Unplanned maintenance Telemetry and communications malfunctions	No allowance.	Telemetry and communication malfunctions Assume 3.8% meters per year will experience a malfunction in telemetry. Every time a malfunction is identified or reported a corrective action should be undertaken. Assume 4 hours and travel costs and apply 3.8% factor = $21.55 per meter

3d. Unplanned maintenance
Meter replacement (damaged by external forces and not covered under warranty)
	Three year meter supplier warranties assumed. Only allowed for replacement costs related to failures and damage due to external causes.
	Failure rates:
	• 3% for electromagnetic meters
	• 1.5% for mechanical meters
	• Replacement cost
	• 25% of initial meter cost (in most instances only part of the meter will need replacement)
	Initial cost
	• Electromagnetic meter prime cost based on 300mm Tyco IR2060 plus programmable data logger
	  ○ $6,020 meter
	  ○ $1000 mobile phone modem
	  ○ Or $3,000 for satellite
	  ○ $1,000 programmable datalogger
	• Mechanical meter prime cost based on 80mm Elster
		State Water assumed 1% meters per year will need to be replaced due to causes not covered by warranty.
		[Cost assumptions driven from a separate capital cost model.]
		As example, 300mm meter allowance = $14.20 in FY15

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
	R2000 plus basic data logger ○ $945 meter ○ $500 basic datalogger • 50km return distance (assumes maintenance contractors in regional centres) @ $1.50 per km • 4 hrs repair time at site • 1 accredited technician @ $90/hr • No extra allowance for project management or scheduling So, electromagnetic meter with programmable datalogger = 3% failure rate x (25% prime cost factor x prime cost ($6,200+$1,000+$1,000) + labour (4 hrs x $90/hr) + travel cost (50km x $1.50/km) = $75 per meter p.a.	

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
4. Asset management and planning	No allowance.	ADASA categorises this as "Asset Planning" involving: • Statistical data assessment • Use of predictive tools • Design performance and flow assessment. ADASA has estimated 0.5 FTE of a Grade 5 employee responsible for collecting and analysing data from metering network, using predictive tools if practicable, to predict failures, prevent equipment downtime, perform root-cause analysis of failures and follow up on warranty claims. This person will assist in optimising a cost-effective maintenance plan. 0.5 FTE Grade 5 salary + 112.25% overhead = $103 k p.a. Divide by metering scheme meters = 7,122 Average per meter = $14.50
5. Audit and reporting	No allowance.	Resources allocated "to meet the auditing and reporting requirements under the Metrological Assurance Framework". ADASA has estimated 0.5 FTE of a Grade 4 employee responsible for collecting, processing, reviewing and reporting the information relating to meter details, maintenance and compliance activities, costs etc required by the State and Commonwealth. 0.5 FTE Grade 4 salary + 112.25% overhead = $85 k p.a. Divide by metering scheme meters = 7,122 Average per meter = $11.92
6a. Other	Have allowed an FTE at $114,000 p.a. plus 50% for	No allowance.

Cost category	Nayar assumptions (2010-11 $)	SWC & ADASA Assumptions (2012-2013 $)
Dispute resolution with customers	equipment and associated costs. This figure does not include corporate overheads. Assume 10,000 meters Cost per meter = $114,000 / 10,000 + 50% x $114,000 / 10,000 = $17 per meter p.a.	
6b.Other Project / Contract management	No allowance. Expected to be paid for through contracts funded by the metering scheme funding from the Commonwealth. Expected that project management costs will rise in the next pricing period once the Cwealth funding stops.	No allowance.
7. Contingency	20% across everything	None.