COMMERCIAL IN CONFIDENCE

FINAL REPORT

Economic analysis of NSW metering regulation

Cost estimates

Prepared for
NSW Department of Climate Change, Energy, the Environment and Water

3 March 2025

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Contents

BOXES, CHARTS AND TABLES

Executive summary

The CIE has been tasked with estimating the costs of the NSW non-urban water metering policy (NUM policy) and for a range of possible alternative options.

The current policy, introduced in 2018, requires holders of water supply work approvals to install and maintain approved meters, and in some cases telemetry, to works taking water from non-urban water sources (such as regulated rivers, unregulated rivers and groundwater systems), unless exempt. The policy is based on national non-urban metering standards which will see about 95 per cent of licensed water taken with accurate, auditable and tamper evident meters.[1]

The policy is being rolled out in four tranches, which begin with metering of larger surface water pumps before progressing through geographical regions. Based on proposed timelines, the entire rollout was scheduled to conclude by the end of 2024:

- Tranche 1 – 500 mm+ Surface water pumps by December 2020
- Tranche 2 – Northern Inland and NSW Fractured and Porous Rock (not shown on the map) by December 2021
- Tranche 3 – Southern Inland by June 2023
- Tranche 4 – Coastal by December 2024

Uptake of the policy by water users to date has been low. In response, the NSW Government has initiated a review. The aim of the review is to accelerate the metering compliance rates and remove barriers to implementation, particularly for small-medium users. This work is seeking to develop cost estimates for a range of response options which are currently being developed and considered as part of the review.

Under the current rate of compliance with the policy, full compliance is not achievable within the set compliance dates. We have therefore estimated a plausible uptake scenario for each option and associated compliance dates.

Options assessed

The options assessed in this report are summarised below. This report does not present all options which were assessed but focuses on those which underwent further consideration by Government. Other options were considered by the review but were not included in the economic analysis in the cost analysis.

Options have also been bundled into a package, which shows the impact of delivering a range of options together. The packaged option includes:

1 https://water.dpie.nsw.gov.au/our-work/nsw-non-urban-water-metering/important

- exclusion of non-taking/unmeterable works
- exclusion of inactive works
- staged compliance dates based on risk, enable less prescriptive metering requirements and exempt low-risk water users
- extension of the initial revalidation time period and remove in-situ accuracy testing
- an increase in the Duly Qualified Persons (DQP) workforce, and
- better training and support for DQPs.

Results

Timing of rollout

The assessed options address a variety of identified obstacles with the rollout of the policy to date, which have different impacts on the completion date of the implementation of the policy (NUM rollout).

As part of the analysis two impacts of options have been measured and reported against:

- Rollout timing: Bringing forward the rollout is a fundamental objective of the policy and a key measure of effectiveness. This is measured by:
  - Date of finalisation of the NUM rollout – when all of the works required to meter under the policy have a compliant meter installed.
  - Date of reaching 95 per cent of metered licenced water take – this may occur at a different point to which 95 per cent of works have compliant metering installed.
  - Note, our model is set up on a works-level basis, where each work is classified by water user group and assigned an "net entitlement" (based on the number of works linked to the WAL). For the rollout projections, we sum the total number of works/meters by water user group and calculate the total entitlement within each group. Then, we estimate the total number of installations per group (table 3 shows the number of works required to be metered by group), assuming that each work within a group has the same "net entitlement." Once the cumulative entitlement exceeds 95 per cent, we record the date. We use 95 per cent rather than 100 per cent because reaching full rollout among smaller water users would push the end date significantly further into the future.
- Overall cost: The objective of the proposed options is to decrease or maintain the same cost compared to the base case. This is measured using:
  - Cost effectiveness analysis which shows the costs of achieving a given outcome. In this case we measure the present value cost per ML of entitlement meter [2]
- The cumulative impact of the options included in the packaged option could enable the rollout to achieve 95 per cent of licenced water take metered by 2027, around

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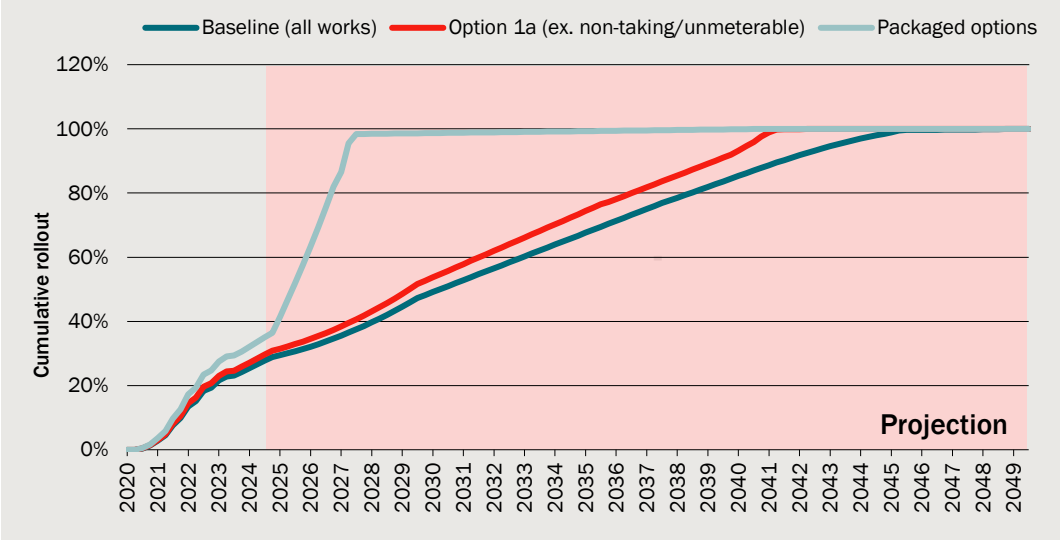
2 Due to the fix appraisal period, total metering costs are higher when the rollout is brought forward (more operating cost, capital replacement costs, and revalidation costs are accumulated within the same time). However, in terms of the cost per ML metered, this may not be the case.

16 years earlier than the existing policy (chart 1 and table 2). The timing of the rollout by water user group is reported in table 4, and shows that the rollout is expected to take longest for small volume water users.

1 Rollout projection



Source: CIE based on The Water Group and NRAR data. Baseline is the current policy

2 Rollout projected completion date

	50 per cent of licenced water take metered	95 per cent of licenced water take metered	Rollout finalised

Source: CIE.

3 Number works to be metered, ex. non-taking/unmeterable & inactive works

Water user group	Number of meters
High risk and larger volume water users	8 573
Large volume water users (Coastal)	3 193
Smaller volume water users	7 680
Low risk water users	NA

Note: Low risk water users are exempt from the requirement to install a meter.

Source: CIE.

4 Rollout projected completion date of packaged options by water user group

	Water user group	50 per cent of licenced water take metered	95 per cent of licenced water take metered	Rollout finalised
	Smaller volume water users	Q4-2031	Q2-2040	Q1-2041
	Low risk water users	NA	NA	NA

[a] Low risk water users are exempt from the requirement to install a meter.

Source: CIE.

Costs

Cost effectiveness analysis allows a like-for-like comparison across options. To illustrate the magnitude of these costs and how they compare, it is helpful to express them in terms of costs per installed meter or ML of entitlement. This is done by dividing the present value costs[3] by the present value number of installed meters or entitlements metered. Dividing by the discounted number of meters or entitlement accounts for changes in the NUM rollout time frame (see for more detail chapter 5).

Table 5 shows the costs of the packaged options relative to option 1a, the base case. The packaged options are expected to deliver cost savings in terms of $ per ML of entitlement metered relative to option 1a, as well as accelerating the rollout.

5 Cost of packaged options compared to option 1a

Option	Description	95% of licenced water take metered	Rollout finalised	Cost savings relative to Option 1a
		Year	Year	$/ML, present value
Option 1a (Base case)	Excludes non-taking/unmeterable works	2040	2042	0.0
Packaged options	Excludes non-taking/unmeterable and inactive works Combines Options 1b, 2, 4, 3, 5, 4, 5 and 6	2027	2041	36.3

Data source: CIE.

3 The total cost encompasses all expenses over the appraisal period, including maintenance costs, replacement costs of meters and LID, and the cost of the Water Group staffing.

This report

This report is structured as follows:

- Chapters 1 and 2 provide an introduction to the project and the baseline metering framework.
- Chapter 3 describes the options considered as part of the NUM review and the key assumptions used to model them
- Chapter 4 outlines the costs that have been quantified.
- Chapter 5 present the costing analysis results, distributional analysis, detailed cost summaries, and sensitivity analysis.
- Details on the costing methodology, unit costs parameters and other key assumptions are provided in Appendix A.

1 Introduction

The NSW Government introduced a non-urban water metering policy in December 2018. The policy requires holders of water supply work approvals to install and maintain approved meters, and in some cases telemetry, to works taking water from non-urban water sources such as regulated rivers, unregulated rivers and groundwater systems, unless exempt.

The policy is based on nationally adopted non-urban metering standards which will see about 95 per cent of the licensed water take in NSW fitted with accurate, auditable and tamper evident meters.[4]

The policy is being rolled out in four tranches, which began with metering of larger surface water pumps before progressing through geographical regions (table 1.1). Based on the proposed timelines, the entire rollout was scheduled to conclude by the end of 2024.

1.1 Rollout dates for meters

Tranche	Region	Works covered	Rollout date
1	All NSW	Surface water pumps where the authority authorises the use of a pump that is 500 mm or larger	1 December 2020
2	Inland northern region	▪ All remaining works that meet the metering thresholds in the water sources in the listed water sharing plans, and ▪ all works under a Water Act 1912 entitlement with a number that begins with 80, 85 or 90	1 December 2021
3	Inland southern region	▪ All remaining works that meet the metering thresholds in the water sources in the listed water sharing plans, and ▪ all works under a Water Act 1912 entitlement with a number that begins with 40, 50, 57, 60 or 70	1 June 2023[a]
4	Coastal region	▪ All remaining works that meet the metering thresholds in the water sources in the listed water sharing plans, and ▪ all works under a Water Act 1912 entitlement with a number that begins with 10, 20 or 30	1 December 2024[a]

[a] The rollout for tranches 3 and 4 was extended due to the impact of floods.

Source: NSW Department of Planning, Industry and Environment 2020, NSW Non-Urban Water Metering Policy, November.

However, uptake of metering to date has been low. In response, the NSW Government initiated a review.

The aim of the review is to accelerate the metering rollout and remove barriers to implementation, particularly for small-medium users. This work is seeking to develop

4 https://water.dpie.nsw.gov.au/our-work/nsw-non-urban-water-metering/important

cost estimates for a range of response options which are currently being developed and considered as part of the review.

Objectives of policy

The overarching objectives of the policy are to ensure that:[5]

- the vast majority of licensed water take is accurately metered: The policy aims to achieve the principle of 'no meter, no pump' by requiring accurate metering coverage of 95 per cent of licenced water take across NSW.
- meters are accurate, tamper-proof and auditable: This objective informs the meter standards required under the rules.
- undue costs on smaller water users are minimised: This objective reflects the intention that metering requirements and associated costs should be proportionate to the risk to the water source and that costs should not significantly outweigh the benefits of metering. It is also more considerate of the 'impactor pays' principle.
- metering requirements are practical and can be implemented effectively.

Better metering will improve the quality of data available for resource management, enforcing licence conditions, water users' social licence and policy making.

Compliance with policy

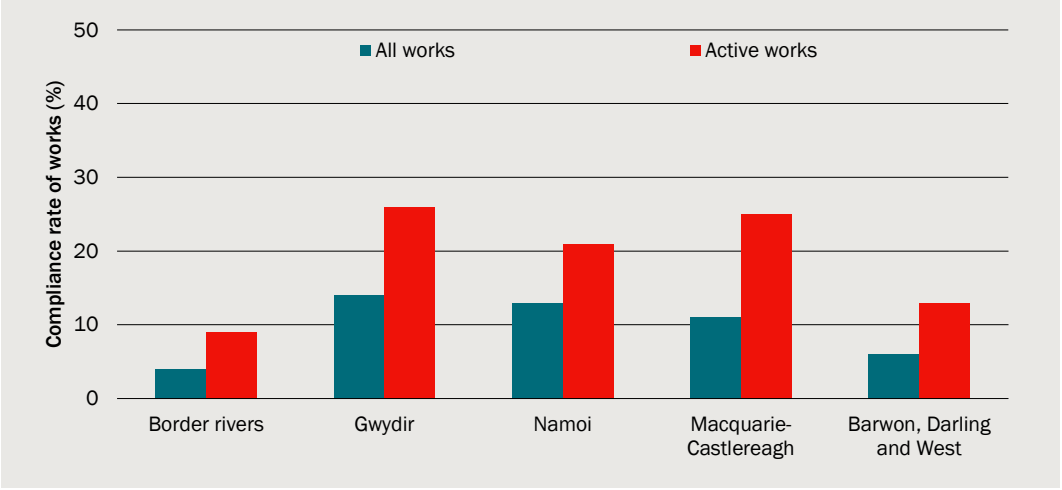
NRAR publishes metering compliance data for works. This data shows that compliance varies across regions, with lower rates of compliance in northern inland region, relative to southern inland areas (charts 1.2 and 1.3). Similarly, compliance appears to be higher for surface water pumps 500mm and greater in diameter (chart 1.4). The compliance data is reflective of works that have both a validated meter installed as well as a LID[6] that has been set to installed. Works that have met some of these criteria are counted in compliance reporting as 'progressing'.

In charts 1.2, 1.3 and 1.4 'all works' is the rate compliance rate when all works subject to the policy are included in the compliance rate and 'active works' shows what the compliance rate would be if we excluded the work assumed to be non-taking/unmeterable and inactive works (1b) - effectively reducing the denominator.

5 NSW Department of Planning, Industry and Environment 2023, Review of the non-urban metering framework Issues and options paper October 2023

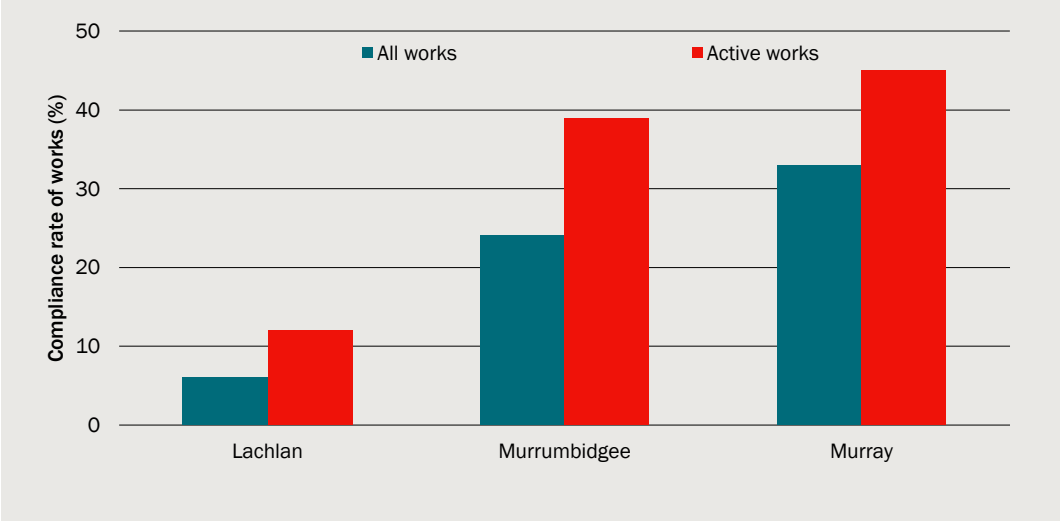
6 LID is an NSW term meaning local intelligence device. A LID a data logger that has telemetry capacity. All works required to meter are required to be fitted with a LID

1.2 Northern inland works compliance (due to comply 1 December 2021)



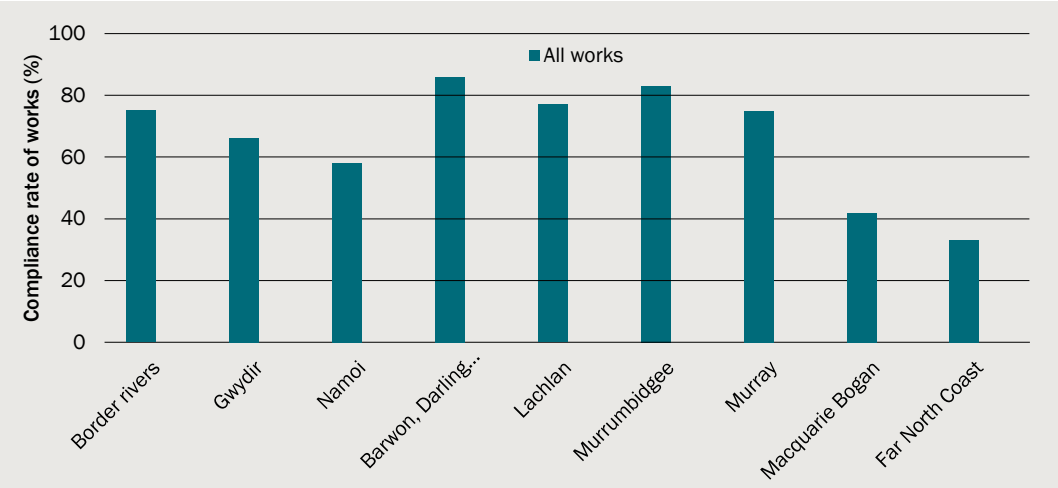
Data source: NRAR (https://www.nrar.nsw.gov.au/progress-and-outcomes/metering-compliance-reports).

1.3 Southern inland works compliance (due to comply 1 June 2023)



Data source: NRAR (https://www.nrar.nsw.gov.au/progress-and-outcomes/metering-compliance-reports).

1.4 Surface water pumps 500mm and greater works compliance (due to comply 1 December 2020)



Note: Compliance is measured against all works in the denominator. Excluding inactive works, would increase compliance.
Data source: NRAR (https://www.nrar.nsw.gov.au/progress-and-outcomes/metering-compliance-reports).

The low levels of compliance may be driven by:

- high costs of installing compliant metering and telemetry
- difficulties contracting DQPs to install and maintain equipment or acquiring and installing compliant meters and telemetry, and
- low levels of enforcement and/or minor consequences of non-compliance.

Limitations of this study

There are several limitations for the study, which should be considered when interpreting results. These include:

- Only costs for each of the options have been measured. Benefits are likely to differ across options, insofar as options result in different impacts, and should also be considered when comparing options.
- Comparison between options on a pure cost basis is not informative. Options that deliver a faster rollout will generally look less favourable due to the nature of discounting of costs, i.e., faster rollouts will result in costs being incurred earlier and therefore are less discounted. In choosing between options, it will be necessary to determine the trade-off between costs and a rollout completion date which is acceptable.
- Some options are at an early stage of development. Where this is the case, cost estimates are based on a range of assumptions including:
  - How options may be implemented
  - The expected size of the impact of the option (for example, by how much an option brings forward metering)
  - Cost assumptions based on high level estimates which are likely to change as options are refined

- This analysis does not consider risks associated with different options. This may affect costs and delivery timelines.
- There are limitations on the availability of licenced water take data, and therefore to determine the point at which 95 per cent of licenced water take is metered, entitlement or licenced share component has been used as a proxy. As 100 per cent of entitlement is not always taken within a water year there is potential that 95 per cent of licenced water take will be metered before the projected completion date.
- There are uncertainties around the data provided and the assumptions taken to address those. Some examples include the number of works requiring a meter, the meter size required for the respective works (in particular, where no work size is recorded), and cost assumptions.

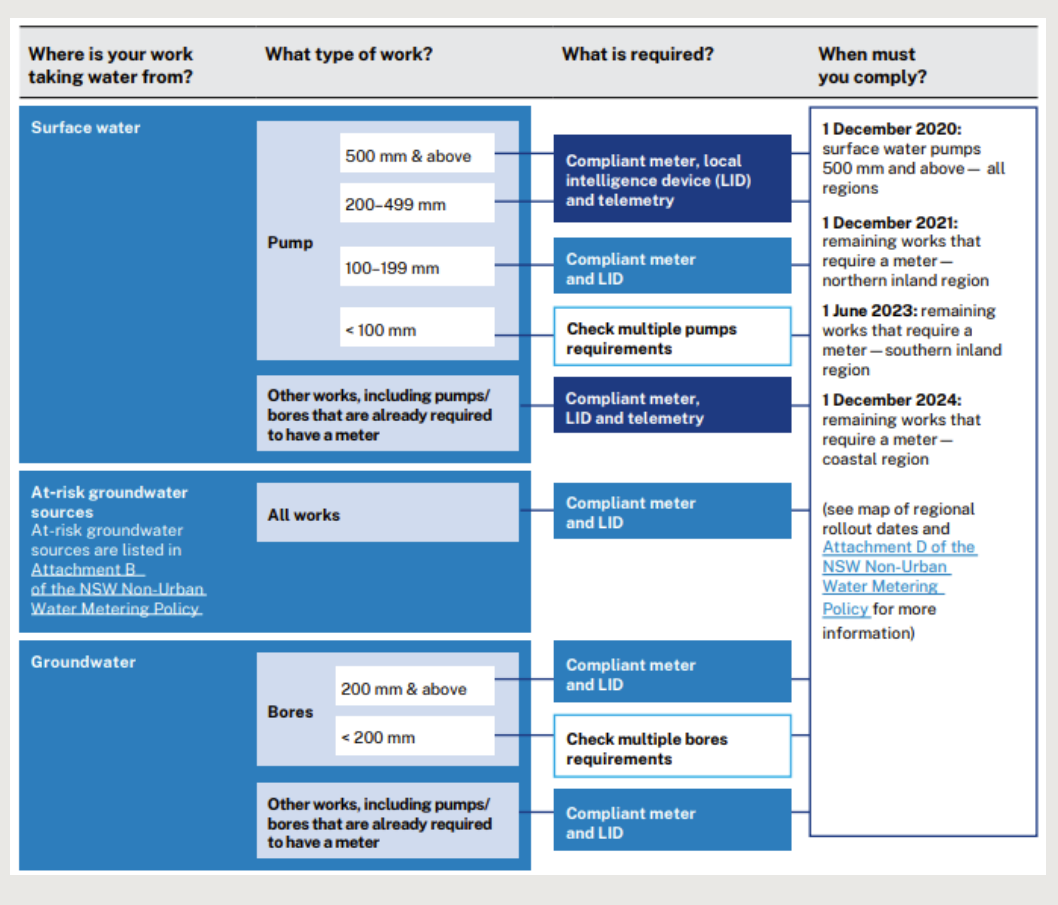
2 Baseline metering framework

The rollout is subject to a range of rules and standards, which define the framework.

Key aspects of the rules and standards include defining:

- which works do not require a meter
  - all works on water supply work approvals need a meter, unless they meet the requirements for an exemption
  - exemptions to the framework exist for works
    - used solely for Basic Landholder Rights (BLR) purposes,
    - works not nominated by a licensed entitlement,
    - works that are below defined specified work size thresholds,
    - works that are solely used for flood plain harvesting,
    - works that have notified that they are not currently used (inactive).
- standards for compliant metering equipment, which defines what type of meter and data loggers (LIDs) can be used.
- who can undertake works relating to metering equipment/validation requirements
  - the framework only allows a certified meter installer known as a Duly Qualified Person (DQP) in NSW to undertake work in relation to metering equipment. Only a DQP can:
    - install or re-install metering equipment
    - validate metering equipment
    - certify the design of new open channel metering equipment, and
    - carry out maintenance required under the maintenance specifications.
- rollout dates (i.e. when compliant metering needs to be in place, see chart 2.1).
- recording and reporting water take/use requirements, and
- how users must notify of faulty metering equipment.

2.1 Summary of metering rules



Data source: NSW DPE Non-urban water metering in NSW What water users need to know (Jan 2023), https://water.dpie.nsw.gov.au/__data/assets/pdf_file/0006/320199/non-urban-water-metering-in-NSW-what-water-users-need-to-know.pdf

These rules and standards drive the costs of the framework, which are borne by:

- Work approval holders /infrastructure owners who incur:
  - metering equipment installation costs
  - maintenance costs
  - record keeping costs
- NRAR costs associated with monitoring and enforcement of metering requirements.
- WaterNSW costs associated with collecting and managing metering data and supporting water users
- costs for DQPs and IAL to meet certification requirements.

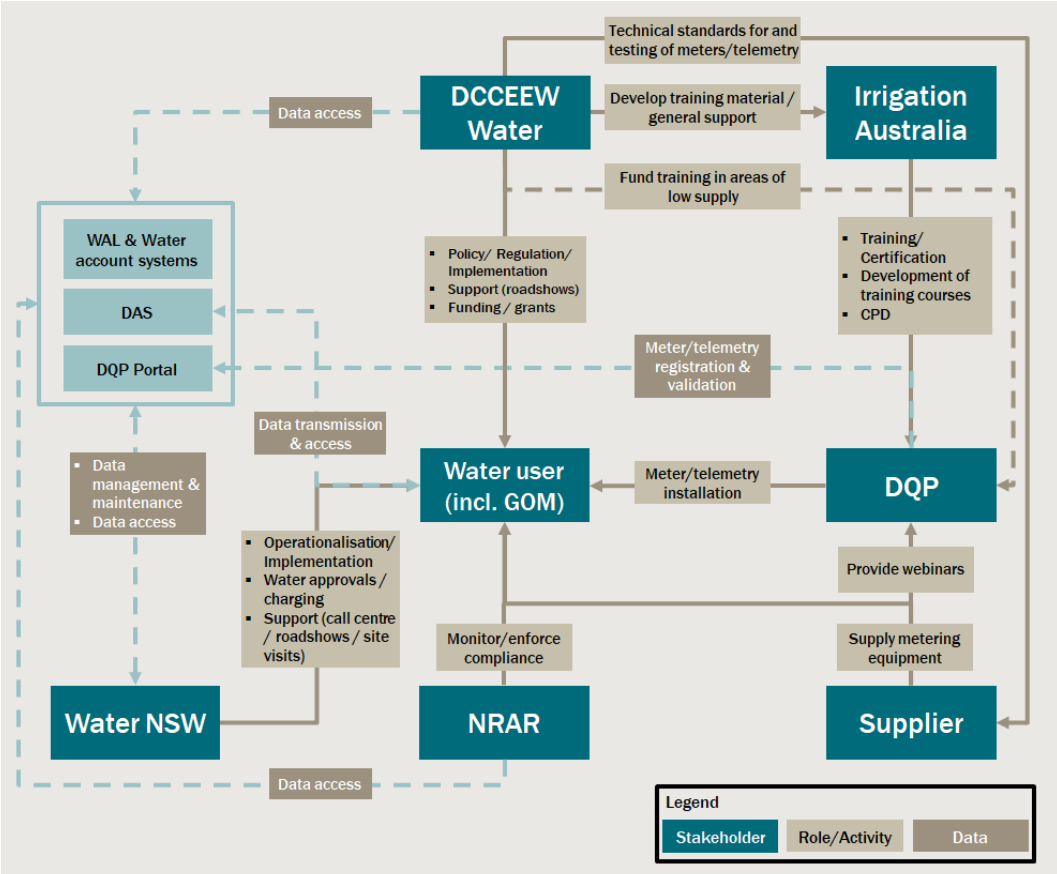
Changes in these rules and standards would likely result in different aggregated rollout costs, as well as difference incidence of costs across stakeholders.

Roles and costs for each stakeholder

This section sets out the roles of each stakeholder in the rollout.

Chart 2.2 shows a high-level summary of each stakeholders' role and how they interact with each other. These roles are mapped to costs in chapter 4 (see table A.12)

2.2 Stakeholder flowchart



Data source: CIE.

The Water Group

The Department of Climate Change, Energy, the Environment and Water (DCCEEW or the Water Group) holds a pivotal role in the implementation of the Non-Urban Metering policy (the policy). Their responsibilities encompass both development and implementation of the policy.

The Water Group takes on the responsibility of executing implementation plans, shaping the policies, and crafting the regulations that govern these programs. Their role extends beyond drafting guidelines, as they are actively engaged in collaborating with water users and meter installers to facilitate the adoption of the metering program.

To ensure the successful implementation, the Water Group undertakes several key activities:

- **Policy**: developing and maintaining the policy framework.
- **Water users support**: conducting educational campaigns, including roadshows, and stakeholder/community engagement to help water users understand the framework

rules. In addition, facilitating grants from the Australian and State Government to water users.

- **Technical Standards**: setting technical standards for metering and telemetry equipment, ensuring that all systems meet the required specifications.
- **Equipment standards**: overseeing and defining the standards for validation, while DQPs are responsible for the actual validation process of metering equipment, including telemetry or local intelligence devices (LIDs).
- **WaterNSW Support**: providing support to WaterNSW who work alongside meter installers, offering support and guidance.
- **Training**: allocating funds for the training of Duly Qualified Persons (DQPs) in regions facing a shortage of DQPs and produces training material for DQPs.
- **Funding**: the data management systems (DAS and DQP portal) have been built using funding from the Water Group but are owned and maintained by WaterNSW.

WaterNSW

WaterNSW is generally responsible for all aspects related to work approvals and licensing, billing, and maintaining the water management systems[7]. In relation to the rollout WaterNSW is responsible for the operationalisation and implementation of the policy. This means support for water users to help them understand the policies and to work together with the Water Group to test metering and telemetry equipment before it is approved to be used with the framework.

WaterNSW undertakes several key activities:

- **Water users support**: supporting and educating water users (service centre, site visits and roadshows)
- **Data Management:** responsible for the collection and processing of transmitted metering data, and the operation and maintenance of the Data Acquisition System (DAS) and DQP portal. This also includes the processing of certificates of compliance and non-compliance from DQPs.
- **Meter Installation**: installation of meters and telemetry to ensure they comply with the new framework on government owned meters (GOM) which were installed on privately owned works as part of previous metering programs.
- The main costs that arise from the NUM reform are likely:[8]
  - Operation of the service centre (this includes the operating and maintaining DAS and DQP Portal, processing data and general enquiries and education, and customer systems), and
  - Communications (such as reporting to NRAR or with customers)

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7 Note, that the Water Group is responsible for work approvals and licensing for certain water users.

8 WaterNSW - Non-urban metering reforms analysis submission to IPART, "Metering Reform Cost Model Model 2_v23"

- Although these responsibilities are held by WaterNSW, the cost recover arrangements mean that these costs will be passed through to water users – this transfer will be considered as part of the baseline costing.

NRAR

The Natural Resources Access Regulator (NRAR) is responsible for compliance and enforcement of water laws in NSW, including non-urban metering rules.

NRAR undertakes several key activities:[9]

- Ensuring compliance among high-volume and active works.
- Providing education to water users regarding the rules and their responsibilities as they approach their compliance deadlines.
- Monitoring and enforcing compliance within groups that have already reached their compliance deadlines.

Irrigation Australia

Irrigation Australia Limited (IAL) is the peak body for the irrigation industry and trains approximately 500 individuals annually nationally, with DQPs comprising half of this cohort.

- Additionally, there are expenses associated with supporting staff for administrative tasks, course assessment and certification management, as well as the revalidation process (CPD).
- These costs will be passed onto DQPs, which in turn will passed onto water users

IAL undertakes several key activities:

- **Initial training and certification of DQPs**: IAL has been developing and improving a robust training curriculum for metering and measurement since 2010, in accordance with Federal requirements. This curriculum was further enhanced in 2017, and a schedule of training courses for DQPs for the installation and validation of water meters was established in NSW in 2019.
  - The training program for DQPs, which currently spans three days, is set to transition to a hybrid model with two days of face-to-face instruction and one day of online learning. The curriculum covers installation, validation, and telemetry. In person training is delivered across regional NSW and each class has between 8 and 16 students.
  - IAL maintains a close working relationship with WaterNSW and various suppliers to ensure the availability of necessary resources. They also extend invitations to manufacturers to participate in their courses.
- **Continuing Professional Development and recertification:** IAL has instituted a recertification process for DQPs based on a point system. As DQP's are certified as

9 https://ocg.nsw.gov.au/child-safe-scheme/implementing-child-safe-standards/our-approach-compliance-and-enforcement

opposed to qualified, DQPs must meet minimum training and activity requirements which are managed by IAL. The costs to IAL relate to checking whether DQPs are meeting their training requirement to remain accredited and maintaining the list of DQPs.

Duly Qualified Persons (DQPs)

A duly qualified person (DQP) is an individual possessing the necessary qualifications, skills, or experience to perform specific tasks related to metering equipment. Different types of DQPs are required to carry out different work in relation to metering equipment, including certified meter installers, certified practising hydrographers, metering system designers, and telemetry technicians.

Under the current non-urban metering rules, only DQPs are authorised to install and validate metering equipment, including components like local intelligence devices (LIDs) and tamper-evident seals.

There are two primary types of DQPs with different key activities:[10]

- Certified Meter Installers (CMIs): CMIs are qualified to install and validate metering equipment, including telemetry systems, particularly for closed conduit works like pumps and bores. Their certification and professional conduct are overseen by Irrigation Australia Limited.
- Certified Practising Hydrographers: These individuals are certified to install and validate metering equipment for open conduit works such as channels and regulators. The Australian Hydrographers Association is responsible for their training, certification, and monitoring of their professional behaviour.

Water User

Water users that meet the conditions of the non-urban metering rules are required to comply within the set rollout dates, which vary by region. Costs imposed on water users included those:

- This encompasses covering the initial capital expenses linked to the meter, local intelligence device (LID), and, under specific circumstances, telemetry. Furthermore, ongoing costs are incurred for the routine maintenance, revalidation of this equipment, ensuring its continued functionality and precision, and the replacement of meters and LIDs at the end of the life. We expect that installation and maintenance costs paid to DQPs cover their and IAL's costs.
- Moreover, water users are also liable for the scheme management charge and telemetry charge, provided they possess compliant meters, and a meter service charge if they have a GOM installed on their works. This is a transfer from WaterNSW.

10 https://water.dpie.nsw.gov.au/nsw-non-urban-water-metering/what-duly-qualified-persons-need-to-know

- Beyond direct financial outlays, there may also be potential opportunity costs associated with the administrative burden, as water users invest time and effort into complying with various regulatory, or manual recording and reporting requirements.

Key responsibilities for water users include:

- **Installation of compliant equipment**: Water users need to have had DQPs install compliant meters, and local intelligence devices (LID). In addition, telemetry is required to be enabled for LIDs on all surface water works (except for pumps smaller than 200mm).
- **Maintenance and re-validation:** Water users need to ensure that their metering equipment is maintained and re-validated in accordance with Schedule 1 and 2 in the Maintenance Specifications 2019:[11]
  - Meters for closed conduit works, such as pumps and bores must be checked, maintained and re-validated by a certified meter installer at least once every five years.
  - Meters for open channel works, such as diversion channels or regulators, must be checked, maintained and re-validated by a certified practising hydrographer at least once every 12 months.
- **Recording and reporting**: All water users have updated recording and reporting requirements as part of the metering framework.
  - Works with telemetry enabled LIDs installed do not have to record or report licensed water take as the LID does it for them, however they do have to report BLR taken if taken with a work also used to take licensed water.
  - Works which require a meter but do not have to have a telemetry enabled LID installed must record water take within 24 hours of take occurring and report their take monthly.
  - Works which are not required to install a meter must record water take within 24 hours of take occurring and report annually.

11 https://water.dpie.nsw.gov.au/nsw-non-urban-water-metering/what-water-users-need-to-know

3 Options

As part of the review the Water Group has developed a range of options to improve the effectiveness and efficiency of the roll out. These are summarised in a discussion paper which provides an overview of the barriers to implementing the rules and describes potential options to address the key issues.[12] Where possible, these options have been costed as part of this study.

The following options hare considered in this study:

- 1a: Exclude non-taking/unmeterable works (Base case)
- 1b: Exclude non-taking/unmeterable and inactive works
- 2: Stage compliance dates based on risk (volume) to smooth demand for DQPs over time and simplify metering requirements
- 3: Increase the DQP workforce by expanding definitions of who can be a DQP
- 4: Review maintenance and 5-year validation requirements
- 5: Review of the Data Logging and Telemetry Specifications 2021 + Government prescribing which data logger and meters must be used together
- 6: Better training and support for DQPs
- 7: Water use reporting
- 8: Amend the Regulation to provide a measurement pathway for unregulated overland flow take
- 9: Improving provisions for faulty metering equipment
- 10: Clarifying definitions for offence provisions (s. 91I).

These options are discussed in further detail in this chapter, while key modelling assumptions are summarised in Appendix A, and specifically table A.5. Note this report does not present all options which were assessed but focuses on those which underwent further consideration by Government.

The options have been developed addressing specific barriers to implementation of the policy include:

- minimising undue costs
- addressing DQP shortages
- data logger and telemetry requirements
- reporting of water take information
- measuring overland take, and
- strengthening compliance tools.

12 Department of Planning and Environment, 2023, DRAFT Review of the non-urban metering framework: issues and options paper.

These options in turn deliver fall broadly under one or more of the following outcomes:

- accelerate uptake of the metering compared to the current trajectory
- reduce the costs of delivering the policy
- make the rules easier to understand, implement, comply with and enforce, and
- make the system work more efficiently.

Not all options address the same objectives or outcomes, with some focused-on enforcement and others on reducing costs. Options targeting different outcomes are not necessarily mutually exclusive and could be implemented together. This makes comparing, or prioritising options, more complicated in the absence of an analysis of benefits (because the options result in different outcomes, cost is not the only differentiator across the options). The results of this study should be considered alongside the benefits and risks of the options.

Minimising undue costs of the metering policy

Installation rate

With the current rate of compliance, full compliance with the policy is not achievable within the set compliance dates. We have, therefore, estimated a plausible uptake scenario for each option and associated compliance dates for each water user risk group.

The modelling behind the compliance dates considers the existing and projected DQP workforce based historical data, the proportion of DQPs that actively install meters, and the average installation rates among those active DQPs. Although the DQP workforce is anticipated to grow over time, a considerable portion of its capacity is allocated to mandatory in-situ revalidations every five years. This diversion of resources leads to capacity constraints in the foreseeable future, thereby causing significant delays in the rollout process.

There is considerable uncertainty regarding the future installation rates, in particular for smaller volume and low-risk water users due to the lack of incentives.

We have examined compliance dates under two different installation rate assumptions:

- Central case installation rate – based on the overall historical installation rates across all meters, and
- Government-owned meter installation rate[13] – based on overall historical installation rates for Government-owned meters, which is higher than the historical installation rate across all meters.

The compliance dates between the considered options varies considerably driven by the number of works that require a meter and the assumed installation rates (table 3.1).

- Under the baseline option and central case installation rate, full rollout is projected to conclude in 2049, 25 years later than originally expected.

[13] Note the Government-owned meter installation rate is for validation and LID installation only.

- Assuming an installation rate equivalent to the government-owned meter rollout, the number of years until compliance is achieved would be cut by approximately half.

For the purpose of modelling, we have used the central case installation rate that is based on historical installation rates for all meters. Although higher rates have been observed for the government-owned meter rollout, we do not believe this would be achievable given the incentives faced by the remaining water uses

3.1 Full-compliance dates for different options, 100 per cent of works metered

Water user group	Original rollout	Central case installation rate	Central case installation rate	Government owned meter installation rate	Government owned meter installation rate
		Baseline	Option 1a	Baseline	Option 1a
High risk and larger volume water users		2047	2042	2036	2034
Large volume water users (Coastal)		2037	2035	2031	2030
Smaller volume water users		2049	2042	2036	2034
Low risk water users		2045	2039	2035	2032
Total	**Dec-2024**	**2049**	**2042**	**2036**	**2034**
Change		**+25**	**+18**	**+12**	**+10**

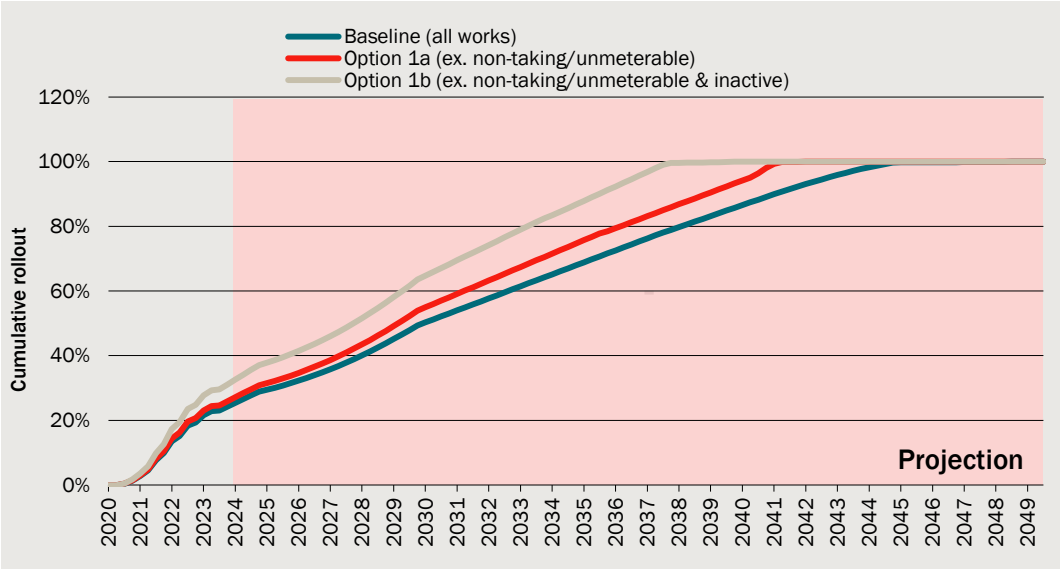
Note: Number of meters required is based on data provided by the Water Group. The GOM installation rate is for validation and LID installation only.

Source: CIE based on the Water Group and NRAR data.

Chart 3.2 shows the cumulative share of entitlement metered for each option over time. Note that this chart uses the central case installation rate. It is important to note that we use the number of installed LIDs to date, as opposed to compliant meters, to comprehensively capture the installation rates. For a work to be compliant under the framework it must have both a compliant meter and an installed LID. This also means that rollout to date might be understated in terms of actually installed meters.

In summary, this rollout profile with the central case installation rate assumes that 95 per cent of works will be metered by 2043 under the baseline option.

3.2 Rollout projection for all works and excluding non-taking/unmeterable and inactive works



Source: CIE based on the Water Group and NRAR data. Note that we use the number of installed LIDs to date, as opposed to compliant meters, to comprehensively capture the installation rates. For a work to be compliant under the framework it must have both a compliant meter and an installed LID.

Baseline metering uptake

Under the current policy many works are unintentionally identified as requiring metering as the metering conditions apply to all works on a water supply approval, unless exempt under the regulation, such as works used solely for basic landholder rights or not nominated by an access license. The intention of the metering policy is that only works taking licensed water from a water source are required to be metered.

The options developed to address this issue seek to address unintended and/or inefficient outcomes of the current metering policy.

Water users' statements of approval which are the records of the works authorised to be installed, and the government databases currently do not distinguish between authorised works on an approval taking licensed water from a water source and those works used for other purposes. This means there are "unintended works", which includes those which do not extract water, unconstructed or derelict works, or those solely for basic landholder rights, which under the current policy are required to have a meter. This is contrary to the intention of the policy and puts an unintended regulatory burden on water users.

Option 1a: Exclude non-taking/unmeterable works

Water users' statements of approval and the government databases currently do not distinguish between works taking licensed water from a water source and those works used for other purposes. This means there are "unintended works", which includes those which do not extract water, unconstructed or derelict works, or those solely for basic landholder rights, which under the base line framework are required to have a meter.

This is contrary to the intention of the framework and puts an unintended regulatory burden on water users.

Unintended works can be categorised into two groups:

- **'non-taking/unmeterable'** — works that are not taking water from the water source, such as dams or channels. As these works do not take water from the water source the policy intent was for these works to not require meters and their metering costs would never have been realised.
- **'inactive'** — works that are not being used to take water from a water source (may be unconstructed or derelict or constructed but not in use) but not declared inactive in the system. If these works were being used, then they would be required to be metered but as they are not being used then the policy did not intend them to require metering.

This option proposes to:

- exclude **non-taking/unmeterable** works from requiring a meter, and
- alter the regulatory framework and government data systems to clearly identify those works on work approvals that take licensed water from the water source and require meters.

This option would:

- provide a more accurate picture of meter coverage and compliance rates, which in turn could enable more efficient compliance action and reduce water user confusion about which of their works require a meter. Note we have not measured a cost saving for NRAR, instead we assume this option will improve the effectiveness of compliance and enforcement.
- accelerate the NUM rollout due to the substantial reduction in number of theoretical metering installations required. Overall, excluding non-taking/unmeterable identified works requiring metering would result in 15 per cent less works requiring meters. Where meters are no longer required, this would represent a cost saving compared to the base line.
- require staffing to resolve this issue would be standing up a team of two 3/4 clerks and one 5/6 clerk for 18 months at a total cost of $550 000.
- require a team for mail outs, customer liaison and data entry, including systems improvements. This includes amendments to the WLS system to cater for the additional information fields. The timeframe for rectifying system improvements would be six months. These would be undertaken as part of BAU funding.
- WaterNSW to upgrade their upgrade systems to reflect which works require metering and which do not. This would come at a cost of - $300 000.

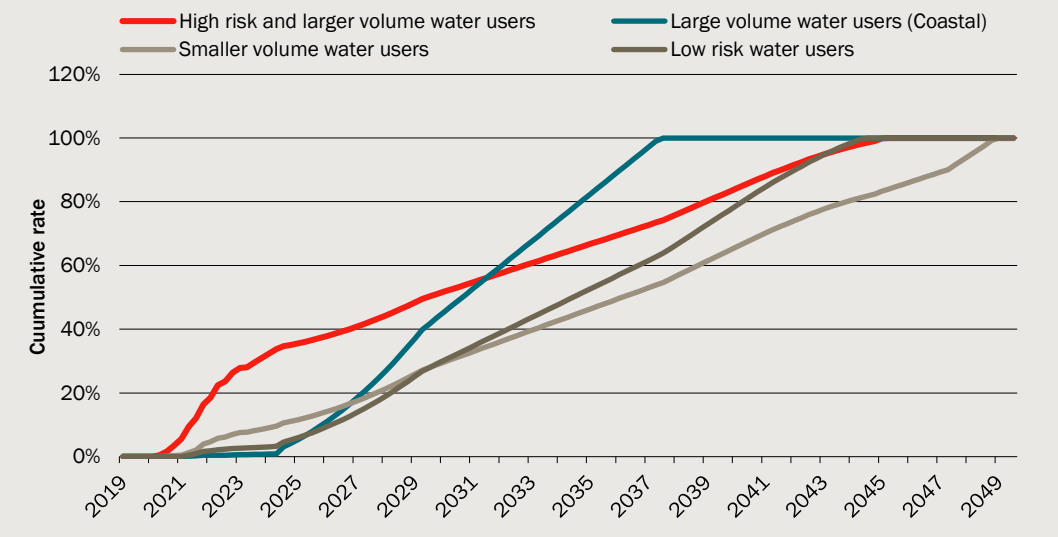
Chart 3.4 shows the cumulative NUM rollout for the baseline (all works covered by the current policy requiring a meter) and chart 3.5 for option 1a. As a result, the NUM rollout could be finalised 7 years earlier compared to the baseline (table 3.3).

3.3 Rollout projection for option 1a

Risk based group	Estimated rollout projection (option 1a)	Estimated change from NUM policy (baseline)
High risk and larger volume water users	Quarter 2 – 2042	~5 years faster
Large volume water users (Coastal)	Quarter 4 – 2035	~2 years faster
Smaller volume water users	Quarter 4 – 2042	~7 years faster
Low risk water users	Quarter 4 – 2039	~5 years faster

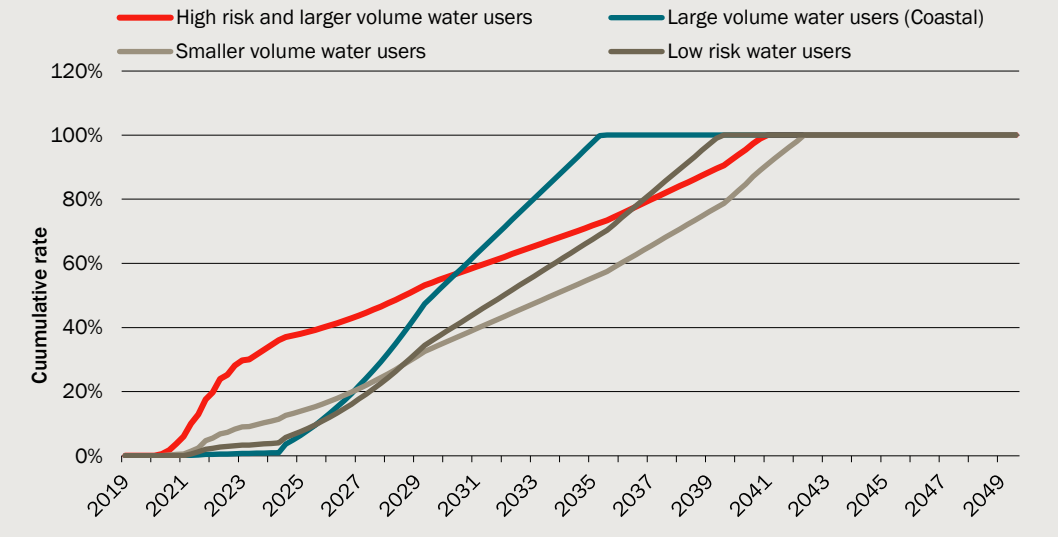
Source: CIE.

3.4 Baseline NUM rollout (NUM policy)



Data source: CIE.

3.5 Option 1a NUM rollout



Data source: CIE.

Option 1b: Exclude non-taking/unmeterable and inactive works

This option would build on option 1a and proposes to:

- exclude *non-taking/unmeterable* and *inactive* works from requiring a meter, and
- alter the regulatory framework and government data systems to clearly identify those works on work approvals that take licensed water from the water source and require meters.

This option would:

- provide a more accurate picture of meter coverage and compliance rates, which in turn could enable more efficient compliance action and reduce water user confusion about which of their works require a meter. Note we have not measured a cost saving for NRAR, instead we assume this option will improve the effectiveness of compliance and enforcement.
- accelerate the NUM rollout due to the substantial reduction in number of theoretical metering installations required. Overall, excluding non-taking/unmeterable and inactive identified works requiring metering would result in 25 per cent less works requiring meters. Where meters are no longer required, this would represent a cost saving compared to the base line.
- require the same staffing and team as option 1a.

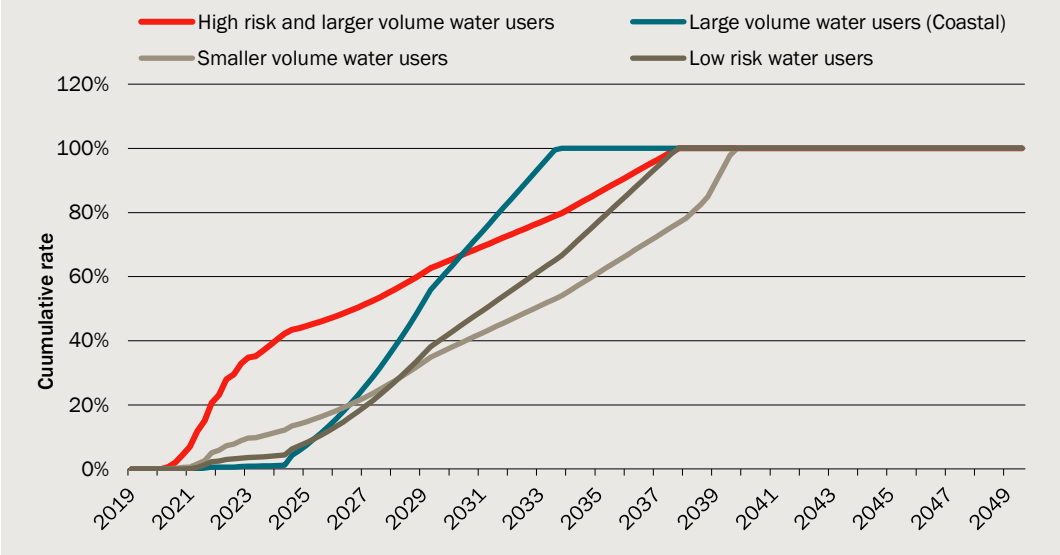
Chart 3.7 shows the cumulative NUM rollout for option 1b. As a result, the NUM rollout could be completed nine years earlier compared to the baseline and three years faster compared to option 1a (table 3.6)

3.6 Rollout projection for option 1b

Risk based group	Estimated rollout projection (Option 1b)	Estimated change from NUM policy (Baseline)	Estimated change from option 1a
High risk and larger volume water users	Quarter 1 – 2039	~9 years faster	~3 years faster
Large volume water users (Coastal)	Quarter 1 – 2034	~4 years faster	~2 years faster
Smaller volume water users	Quarter 4 – 2040	~9 years faster	~3 years faster
Low risk water users	Quarter 2 – 2038	~7 years faster	~2 years faster

Source: CIE.

3.7 Option 1b NUM rollout



Data source: CIE.

Summary

The Water Group has considered these two options alongside the base case to seek to address this issue and address unintended and/or inefficient outcomes of the current metering policy (table 3.8):

- Baseline – Reflects the current policy
- Option 1a – Excludes non-taking/unmeterable works
- Option 1b – Excludes non-taking/unmeterable and inactive works

Options 1a and 1b aim to minimise the impact of unintended consequences of the policy. Overall, the current policy covers 32 533 works. Excluding non-taking/unmeterable works (such as dams or channels) would result in 27 826 works requiring a meter and excluding both non-taking/unmeterable and inactive works from requiring a meter would result in a total number of 24 615 works requiring a meter (table 3.8).

3.8 Number of works that require a meter

Option	Total	Relative to baseline	Percentage relative to baseline
	No.	No.	%
Baseline – Current policy	32 533	0	0%
Option 1a – Excludes non-taking/unmeterable works	27 826	-4 707	-14.47%
Option 1b – Excludes non-taking/unmeterable and inactive works	24 615	- 7 918	-24.34%

Source: CIE based on the Water Group and NRAR data.

For the purpose of this analysis Option 1a has been chosen as the base case on which the considered options are based on.

The central case installation rate has also been chosen as the installation rate on which the considered options are based against.

The following options will assume that non-taking/unmeterable works are excluded from requiring a meter, i.e., option 1a represents the *central base case.*

Introduce a risk (volume) based approach

Under the current policy metering framework, compliance dates were staged based on the geographical location of works (except for tranche 1), refer to table 1.1. Additionally, every work required an AS4747 compliant meter and LID, regardless of the volume of water taken, unless exempt.

The following options address these limitations by:

- Redefining water user groups, and
- Considering less prescriptive measurement standards or full exemptions for low-risk water users in water sources currently subject to universal metering requirements.

In its current form, the regulation aims to enhance metering but overlapping rules with existing metering requirements causes confusion and undue costs for smaller water users. For example, new work approval holders in some water sharing plans can access size-based exemptions which are not available to existing works. Similarly, although metering in at-risk water sources is critical, using the Australian Standard for non-urban metering (AS4747) with ongoing validation and maintenance requirements, which is more costly, may be disproportionate to the risk posed by smaller volume water users in some of these water sources.

Many other jurisdictions in the Murray-Darling Basin define smaller, low-risk water users based on their usage limit or entitlement volume, acknowledging that work size may not solely reflect actual water take or risk.

The following options would see this approach implemented in NSW, shifting from a solely work-size based metering requirement to including an additional water take or entitlement volume threshold-based metering requirement. The intent of this is to align metering obligations with the level of risk to the water source, while still ensuring accurate metering of the majority of licensed water take. At the same time, this would free up DQPs to focus on installing and validating meters on works which are of higher risk or are nominated by a greater volume of licensed entitlement.

Water user groups are re-defined based on ‘risk’ (box 3.9).

3.9 What are the revised water user risk groups?

Water user groups are re-defined based on 'risk', i.e., incorporating the volume of entitlement as a factor:

- High risk and larger volume water users —
  - Surface water pumps 500mm and greater and
  - inland works nominated by a cumulative entitlement (share component) of 100ML or greater
- Larger volume water users (Coastal) —
  - Coastal works, nominated by a cumulative entitlement (share component) of 100ML or greater
  - excluding surface pumps equal to or greater than 500mm in size – which are included in the High-risk category
- Smaller volume water users —
  - Inland and coastal works, which are nominated by cumulative entitlement (share component) of between 16ML to 99ML (excluding surface pumps equal to or greater than 500mm in size)
  - Schedule 9 works that would otherwise meet the criteria for low-risk water users (at-risk water sources)
- Low risk water users —
  - Works which fall below the size-based thresholds (<100mm for surface water pumps and <200mm for bores), or
  - Works with a cumulative nominating entitlement (share component) of less than or equal to 15ML
  - Excludes works which meet these criteria which take water from 'at risk water sources'.

Note: To maintain coherence in our analysis, we have redefined the previously designated 'tranches' as water user risk groups. It is worth noting that this redefinition has no bearing on the total number of meters in the baseline or necessarily the risk posed by the water user group.

For those options there are several implementation risks:

- Flexible metering standards based on water source risk may introduce challenges in ensuring consistent compliance and that given volume is tradeable that requirements on works may vary over time.
- Introducing metering rules tied to entitlement or volume of water take in addition to work size increases complexity and could pose comprehension and compliance difficulties for water users.
- The stratification of the water user groups with the adoption of a statewide volumetric approach may overlook the diverse water use behaviours and management risks in different catchments, leading to implementation challenges.

Option 2: Stage compliance dates based on risk (volume) to smooth demand for DQPs over time

This option would see a lower number of works requiring a meter compared to option 1a. Low-risk water users would be exempt from installing a meter and would only be required to annual report their water take. In addition, high-risk and larger volume water users are prioritised for meter installation, followed by smaller volume water users (table 3.10).

3.10 Metering requirements per water user group

Works	Measurement standard	By when*
High risk and larger volume water users	▪ AS4747 compliant meter ▪ DQP validation ▪ LID and telemetry ▪ Reporting requirements (clause 244 applies)	▪ Immediately
Large volume water users (Coastal)	▪ AS4747 compliant meter ▪ DQP validation ▪ LID and telemetry ▪ Reporting requirements (clause 244 applies)	▪ Inland: Immediately ▪ Coastal: – Metering requirements - 1 December 2026 – Reporting requirements – 1 February 2025
Smaller volume water users	▪ Pattern approved meter ▪ Mandatory take reporting (clause 244A applies) ▪ DQP validation and LID/telemetry optional	▪ Metering requirements - Later of 1 December 2027 or renewal of work approval ▪ Reporting requirements – 1 February 2025
Low risk water users	▪ No meter mandated (exempt), but meter required if trading water ▪ Mandatory take reporting (clause 250 applies)	▪ Reporting requirements – 1 February 2025

Source: The Water Group.

The outcomes of this option are that:

- low risk works affected by this measure have lower cost, as no meter is required
- smaller volume water users do not require DQPs to install and validate meters, lowering cost for those water users
- this option would free up capacity for DQPs as this option reduced the number meters that need to be installed and revalidated by a DQP
- smoothing demand to better match available duly qualified person workforce, and
- enable the Murray Darling compliance compact commitments to be met sooner.

Chart 3.12 shows the cumulative NUM rollout for option 2. As a result, the NUM rollout could be completed 6 years earlier compared to the baseline and similar to option 1a (table 3.11).

Note there is some uncertainty around the timeline of the NUM rollout for smaller volume water users. The rollout of meters for this group is unlikely to have been constrained by DQP and metering equipment availability, rather the main barrier to

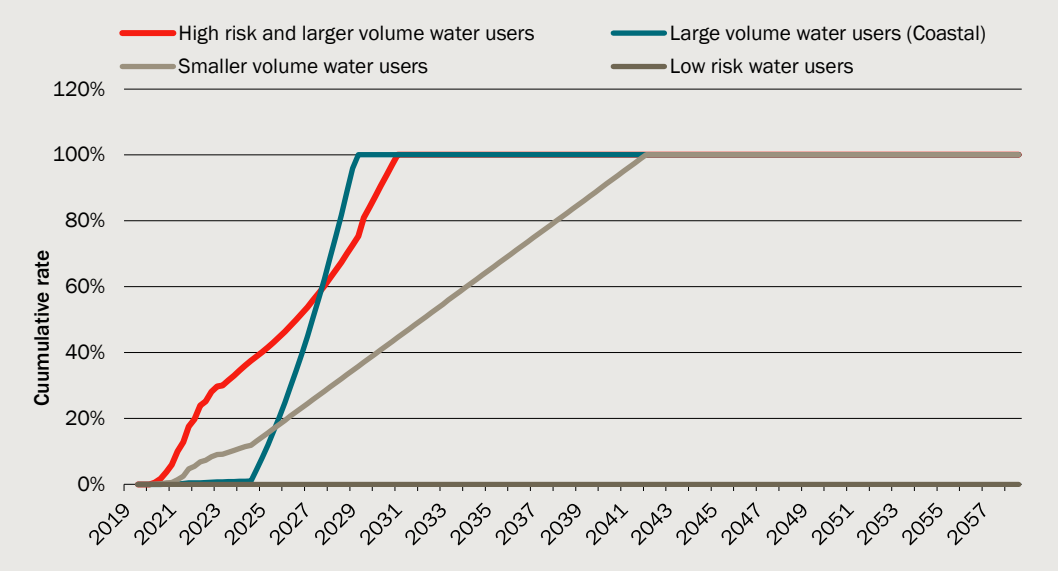
adoption has been relatively high costs compared to the benefits these users get from metering (which are negligible). In the absence of enforcement, which is likely to be costly for such a large cohort, or other rewards for undertaking metering, there is a risk the rollout for this group may not meet the modelled timeline.

3.11 Rollout timing projection for option 2

Risk based group	Estimated rollout projection	Estimated change from NUM policy (baseline)	Estimated change from option 1a
High risk and larger volume water users	Quarter 1 – 2032	~16 years faster	~10 years faster
Large volume water users (Coastal)	Quarter 3 – 2029	~8 years faster	~6 years faster
Smaller volume water users	Quarter 1 – 2043	~7 years faster	~0.5 years slower
Low risk water users	NA	NA	NA

Source: CIE.

3.12 Option 2 NUM rollout timing projection by water user group



Data source: CIE.

Summary

Option 2 introduces a new approach to classify water users and to stage the rollout based on risk. In addition, the option makes allowances to reduce the burden and need for DQPs for smaller volume water users and exempts low-risk water users. (table 3.13).

3.13 Number of meters installed under each option

Option		Works requiring an AS4747 meter	Works requiring a pattern approved meter	Relative to baseline
		No.	No.	No.
Baseline	All works	32 533	0	0
Option 1a	Exclude non-taking/unmeterable works	27 826	0	- 4 707
Option 1b	Exclude non-taking/unmeterable & inactive works	24 615	0	- 7 918
Option 2	Stage compliance dates based on risk (volume) to smooth demand for DQPs over time & simplify metering requirements – excl. non-taking/unmeterable works – no meter required for low-risk users	13 896	7 946	- 10 691

Source: CIE based on the Water Group data.

The following options will assume that:

- **non-taking/unmeterable works are excluded from requiring a meter (as per option 1a),**
- **NUM rollout will be staged based on risk and that low-risk water users are exempt from requiring a meter (as per option 2).**

Addressing DQP shortages

Under the framework DQPs must install, maintain, and validate meters. The limited number of active DQPs can result in supply bottlenecks that slow the framework rollout. The options in this section seek to ease these shortages.

Option 3: Increase the DQP workforce by expanding definitions of who can be a DQP

This option allows additional professions to become DQPs, which a view to increasing the number of DQPs. This is modelled as an increase in the number of DQPs. These professions include engineers, surveyors, plumbers, and electricians, and may already be involved in the delivery of meters (e.g. engineers and surveyors may be involved in the civil works related to the installation of larger meters).

The expanded definition would be accompanied by:

- waiving the entry fee and ongoing membership fees related to the certified meter installer course for qualified trades people and professionals, and
- a short course that is part of the DQP registration process (assumed to be 2 hours as compared to 3 days for the current DQP training).

The impact that this option will have on the number of active DQPs is highly uncertain and will need to be confirmed through market engagement. Given the relatively low number of DQPs (and even lower number of active DQPs), and the large number of workers in the proposed professions in NSW, the change in the number of DQPs could be substantial. To consider the size of the impact on DQP numbers we consider evidence on incentives for eligible profession to currently become DQPs:

- There are several disincentives to work as a DQP (reflected by the low number of current DQPs). Without resolving these disincentives[14] the increase in DQPs is likely to be modest.
- Reducing training requirements to 2 hours from three days, reduces the cost of becoming a DQP. This would make becoming a DQP more attractive as the upfront cost of becoming a DQP would fall from $2 500 to around $210 (excluding the opportunity cost of time for training). However, the overall decision to become a DQP will be driven by a consideration of the total return on this training (i.e. revenue from providing DQP services less the costs), compared to the next best use of their time (i.e. the opportunity cost of being a DQP, which for a surveyor would be the foregone returns from only undertaking surveying work). Given the training cost are small compared to the potential income a worker could generate over the course of a year, the impact of this cost saving on uptake is likely to be small but positive.[15]

Taking this into account, the outcome we have modelled is subject to considerable uncertainty and further work should be undertaken to consult with the targeted professions to gauge interest in becoming a DQP and the sensitivity of this to certification and training costs.

The costs of this option would include:

- Training for new DQPs (the costs of which we assume would ultimately be recovered from water users)
- Once-off cost of $30 000 to undertake a DQP competency analysis for WaterNSW
- Once-off cost of $30 000 for WaterNSW to register DQPs on the DQP Portal

This option will not affect the installation rate per DQP but will increase the number of DQPs installing meters. We assume this would increase the number of DQPs by 10 per cent resulting (resulting in a 10 per cent increase in the annual meter installation rate). This is particularly effective as it alleviates the issue of insufficient DQP capacity in the short and medium term. This is specifically important as revalidations are expected to occur from 2025 onwards, which will further reduce the capacity to install meters.

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14 For further detail see: Department of Planning and Environment, 2023, DRAFT Review of the non-urban metering framework: issues and options paper.

15 Where DQPs undertake very few meter installations or validations each year, the reduction in fixed training costs would have a larger impact on potential DQP decisions compared to a high volume DQP. This is because a DQP undertaking high volume of work spreads fixed costs over a larger revenue base. For high volume DQPs changes in fixed costs have a smaller impact on choices.

Option 4: Review maintenance and 5 year revalidation requirements

This option proposes to:

- remove the in-situ accuracy testing requirements
- modify the revalidation requirement. Initial revalidation would now to take place at 10-years post installation (instead of 5 years) and then 5 years thereafter. Revalidation is only required for meters required to be compliant with AS4747

This option would require implementation of system changes for re-validation requirements, which are estimated as an upfront cost of $50 000.

The expected outcomes of this option are significant as in-situ revalidations are a time intensive and costly process:

- Thus far it was assumed that an in-situ revalidation every 5 years requires the same amount of time as installing a meter for a DQP. We assume that removing the in-situ requirement could significantly free-up DQP capacity in the order of four. This means DQPs will be able to revalidate four meters in the time they currently require revalidating one.
- This means that revising the revalidation requirement is expected to substantially reduce costs. We assume that revalidation costs would fall by 75 per cent ($743 instead of $3 013 per revalidation excl. LID replacement and excavator cost).

Data logger and telemetry

Option 5: Review of the Data Logging and Telemetry Specifications 2021 and government prescribing which data logger and meters must be used together

This option has two components:

- review of the Data Logging and Telemetry Specifications 2021
- government prescribing which data logger and meters must be used together

Review of the Data Logging and Telemetry Specifications 2021

The regulations define the type of telemetry system which much we used. They do not allow use of pre-existing telemetry systems (e.g. SCADA systems) which are excluded due to security requirements. This option proposes to allow alternate telemetry systems to be used. Under this option, water users with systems such as SCADA would avoid having to replace their existing meter telemetry systems with compliant systems as per the existing regulations.

The main rationale of this option is ensuring that there are additional benefits to water users such as on-farm water efficiencies gained through allowing third party telemetry systems. Cost savings would be experienced where water users already have these systems in place, this is like to be a small number of water users (assumed to be around 5 per cent of water users).

The cost saving for water users will be offset by additional costs for WaterNSW to accommodate the third-party telemetry systems. This is estimated have an upfront cost of around $100 000 per system, and $20 000 per system per year thereafter. Assuming 5 systems, this would have an upfront cost of $500 000 and $100 000 per year thereafter. Note the number of systems to be incorporated may vary.

This component of option 5 would slightly accelerate the rollout by reducing the number of faulty or mismatched telemetry installations, thereby minimising the need for re-visits. The magnitude of this depends on the prevalence of SCADA systems.

Government prescribing which data logger and meters must be used together

Often there are mismatches between meters and data loggers (LIDs). This may occur where a pulse meter is connected to a modbus data logger or vice versa. This mismatch has resulted in increased errors rates.

This option will reduce the number of DQP visits required to fix up faulty metering equipment and incompatible equipment installations. In turn this will realise cost savings users. The review to develop guidelines has an expected cost:

- $150 000 for technical review of equipment
- $100 000 for DQP training material on LID installation (step by step guides)
- $120 000 for Review of telemetry specifications/marketplace

The number of meters affected is based on the share of meters for which there is a mismatch. Based on installations to date this has been estimated at 4 per cent. We, therefore, assume an increase in the installation rate in the order of 4 per cent.

Option 6: Better training and support for DQPs

This option would consist of:

- A support hotline for DQPs to provide assistance, this would include a concierge service to support the installation and registration of meters and local intelligence devices, and use of the DQP Portal.
- Additional training and materials, such as an installation checklist for data required for the DQP portal. This would consist of:
  - New course for installing LIDs, better tailored to the skills required. Currently this is a gap within NSW. This would be a one day training course for installing local intelligence device and telemetry
  - New certified meter installer course (reduced from three days to one -one and a half days). This would be focused on the practical side of installing meters and specifics of the NSW rules and systems. Any registered training organisation would be allowed to run the course.

We assume that this would increase DQP productivity by 20 per cent; this would enable 20 per cent more installations per year.

The additional training costs are assumed to be 1 hour in duration for DQPs and would be in *addition* to above mentioned training requirements.

The costs are assumed to be:

- Assume 3 FTE for 2 years (plus contingency) with a cost of $1 million to stand up DQP concierge service for LID installation technical support and water user support
- New course for installing LIDs would likely need to be funded by the NSW Government at a cost of $120 000.
- $300 000 to improve systems and reduce administrative burden for DQPs.

Reporting of water take information

Option 7: Water use reporting

Government will increase water user compliance with self-reporting water take data to support water resource management, by:

- Updating reporting and recording rules to streamline and simplify the requirements and ensure the mechanisms for reporting water take are user friendly. This relates to allowing water users to report only when they take water, as opposed to requiring monthly reporting of non-usage.
- Undertaking targeted compliance action to increase reporting.

This should reduce costs to water users through lower cost of compliance, assuming requirements are less onerous and easier to comply with.

Measuring overland take

Option 8: Amend the Regulation to provide a measurement pathway for unregulated overland flow take

Overland flow taken with an unregulated river licence must be metered in accordance with the non-urban metering framework. In contrast if overland flow is taken with a floodplain harvesting licence, it must be measured through either point-of-intake metering equipment (closed conduit metering under the metering framework) or storage measurement equipment, under the floodplain harvesting measurement framework.

In cases where water users intercept diffuse overland flow and take it under an unregulated river licence it is proposed by the review to allow them to measure their take using storage measurement devices, as is allowed under the floodplain harvesting measurement framework.

This option proposes to harmonise regulations around this type of overland flow take. This is modelled based on the following assumptions:

The following information is used to cost this option:

- there 110 storages affect by this option this

- for each storage meter 6-10 closed open channel meters are avoided. In the model we assume 6 avoided at the cost of 400mm sized meters
- Meters used for storages are closed conduit meters, the costs of which are provided in Appendix A.

This option brings forward the rollout slightly, by reducing the number of meters which need to be installed.

Strengthening compliance tools

A series of options have been developed to address potential deficiencies in the existing metering framework. These options do not affect the timing of the NUM rollout, but affect the efficiency and effectiveness of NRAR's compliance and enforcement activities.

Option 9: Improving provisions for faulty metering equipment

An approval holder is required to repair a meter within 21 days of becoming aware their equipment is faulty or notify WaterNSW and apply for an extension if it cannot be repaired in this timeframe. However, there is no limit to the number or duration of extensions to repair meters, and no application mechanism to cover circumstances where a meter needs to be replaced.

This option relates to closing this a loophole in the existing framework whereby a user could indefinitely delay repairing a faulty meter.

This option would see a time limit, or limit to the number of extensions allowable to repair a meter. Data was not available within the timeframes of this report to model meter faults. As such this option was not costed

Option 10: Clarifying definitions for offence provisions (s. 91I)

Under the *Water management Act 2000* s. 91I, it is an offence to take water when metering is not operating properly or is not operating and

- *(a) who intentionally or negligently fails to ascertain whether the metering equipment is not operating properly or is operating, or*
- *(b) who knows or has reasonable cause to believe that the metering equipment is not operating properly or is not operating*[16]

Based on discussions with NRAR it was determined that this would largely be an administrative change and would not have a material impact on costs for NRAR, and no impact on water users.

WaterNSW costs are expected to increase by $150 000 per year associated with potential additional workload associated with the change.

16 https://www5.austlii.edu.au/au/legis/nsw/consol_act/wma2000166/s91i.html

Packaging of options

Options have also been bundled into a package, which shows the impact of delivering a range of options together. The packaged options include (table 3.14):

- exclusion of non-taking/unmeterable works
- exclusion of inactive works
- staged compliance dates based on risk, enable less prescriptive metering requirements and exempt low-risk water users
- extension of the initial revalidation time period and remove in-situ accuracy testing
- an increase in the DQP workforce, and
- better training and support for DQPs.

In chapter 4, results are reported for:

- Each of the quantified options compared to the base case (option 1a, exclusion of unmeterable works)
- Packaged options compared to option 1a. All of the options are considered in combination with option 1a.
- Packaged options using the central case installation rate as the installation rate on which the considered options are based against.

3.14 Option packages

No.	Option	Base case	Packaged options	Quantified
		✓	NA	✓
		✗	✓	✓
		✗	✓	✓
		✗	✓	✓
		✗	✓	✓
	Review of the Data Logging and Telemetry Specifications 2021 + Government prescribing which data logger and meters must be used together	✗	✓	✓
		✗	✓	✓
		✗	✗	✗
		✗	✗	✓
		✗	✗	✗
		✗	✗	✗

Source: CIE.

4 Estimating cost

Approach to modelling option costs

In undertaking the assessment each option they were compared against:

- the baseline costs for the framework (the costs under the existing metering framework) and
- are considered in combination with the base case (option 1a).

The reason for the comparison against the base case as well as the baseline is because the government systems currently do not distinguish between authorised works taking licensed water from a water source and those works authorised to be used for other purposes, which is not consistent with intention of the NUM framework. Excluding works (as happens in the base case) which do not take water gives a more actual reflection of the actual costs of the metering rolling-out and allows for a more accurate comparison of costs across options.

Scope of costing

Where possible we have measured all direct costs associated with the NUM rollout for each stakeholder. These costs are described in detail in the roles and costs for each stakeholder section in chapter 5A, however in summary commencing from January 2025 onwards:

- **Water users** bear the responsibility of financing several critical aspects.
  - Installation of compliant equipment
  - Maintenance and revalidation
  - Recording and reporting
- **The Water Group's** main cost arise from operating a team dedicated to the NUM policy development and governance and implementation, but also support for water users, and community and stakeholder engagement (e.g., roadshows).
- **WaterNSW** operates various teams to support water users, manage data, and to manage the compliance of the GOM fleet.
- **NRAR's** main costs arise from the regulatory effort, including data and intelligence, education and outreach, audits and inspections, and investigations and enforcement to ensure metering compliance.
- **Irrigation Australia Limited's (IAL)** primary costs stem from conducting the DQP training program.
- **DQPs** incur a range of costs in delivering metering from initial training cost and ongoing Continuing Professional Development (CPD) costs to maintain

accreditation. Moreover, there are additional expenditures related to travel time. Lastly, DQPs often face costs associated with administrative burdens.

- note these costs will ultimately be passed onto water users in installation and maintenance fees.

Detailed costing assumptions are provided in Appendix A of this report.

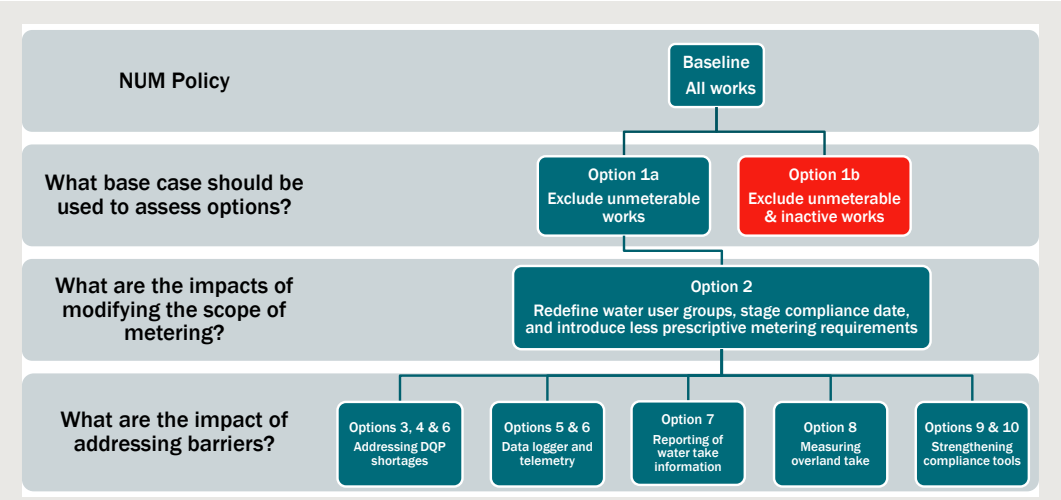
5 Results

As part of the analysis two impacts of options have been measured and reported against:

- Rollout timing: Bringing forward the rollout is a fundamental objective of the policy and a key measure of effectiveness. This is measured by:
  - Date of finalisation of rollout.
  - Date of reaching 95 per cent of metered entitlement
- Overall cost: The objective of the proposed options is to decrease or maintain the same cost compared to the base case. This is measured using:
  - Cost effectiveness analysis which shows the costs of achieving a given outcome. In this case we measure the present value cost per ML of entitlement meter [17]
  - End of the chapter reports total costs in undiscounted and discounted terms

They are structured as in terms of answering the following questions in chart 5.1.

5.1 Structure of the analysis



Note: Teal boxes represent the choices of the respective question.

Data source: CIE

The analysis is structured as follows:

- First, we identify the costs of the existing NUM policy (baseline) as it stands. This is the status quo, which would continue in the absence of any changes to the policy.

17 Due to the fix appraisal period, total metering costs are higher when the rollout is brought forward (more operating cost, capital replacement costs, and revalidation costs are accumulated within the same time). However, in terms of the cost per ML metered, this may not be the case.

- We then assess what base case should be used to assess options. This considers the impact of excluding non-taking/unmeterable works (option 1a and option 1b).
- From this analysis, and based on advice from the Water Group, all subsequent options are compared to option 1a (the base case), which excludes non-taking/unmeterable works. This better reflects the intent of the policy and likely metering, given it only includes works which take water.
- Next, we assess the impact on the base case of modifying the scope of metering. This involves considering alternative definitions of water user groups, varying requirement and exempting low risk water users (option 2).
- Finally, we assess the impacts of addressing a range of barriers to metering and other issues related to metering. These subsequent options are all modelled on the base case in conjunction with option 2 (exempt low-risk water users) based on advice of the Water Group. This assumes that option 2 is complementary with all subsequent options, which would only proceed in conjunction with this option.

This chapter also provides results for packaged option developed by the Water Group.

What base case should be used of assess options?

As discussed in chapter 2, we first assess the difference in costs between the existing NUM policy (baseline) and excluding non-taking/unmeterable and inactive works (see table 3.8 for the number of works which require a meter under these scenarios).

These options reflect the difference in costs for the NUM rollout depending on what works are considered within the scope of the policy.

The base case cost is estimated at $167.2 per ML.

Both options lead to a faster rollout but due to a reduction in overall number of works this also leads to a somewhat lower level of total licenced water take covered.[18] Under option 1a this leads to a marginally higher cost per ML, while under option 1b the time savings outweigh this (table 5.2).

- For the rollout projections, we sum the total number of works/meters by water user group and calculate the total entitlement within each group. Then, we estimate the total number of installations per group, assuming that each work within a group has the same "net entitlement." Once the cumulative entitlement exceeds 95 per cent, we record the date. We use 95 per cent rather than 100 per cent because reaching full rollout among smaller water users would push the end date significantly further into the future.

18 Note that there is some uncertainty as to the total nominated entitlement by work as the entitlement is linked to the water access licence and not the work.

5.2 Options 1a and 1b compared to NUM policy

Option	Description	95% of entitlement metered	Rollout finalised	Cost savings relative to Baseline (NUM Policy)
		Year	Year	$/ML, present value
NUM Policy	All works	2043	2049	0.0
Option 1a	Excludes non-taking/unmeterable works	2040	2042	-6.7
Option 1b	Excludes non-taking/unmeterable and inactive works	2037	2040	2.4

Source: CIE.

What are the impacts of modifying the scope of metering?

Changing the scope of the metering framework affects costs by (option 2):

- staging compliance to better match the DQP workforce
- allowing less prescriptive metering standards for small water users (by removing the requirements for meters to be installed by DQPs, ongoing validations and AS4747 compliance)
- exempting low risk water users from metering requirements, which reduces the number of works required to meter compared to option 1a.

Cost per ML is significantly lower across all options which adjust the scope of the rollout (table 5.3).

- Option 2 has a significant time saving compared to option 1a (the base case) in terms of achieving the policy objective of metering 95 per cent of the licenced water take, however, for finalising the rollout and metering all works subject to metering requirements, the completion of rollout is the same as option 1a due to the smaller volume water users not requiring compliance till 2034.[19]
- Costs are also lower due to bringing forward the relatively low-cost, high-risk and larger volume water users, characterised by their lower cost per ML (chart 5.4). Meanwhile, the implementation of metering compliance for higher-cost smaller water users is subject to greater delays.

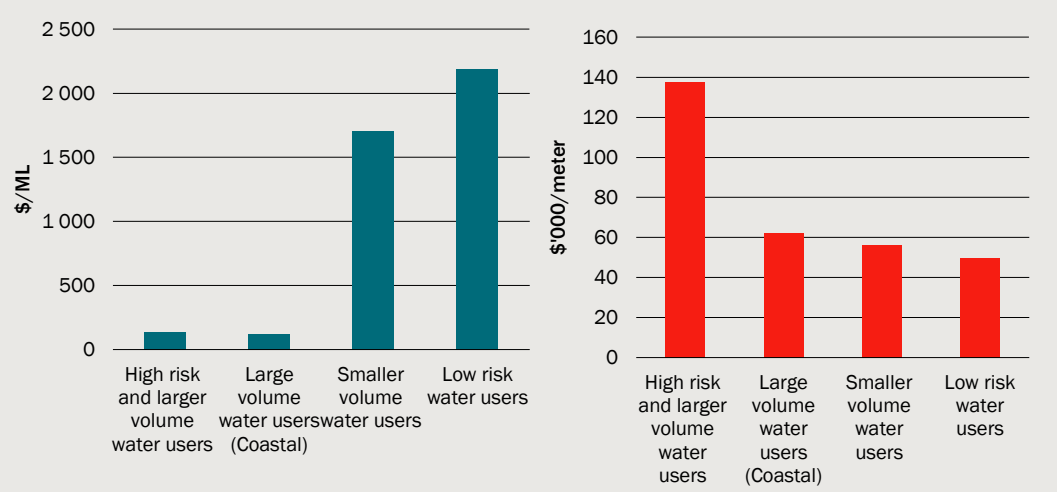
19 For the rollout projections, we sum the total number of works/meters by water user group and calculate the total entitlement within each group. Then, we estimate the total number of installations per group, assuming that each work within a group has the same "net entitlement." Once the cumulative entitlement exceeds 95 per cent, we record the date. We use 95 per cent rather than 100 per cent because reaching full rollout among smaller water users would push the end date significantly further into the future.

5.3 Option 2 compared to option 1a

Option	Description	95% of licenced water take metered	Rollout finalised	Cost savings relative to Option 1a
		Year	Year	$/ML, present value
Option 1a	Excludes non-taking/unmeterable works	2040	2042	0.0
Option 2	Stage compliance dates based on risk (volume) to smooth demand for DQPs over time & simplify requirements for smaller volume and low-risk works	2031	2042	30.0

Source: CIE.

5.4 Cost per meter and per ML of entitlement (option 1a)



Note: Cost per ML and per meter is based on the total discounted cost (capital and operating cost for meter). Total costs are assessed over a 25-year appraisal period (see box below).

Data source: CIE.

5.5 Cost per meter and per ML of entitlement

For this analysis, we calculate a cost-effectiveness measure rather than estimating the benefits of accelerating the rollout. From a cost perspective, options that expedite the rollout incur higher costs because additional operating and replacement expenses accumulate within the same appraisal period. This would mean that any option that accelerates the rollout would lead to overall higher costs without knowing the associated benefits. Therefore, a cost-effectiveness analysis takes this into account.

To implement this, we calculate the discounted costs by water user group and then divide these costs by the discounted entitlement or the discounted number of meters. This approach is similar to how water or electricity utilities calculate the levelised cost per ML or per kWh for projects, providing a standardised measure of project cost.:[20]

20 See for example, https://www.ipart.nsw.gov.au/sites/default/files/documents/final-report-review-of-prices-for-sydney-water-june-2020_0.pdf

$$Cost\ per\ ML\ (water\ user\ j) = \frac{\sum_{t=1}^{T} \frac{Cost\ Meter_j(t)}{(1+r)^t}}{\sum_{t=1}^{T} \frac{Entitlement_j(t)}{(1+r)^t}}$$

$$Cost\ per\ Meter\ (water\ user\ j) = \frac{\sum_{t=1}^{T} \frac{Cost\ Meter_j(t)}{(1+r)^t}}{\sum_{t=1}^{T} \frac{No.\ of\ meter_j(t)}{(1+r)^t}}$$

The trade-off in cost-effectiveness with an earlier rollout lies in the balance between the higher discounted costs and the larger discounted denominator. Here's how this works:

- **Higher Discounted Costs**: An earlier rollout means more costs—both operating and replacement—are incurred sooner, which typically increases the total discounted costs. These costs are less impacted by discounting because they occur closer to the present, resulting in a higher present-value cost.
- **Higher Discounted Denominator**: However, an earlier rollout also accelerates the delivery of benefits, such as increased entitlements or meter installations. This raises the discounted denominator (i.e., the total discounted entitlement or number of meters) since these benefits begin accruing sooner, and therefore have a greater present value than if they were delayed.
- **Trade-off and Cost-Effectiveness Outcome**: The trade-off between the higher discounted costs and the higher discounted denominator depends on the scale of each. If the increase in the denominator (entitlement or meters) is significant enough, it can offset the higher costs, leading to a more favourable (lower) cost-effectiveness measure. Essentially, this scenario reflects more value (entitlement or usage capacity) for each unit of cost, making the earlier rollout appear more cost-effective despite the upfront cost increase.
- **Outcome by Option**: Depending on the specific option, this balance may yield different results. Some options may have higher costs but bring enough benefits forward to improve cost-effectiveness. For others, the increase in costs may outweigh the benefits brought forward, making them less cost-effective.

What are the impacts of addressing barriers?

Table 5.5 shows the rollout timing and cost impact of the remaining options compared to option 2 (table 5.6) with option 2 having been applied to the base case (option 1a). Note the options here are shown relative to option 2, which is assumed to be implemented alongside each of the proposed options.

All options lead to some acceleration of the rollout, although this is modest for some options.

Option 4 results in the largest acceleration of the rollout, and also has the lowest costs per ML metered, as the option reduces the ongoing revalidation costs associated with the

metering framework. Options 5 and 6 achieve a similar overall acceleration with somewhat more modest cost savings. Option 3 and 8 see the smallest reduction in terms of rollout timing and cost (chart 5.7 and 5.8).

5.6 Options 4-9 compared to option 3b

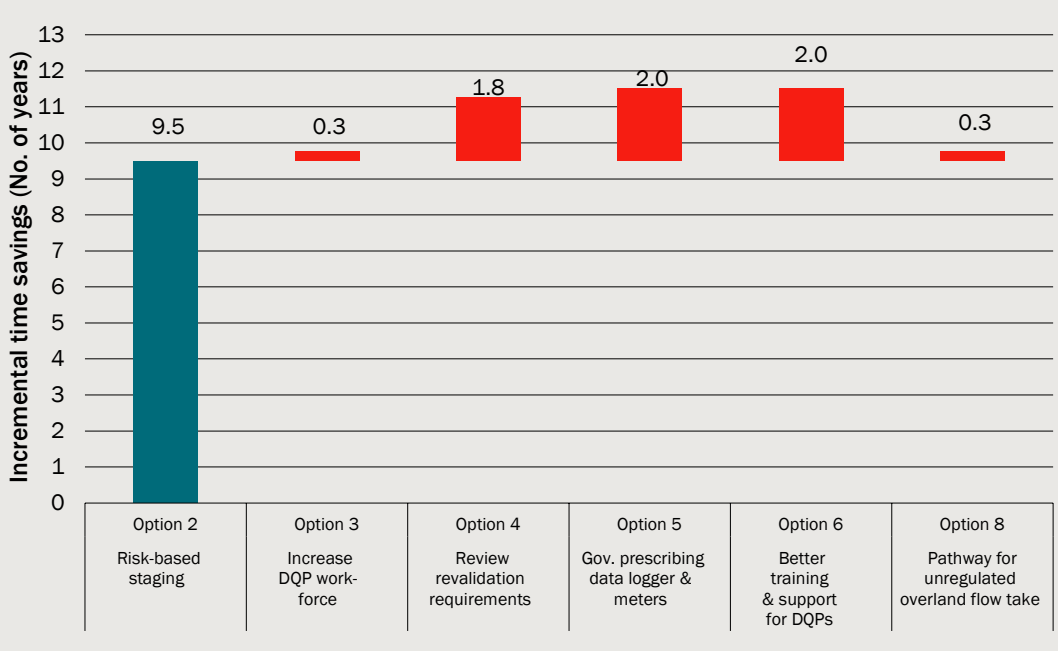
Option	Description	95% of licenced water take metered	Rollout finalised*	Cost savings relative to Option 3b
		Year	Year	$/ML, present value
Option 2	Stage compliance dates based on risk (volume) to smooth demand for DQPs over time & simplify requirements for smaller volume and low-risk works	2031	2042	0.0
Option 3	Increase the DQP workforce by expanding definitions of who can be a DQP	2030	2042	0.2
Option 4	Review maintenance and 5-year validation requirements	2029	2042	4.3
Option 5	Government prescribing which data logger and meters must be used together	2029	2042	1.7
Option 6	Better training and support for DQPs	2029	2042	1.6
Option 8	Amend the Regulation to provide a measurement pathway for unregulated overland flow take	2030	2041	1.5

*Rollout finalised is when all works required to be metered are compliant with the policy.

Note: All options are assumed to be implemented in conjunction with option 2.

Source: CIE.

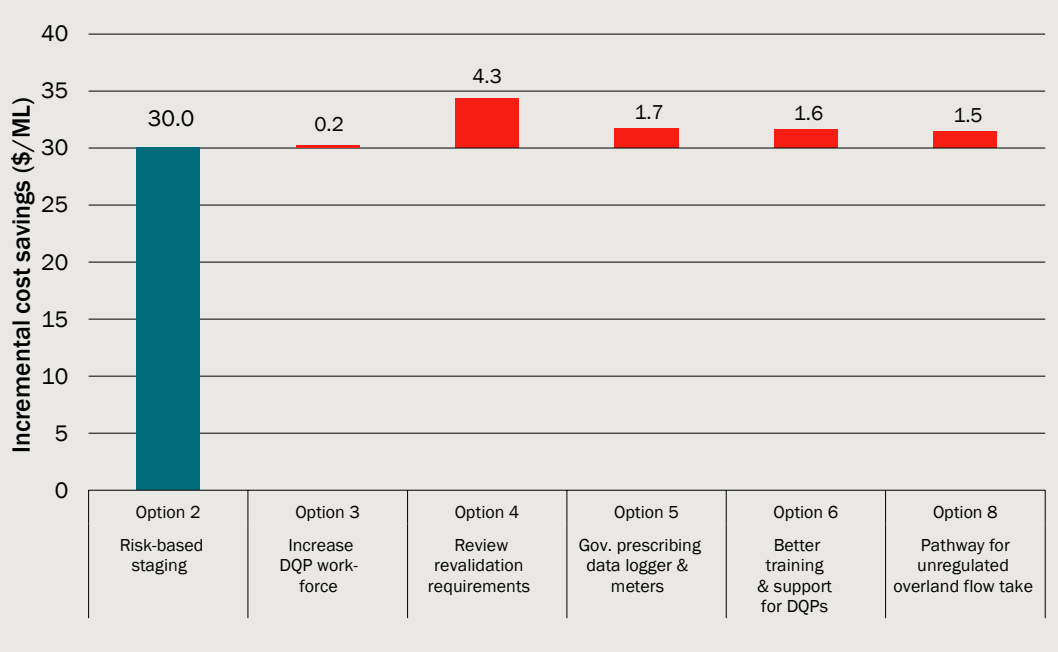
5.7 Timing of options compared to option 1a



Note: All options are assumed to be implemented in conjunction with option 2.

Data source: CIE.

5.8 Costs of options compared to option 1a



Note: All options are assumed to be implemented in conjunction with option 2.

Data source: CIE.

What are the impacts of packaging of options?

Packaging of options was developed by the Water Group, and was assessed for its impact on the timing and cost of the rollout.

The proposed packaged options result in significant cost savings per ML, as well as acceleration of the rollout (table 5.9).

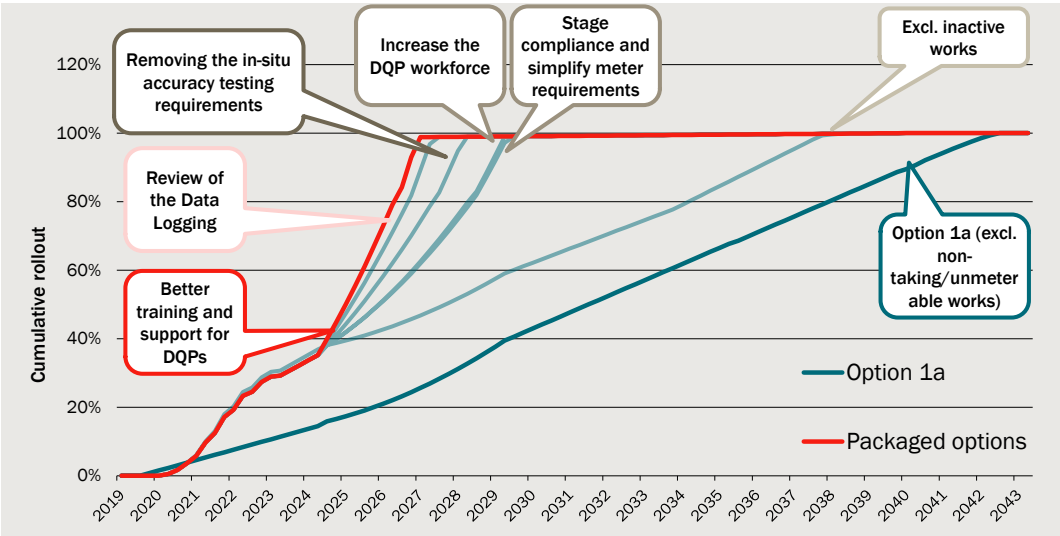
5.9 Packaged options compared to option 1a

Option	Description	95% of licenced water take metered	Rollout finalised	Cost savings relative to Option 1a
		Year	Year	$/ML, present value
Option 1a (Base case)	Excludes non-taking/unmeterable works	2040	2042	0.0
Packaged options	Excludes non-taking/unmeterable and inactive works Combines Options 1b, 2, 4, 3, 5, 4, 5 and 6	2027	2041	36.3

Data source: CIE.

Chart 5.10 shows the cumulative impact of each option within the packaged options.

5.10 Packaged options cumulative rollout timing impact



Data source: CIE.

Distributional analysis

Distributional Analysis is a supplementary component of an economic costing analysis that provides further information to decision makers on how an initiative affects subgroups within society.

Economic cost analysis provides an estimate of aggregated impacts in a specified society, known as the referent group. In the analysis above we have presented the ultimate incidence of all costs as well as the costs that are borne by stakeholders but passed on to water users.

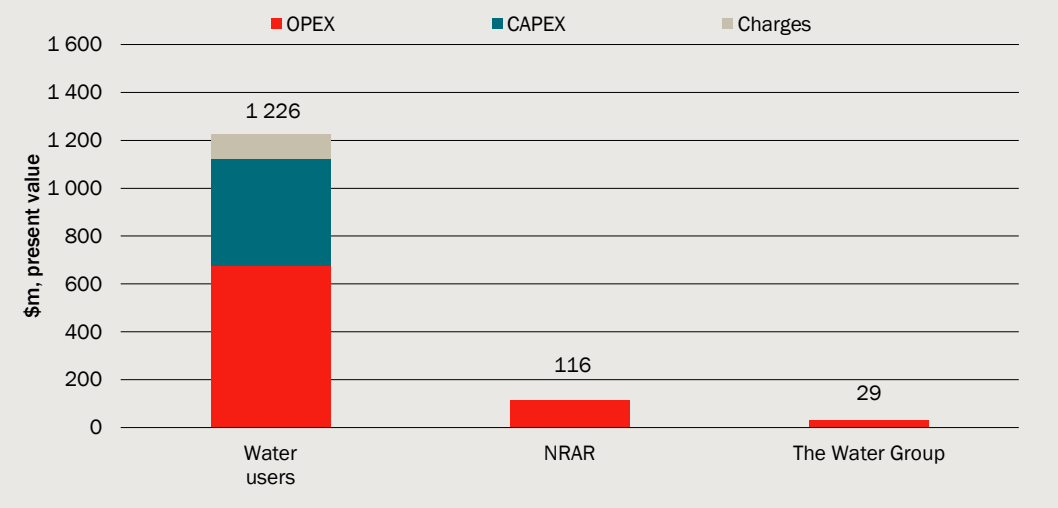
The following stakeholders have cost recovery arrangements in place:

- WaterNSW, which pass costs onto water user. These costs are recovered through the non-urban metering charges set by IPART.
- IAL, which passes costs onto DQPs.
- DQPs who recover their costs from water users (including their fixed cost of certification and re-certification, and travel cost).

Charts 5.11 and 5.12 costs cost for each stakeholder by type of expense in present value terms for option 1a. Note the charts below accounts for transfers between stakeholders, this means that costs borne by WaterNSW, DQPs, and IAL are passed on to water users.

- Water users bear more than 80 per cent of the total program cost.
  - Metering charges, aimed at recovering WaterNSW costs, make up 8 per cent of the overall cost for water users, with capital and operating costs each contributing 36 and 55 per cent, respectively.
- WaterNSW expenses represent approximately 7 per cent of the total rollout cost, with the majority attributed to operating costs.
- NRAR, and the Water Group collectively account for about 9.6 per cent of the total program cost.
- DQPs account for 2.6 per cent of total costs.
- Irrigation Australia, on the other hand, account for less than 1 per cent or total costs.

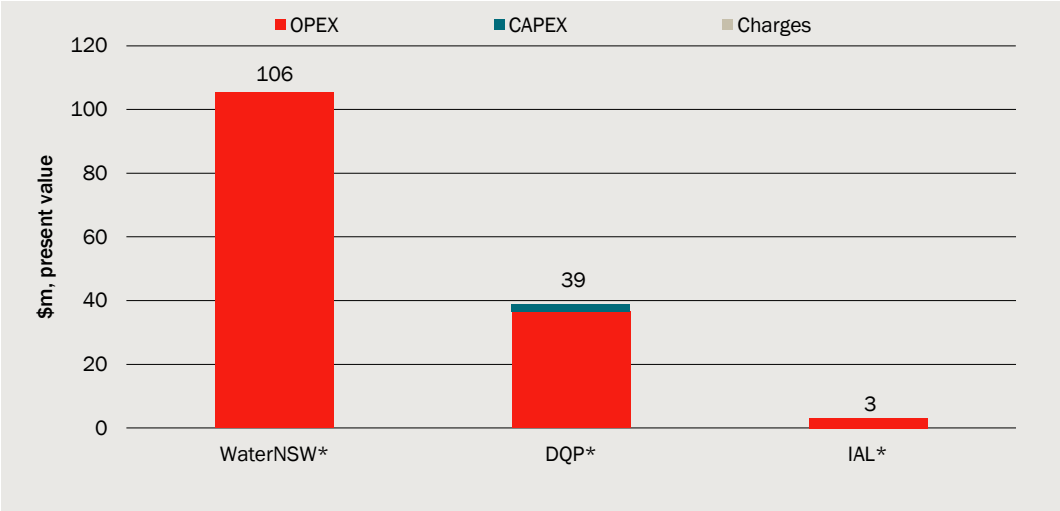
5.11 Total cost by stakeholder in present value terms ($m), Option 1a, 2024-2049



Note: Values have been discounted using a real social discount rate of 5 per cent.

Data source: CIE.

5.12 Cost to stakeholders transferred to water users, present value terms ($m), Option 1a, 2024-2049



Note: Values have been discounted using a real social discount rate of 5 per cent.

Data source: CIE.

The total lifecycle costs by type of expense and are shown in table 5.13. Costs are presented in real present values across selected options (Baseline (NUM Policy), Base case (Option 1a) and the packaged options):

- Cost differences are driven by the timing of the rollout (discounted cost are higher the earlier they are incurred) and the number of works that require a meter. For example, under both packages, low risk water users do not require a meter, lowering the cost substantially.
- Lower operating costs for the packaged options relative to the baseline options are driven by (chart 5.14):
  - less works requiring a meter,
  - reduction in operating costs for water users not required to be compliant with AS4747
  - reduction in capital costs for water users not required to install LIDs or enable telemetry
  - removal of the in-situ accuracy testing,
  - and earlier rollout end date leading to an earlier business as usual for NRAR and the Water Group.
  - Cost for WaterNSW is higher as more costs are accumulated within the same appraisal period.
- While discounted capital and capital replacement cost would usually be expected to be higher for the packaged options, as they deliver the rollout much earlier, this is offset by less works requiring a meter and reduced metering standards and telemetry requirements.

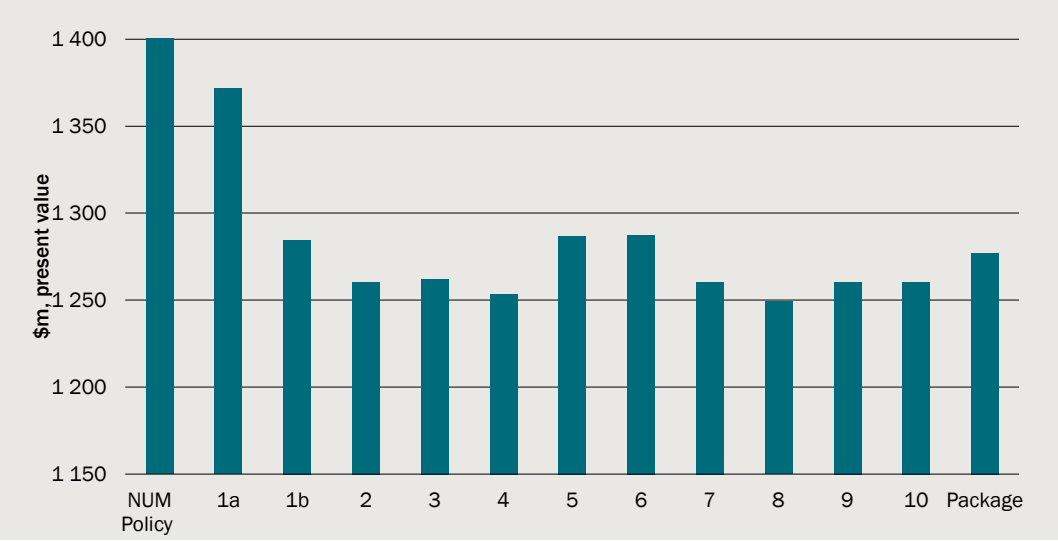
5.13 Total cost by stakeholder ($m, real present value), 2024-2049

		Baseline (NUM policy)	Base case (Option 1a)	Package
		$m, PV	$m, PV	$m, PV
Operating Cost	Water users	676	675	625
	WaterNSW*	108	105	98
	DQP*	39	37	23
	IAL*	3	3	3
	NRAR	129	116	25
	The Water Group	30	29	19
Capital Cost	Water users	466	447	510
	WaterNSW*	0	0	0
	DQP*	2	2	3
Charges	Water users	108	104	98
Total	Water users	1 250	1 226	1 233
	WaterNSW*	108	106	98
	DQP*	41	39	26
	IAL*	3	3	3
	NRAR	129	116	25
	The Water Group	30	29	19
Grand Total	**All**	**1 409**	**1 372**	**1 277**

* Grand total accounts for transfers between rollout stakeholders, and excludes the cost from WaterNSW, DQPs, and IAL as those are borne by the water users.

Data source: CIE.

5.14 Cost for each option by stakeholder in present value terms ($m), 2024-2049



Note: Values have been discounted using a real social discount rate of 5 per cent.

Data source: CIE.

Costs results

Cost results for the options are expressed in terms of cost-effectiveness (cost per ML of entitlement which is metered). The tables below provide cost estimates in different forms, including:

- **Nominal terms** – This is the cost including inflation and represents the cost that has to be paid at time.
- **Real, undiscounted terms** – This is the cost excluding inflation and represents cost in today's dollars.
- **Discounted with sector specific discount rate** – Real costs are discounted using different discount rates for each stakeholder. Discounting reflects the view that a dollar received in the future is worth less than a dollar now (for a consumer) or that a dollar invested today will not be available to invest elsewhere (for an investor). The discount rate reflects the opportunity cost of the resources used and in this case we have used the real cost of capital for each stakeholder.

Total lifecycle cost

5.15 Total lifecycle cost by option

	Nominal	Real, undiscounted	Discounted	Cost effectiveness
	$m	$m	$m, PV	$/ML
NUM Policy	4 060	2 749	1 409	167.2
Option 1a	3 867	2 638	1 372	174.0
Option 1b	3 547	2 435	1 285	164.8
Option 2	3 243	2 276	1 260	143.9
Option 3	3 243	2 278	1 262	143.7
Option 4	3 199	2 250	1 254	139.6
Option 5	3 255	2 296	1 287	142.2
Option 6	3 255	2 296	1 287	142.3
Option 7	3 243	2 276	1 260	143.9
Option 8	3 210	2 254	1 249	142.5
Option 9	3 243	2 276	1 260	143.9
Option 10	3 243	2 276	1 260	143.9
Packaged options	3 190	2 258	1 277	137.7

Source: CIE.

Total lifecycle cost relative to NUM Policy

5.16 Total lifecycle cost by option relative to NUM Policy

	Nominal	Real, undiscounted	Discounted	Cost effectiveness
	$m	$m	$m, PV	$/ML
NUM Policy	-	-	-	-
Option 1a	- 193	- 111	- 37	-6.7
Option 1b	- 513	- 315	- 124	2.4
Option 2	- 817	- 473	- 148	23.3
Option 3	- 817	- 472	- 146	23.5
Option 4	- 861	- 499	- 155	27.6
Option 5	- 805	- 453	- 122	25.0
Option 6	- 805	- 453	- 121	24.9
Option 7	- 817	- 473	- 148	23.3
Option 8	- 850	- 495	- 159	24.8
Option 9	- 817	- 473	- 148	23.3
Option 10	- 817	- 473	- 148	23.3
Packaged options	- 869	- 491	- 131	29.5

Source: CIE

Total lifecycle cost relative to Option 1a

5.17 Total lifecycle cost by option relative to Option 1a

	Nominal	Real, undiscounted	Discounted	Cost effectiveness
	$m	$m	$m, PV	$/ML
Option 1a	0	0	0	0.0
Option 1b	- 320	- 203	- 87	9.1
Option 2	- 624	- 362	- 111	30.0
Option 3	- 624	- 361	- 109	30.2
Option 4	- 667	- 388	- 118	34.4
Option 5	- 612	- 342	- 85	31.7
Option 6	- 612	- 342	- 84	31.7
Option 7	- 624	- 362	- 111	30.0
Option 8	- 656	- 384	- 122	31.5
Option 9	- 624	- 362	- 111	30.0
Option 10	- 624	- 362	- 111	30.0
Packaged options	- 676	- 380	- 94	36.3

Source: CIE

Total lifecycle cost relative to Option 1b

5.18 Total lifecycle cost by option relative to Option 1b

	Nominal	Real, undiscounted	Discounted	Cost effectiveness
	$m	$m	$m, PV	$/ML
Option 1b	0	0	0	0.0
Option 2	- 304	- 158	- 24	20.9
Option 3	- 304	- 157	- 22	21.1
Option 4	- 348	- 185	- 31	25.2
Option 5	- 292	- 138	2	22.6
Option 6	- 292	- 138	3	22.5
Option 7	- 304	- 158	- 24	20.9
Option 8	- 337	- 180	- 35	22.4
Option 9	- 304	- 158	- 24	20.9
Option 10	- 304	- 158	- 24	20.9
Packaged options	- 357	- 177	- 7	27.1

Source: CIE

Cost sensitivity

Table 5.19 reports total cost per ML using a 3 and 7 per cent discount rate sensitivity as per NSW Treasury guidelines.

5.19 Cost per ML by different discount rates

Option	3 per cent	5 per cent	7 per cent
	$/ML	$/ML	$/ML
NUM Policy	186	167	151
Option 1a	195	174	157
Option 1b	188	165	146
Option 2	164	144	128
Option 3	164	144	128
Option 4	161	140	124
Option 5	164	142	126
Option 6	164	142	126
Option 7	164	144	128
Option 8	163	142	127
Option 9	164	144	128
Option 10	164	144	128
Packaged options	160	138	121

A Assumptions

This appendix summarises:

- key data sources
- metering uptake assumptions and how the future rollout is modelled, and
- detailed cost assumptions for each stakeholder.

Data sources

Costs have been collected through targeted consultations with stakeholders. These included:

- The Water Group
- NRAR
- IAL
- WaterNSW, and
- Targeted consultations with DQPs (primarily used to confirm water user cost assumptions).

We have also drawn to some extent on previous analysis undertaken around metering namely:

- Aither, 2018, *Non–urban water metering options for New South Wales: An economic analysis*, prepared for the NSW Department of Industry.

Further information on data used in the analysis is provided in Appendix A.

Metering uptake assumptions

Tables A.1 to A.3 show the total number of works that require a meter under the NUM policy, and the total number of works after accounting for non-taking/unmeterable and inactive works.

A.1 Total number of works under NUM policy

Region	Unregulated	Regulated	Groundwater	Total
	No.	No.	No.	No.

Source: CIE based on data from DCCEEW Water.

A.2 Total number of works excluding non-taking/unmeterable works

Region	Unregulated	Regulated	Groundwater	Total
	No.	No.	No.	No.

Source: CIE based on data from DCCEEW Water.

A.3 Total number of works excluding non-taking/unmeterable and inactive works

Region	Unregulated	Regulated	Groundwater	Total
	No.	No.	No.	No.
Large volume water users (Coastal)	1 953	487	753	
Smaller volume water users	3 074	767	3 839	
Low risk water users	2 233	1 471	1 465	

Note: Low risk water users are exempt from the requirement to install a meter.

Source: CIE based on data from DCCEEW Water.

Table 6.4 outlines the key metrics, assumptions, and data that underpin the metering uptake modelling.

A.4 Key assumptions underpinning metering uptake

Description	Parameter	Assumption / Source
Number of DQPs trained in the future	44.4 per year	Based on number of trained DQPs over the past 5 years (222/5=44.4) (including government staff).
Year until DQPs are trained at the same rate as previously	Until 2040, 44.4 DQPs trained per year after that only half the rate (22.2 per year)	CIE Assumption
Share of DQPs that will remain active and will do installations and revalidations	17 per cent of those trained	Based on historical installation data. This is the share of DQPs that have done at least 10 installations over the past 5 years.

Description	Parameter	Assumption / Source
No. of installations/revalidations per DQP – central case	~35 installations per DQP per year, or ~3 per DQP per month	Based on historical installation data of DQPs that have done at least 10 installations over the past 5 years.
Attrition / Retirement	Active DQPs will remain in the market for 25 years before becoming inactive.	CIE Assumption
Revalidations		Revalidations are subject to additional constraints (i.e. need to be using water to undertake accuracy testing), which may mean that a DQP will not be able to complete accuracy testing at the same rate as installations. In the absence of information on what revalidation rate may be, we assume it is the same as installations, but note this is likely optimistic and further work is required to understand time requirements for DQPs to undertake revalidations.
Entitlement is used as a proxy for licenced water take	Volume of water metered	Water take is required to be metered as per the policy objective, but entitlement is not. However, entitlement is used for the analysis as a proxy for licenced water take as that data is not available. Additionally, 100% of entitlement is not subject to the metering framework and therefore statements to the effect of 95% of entitlement will be metered are incorrect. 95 per cent or 100 per cent metered entitlement refers to the installed meters within scope of the options. Also note that there is some uncertainty as to the total nominated entitlement by work as the entitlement is linked to the water access licence and not the work.
Presentation of results		Our model is set up on a works-level basis, where each work is classified by water user group and assigned an "net entitlement" (based on the number of works linked to the WAL). For the rollout projections, we sum the total number of works/meters by water user group and calculate the total entitlement within each group. Then, we estimate the total number of installations per group, assuming that each work within a group has the same "net entitlement." Once the cumulative entitlement exceeds 95 per cent, we record the date. We use 95 per cent rather than 100 per cent because reaching full rollout among smaller water users would push the end date significantly further into the future.

Source: CIE and CIE based on data provided by WaterNSW and the Water Group.

Key assumptions by option

A.5 Key assumptions by option

Option category	No.	Option	Key modelling assumption
Minimising undue costs of meeting policy	1a	Ensure that metering requirements only apply to works taking water (ex. non-taking/unmeterable works)	▪ Excludes non-taking/unmeterable works based on NRARs analysis. This would see a 15 per cent drop in number of works requiring a meter. ▪ Additional cost ($550 000 over 18 months) for the Water Group to indicate works as inactive. ▪ Changes to the WLS and WAS assumed to be the same as under BAU. ▪ WaterNSW system upgrades to reflect which works require metering and which do not ($300 000 over 18 months). Note this is funded through existing Commonwealth HNRS funds and is assumed to be sunk. ▪ Faster metering roll-out compared to baseline due lowering the number of works requiring a meter (rate of installations unchanged)
	1b	Ensure that metering requirements only apply to works taking water (ex. non-taking/unmeterable and inactive works)	▪ Same as option 1a, but in addition excludes inactive works from metering requirement. This would see a 25 per cent drop in number of works requiring a meter ▪ Faster metering roll-out compared to baseline due to lowering the number of works requiring a meter (rate of installations unchanged)

Option category	No.	Option	Key modelling assumption
Introduce a risk (volume) based approach	2	Stage compliance dates based on risk (volume) to smooth demand for DQPs over time	▪ Water user groups are redefined based on risk with entitlement (share component) volume as a proxy and rollout is staged accordingly: ▪ High risk and larger volume inland water users – Surface pumps equal to or greater than 500mm in size (tranche 1) – Inland works with a cumulative nominating entitlement (share component) of 100ML or greater – No change to meter compliance deadline– targeted compliance to this cohort – AS4747 compliant meters, LID, telemetry and DQP required. ▪ Larger volume water users (Coastal) – Coastal works with a cumulative nominating entitlement (share component) of 100ML or greater – Meter compliance deadline 1 December 2026 – AS4747 compliant meters, LID, telemetry and DQP required. ▪ Smaller volume water users – Inland and coastal holders, cumulative nominating entitlement (share component) of between 16ML to 99ML – Holders who are within at-risk water sources (schedule 9). – Meter compliance deadline 1 December 2027 or work approval renewal date, whichever is later (so out to 1 December 2034) – Pattern approved meter required, no LID or DQP required ▪ Low risk water users – Works which fall below the size-based thresholds (surface water pumps below 100mm and bores below 200mm) or volume-based threshold (15ML or less cumulative nominating entitlement (share component)) – Excludes tranche 1 works or works which take water from at risk water sources – No meter required (reporting requirements still apply) ▪ We assume 20 per cent lower installation and operating cost for pattern approved meter that do not require a DQP for installation and validation.
Addressing DQP shortages	3	Increase the DQP workforce by expanding definitions of who can be a DQP	▪ 10 per cent increase in DQPs, resulting in 10 per cent increase in annual rate of meter installations. ▪ Assume 2 hours of training. ▪ $30 000 cost for DQP competency analysis ▪ $30 000 WaterNSW cost to register DQPs on the DQP Portal ▪ Faster NUM rollout compared to option 2 and 1a.
	4	Review maintenance and 5-year validation requirements	▪ ▪ Initial revalidation now to take place at 10-years post installation and then 5 years thereafter ▪ $50 000 cost for system changes related to re-validation requirement ▪ DQP workforce is not diverted to undertaking 5-yearly revalidations and not involved in time consuming in-situ accuracy testing (instead of 1 in-situ accuracy testing, DQPs can make 4 revalidations). ▪ Faster NUM rollout compared to option 2 and 1a.

Option category	No.	Option	Key modelling assumption
Data logger and telemetry	5	Review of the Data Logging and Telemetry Specifications 2021 and government prescribing which data logger and meters must be used together	▪ Reduction in number of faulty LID installations (mismatch between meter and LID systems). – This is estimated at 4 per cent of installations. We assume that this would translate into a 4 per cent higher installation rate. ▪ 20 per cent increase in installation rate from reduced inefficiencies by improving the DQP Portal and improving the LID registration process ▪ 10 per cent increase in installation rate from providing step by step guidance of how to integrate appropriate meter and LID combinations ▪ Review cost of – $150 000 for technical review of equipment – $100 000 for DQP training material on LID installation (step by step guides) – $120 000 for Review of telemetry specifications/marketplace ▪ Upfront cost of $500 000 and $100 000/annum for WaterNSW ▪ Faster NUM rollout compared to option 2 and 1a.
	6	Better training and support for DQPs	▪ Assume 3 FTE for 2 years (plus contingency) at a cost of $1 million to stand up DQP concierge service for LID installation technical support and water user support ▪ New course material development at $120 000 for the Water Group ▪ 20 per cent increase in productivity that would translate in a 20 per cent increase in installation rates. ▪ $300 000 to improve systems and reduce administrative burden for DQPs. ▪ 10 per cent increase in installation rates from system improvements (in addition to 20 per cent improvement above) ▪ Assume one-hour additional training for DQPs ▪ Faster NUM rollout compared to option 2 and 1a.
Reporting of water take information	7	Water use reporting	▪ Updates reporting and recording rules to streamline and simplify the requirements and ensure the mechanisms for reporting water take are user friendly. ▪ Undertaking targeted compliance action to increase reporting. ▪ Not modelled – likely to reduce costs by only requiring reporting where users take water.
Measuring overland take	8	Amend the Regulation to provide a measurement pathway for unregulated overland flow take	▪ For every installed storage meter this would avoid installation of 6-10 meters. We have used a conversative estimate of 6 meters avoided per storage meter. ▪ There are 110 storage meters across Tranches 2 to 4 ▪ We have assumed that the average meter size is 400mm for the avoided meter. ▪ Cost of $100 000 for system development for alternative forms of take. ▪ Faster NUM rollout compared to option 2 and 1a.
Strengthening compliance	9	Improving provisions for faulty metering equipment	Not modelled – data was not available within the timeframes of this report to model meter faults.

Option category	No.	Option	Key modelling assumption
	10	Clarifying definitions for offence provisions (s. 91I)	Not modelled – NRAR advised cost impacts are likely negligible. Potential for additional costs for WaterNSW associated with increased administrative burden.

Source: CIE.

Modelling assumptions

All quantified cost items are summarised in table A.6, while the majority of the methodology and specific costs can be found in the following section.

A.6 Measured costs

Stakeholder	Metrics	Cost parameter
Water user	▪ Meter and LID installation ▪ Meter and LID replacement ▪ Ongoing maintenance ▪ Revalidation ▪ Non-urban metering reform charges ▪ Residual value of meters and LIDs	See tables A.8, A.9, A.10, A.11, and A.12
The Water Group	▪ Metering & Measurement Staff ▪ Roadshows (two per year) ▪ Other cost expenses associated with the options	▪ $2.3m/annum until >95 per cent of rollout is complete ▪ BAU $1m/annum ▪ $50 000 per roadshow
WaterNSW	▪ Capital cost (GOM) ▪ Operating cost (communications) ▪ Operating cost (service centre and systems) ▪ Operating cost (GOM)	▪ WaterNSW' model for 2021 IPART Determination ▪ IPART Determination 2021 ▪ See table A.13
NRAR	▪ Metering related compliance staff and systems	$11.25m/annum until >95 per cent of rollout (number of works within scope) complete, after that BAU (no included in costing)
IAL	▪ Ongoing maintenance training program ▪ Certification management ▪ Systems to support the total training and certification ▪ Travel cost for training	See table A.14
DQP	▪ Certification ▪ Re-certification (every 2 years) ▪ Travel cost for meter and LID installation ▪ Travel cost for meter and LID replacement ▪ Travel cost for revalidation	▪ $2 500 training ▪ $310 re-certification (every 2 years) ▪ See appendix A, table xx for travel cost administrative burden

Stakeholder	Metrics	Cost parameter
	▪ Administrative burden	

Source: CIE.

Key modelling assumption are summarised in table A.7.

A.7 Model parameters

Assumption	Parameter	Source
Appraisal Period	25 years from Jan-202, aligned to baseline completion date	CIE assumption
CPI forecast	▪ NSW Budget forecast until FY27 ▪ 2.5 per cent thereafter	NSW Government[21]
Real social discount rate	5 per cent	NSW Treasury Guidelines TPG23-08[22]
Real discount rate (sector specific)	▪ Water user/DQP: 6.88 per cent ▪ The Water Group/NRAR: 2.1 per cent ▪ IAL/WaterNSW: 3.7 per cent	▪ Return of capital in agriculture[23] ▪ 10-year NSW Government Bond Rate[24] [25] ▪ IPART real post-tax WACC[26]
Real wage/ infrastructure cost escalation rate	▪ 0 per cent	CIE assumption

Source: CIE.

21 NSW Treasury (2023), *TPG23-08 NSW Government Guide to Cost-Benefit Analysis* https://www.budget.nsw.gov.au/sites/default/files/2023-09/2023-24_01_Budget-Paper-No-1-Budget_Statement.pdf

22 https://www.treasury.nsw.gov.au/sites/default/files/2023-04/tpg23-08_nsw-government-guide-to-cost-benefit-analysis_202304.pdf

23 Based on the CIE CGE model. The return to capital for the agricultural sector is essentially the margin cost of capital by virtue of profit maximisation.

24 We have calculated a real rate of 2.1 per cent based on the average difference between nominal and indexed Commonwealth Government bonds, which gives an estimate of implied inflation.

25 https://www.rba.gov.au/statistics/tables/, table F2.1.

26 IPART (2023), Real post-tax weighted average cost of capital https://www.ipart.nsw.gov.au/sites/default/files/cm9_documents/Fact-sheet-WACC-Biannual-Update-August-2023.PDF

Detailed cost estimation approach

Water User

Meter installation cost vary by size of the respective pump and bore. Costs are based on data provided by WaterNSW and have been adjusted using previous work from Aither[27] and targeted consultation with an active meter installer:

- For each work that requires a meter, the corresponding size is recorded in the dataset provided by the Water Group. We assume that the recorded work size is indicative of the required meter size, although we recognise that this may not always hold. This assumption is based on the general recommendation that the water meter size should match the pump outlet diameter and the associated pipework.[28]

  For works where no size is recorded, typically bores and 'other' works, we have applied an iterative process:
  - First, if the dataset classifies the work as a bore or a pump with a size below a 199mm threshold, we assume a meter size of 100mm;
  - We assume a correlation between gross entitlement and work size. This involves matching the size distribution of pumps and bores[29] to the entitlement distribution for groundwater and surface water.
  - For instance, the median bore size across NSW falls within the 200-299mm range, and the median gross entitlement for groundwater licences is approximately 70ML (for entitlements greater than zero). In such cases, we assume that bores with a gross entitlement of around 70ML will require a 250mm meter.
  - Lastly, for other types of works (e.g., weirs, regulators, diversion channels, etc.), we first match actual installations from the DQP portal. For any work that we cannot match to a size, we assume the lowest cost option.
- For works requiring excavation, we have included the associated costs. The proportion of meters being buried is based on the ACCC's State Water Metering Charges Model.[30]
- Ongoing maintenance cost are between $500 to $1 000 every two years for surface water meters and double for groundwater meters. This is based on previous work from Aither and consultations with a prominent meter installer.

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27 Aither,2018, *Non–urban water metering options for New South Wales: An economic analysis*, prepared for the NSW Department of Industry.

28 Natural Resources SA (2013), *Water metering guide*, https://cdn.environment.sa.gov.au/landscape/docs/mr/samdb-water-metering-guide-gen.pdf

29 This data comes from WaterNSW' IPART submission.

30 ACCC (2013) *State Water's application for ACCC approval/determination of its regulated charges*; State Water Metering Charges Model.xlsx; https://www.accc.gov.au/by-industry/water/water-charge-rules/state-waters-regulated-charges-2014-17-review/application/state-waters-application-for-accc-approvaldetermination-of-its-regulated-charges

A.8 Installation and maintenance cost for meters and LIDs

Pump/ Bore Size	Cost components					Maintenance		Excavation needed
	Meter body cost	Excavator	Labour	Misc Material/ Handling	Total	Surface water	Ground water	
mm	$	$	$	$	$	$/annum	$/annum	Per cent
50 & all other works[a]	850	612	2 928	756	4 796	300	600	43
80[a]	974	620	2 965	766	5 003	300	600	48
100[a]	1 217	625	2 990	773	5 274	300	600	47
150	4 358	798	3 815	986	9 604	378	756	56
200	4 745	814	3 893	1 006	10 115	379	758	58
250	6 641	830	3 971	1 026	11 932	379	758	35
300	7 871	846	4 048	1 046	13 434	381	762	55
350	14 848	863	4 126	1 066	20 570	395	790	61
375	16 840	871	4 165	1 076	22 683	401	802	69
400	18 831	879	4 204	1 086	24 798	401	802	77
450	21 484	1 282	6 132	1 584	30 121	401	802	72
500	24 136	1 685	8 060	2 082	35 712	409	818	85
600	27 157	2 491	11 916	3 079	44 236	414	828	84
650	32 831	2 894	13 844	3 577	52 565	414	828	80
700	37 178	3 297	15 772	4 075	59 538	423	846	76
750	41 526	3 701	17 700	4 573	66 390	452	904	70
800	45 873	3 687	17 635	4 556	70 523	452	904	67
900	50 221	3 660	17 505	4 522	75 908	452	904	100
1000	54 568	3 632	17 374	4 489	80 064	452	904	100
1200	58 916	3 578	17 113	4 421	84 028	452	904	100
1500	65 462	3 496	16 722	4 320	90 000	452	904	100

[a] For meters smaller or equal to 100mm we assume that water users will choose the most cost-effective meter, while for meters greater then 100mm Magflow meters are installed.

Source: WaterNSW, Aither (2018) *Economic analysis Non–urban water metering options for New South Wales*, and CIE in consultation with meter installer.

Tables A.9 – A.11 summarise other costs and parameters in relation to meter and LID replacement cost and revalidation, and water recording:

- Appraisal period is 25 years aligned to the end of the baseline NUM rollout date.
- We assume revalidation and LID replacement happen at the same time every 5 years.
- We include a residual value for both meters and LID at end of the appraisal period.
- We assume that 10 per cent of all LID installations have some errors which results in DQPs coming back on site.
- We assume that each year 1 per cent of meters fail and require replacement.

- Water users are required to record and report monthly, quarterly, annually, or not at all their water take. This depends on the type of set-up they have (e.g., with or without LID or telemetry). This is assumed to have an opportunity cost of $31.18 per hour.[31]
- We assume that looking forward, 80 per cent of all water users will voluntarily install telemetry under the NUM policy and 100 per cent under option 2 for the high-risk and larger volume water users (table A.10).

A.9 Other costs and parameters

Cost item	Note	Parameter

Source: WaterNSW, DCCEEW, Aither (2018) *Economic analysis Non–urban water metering options for New South Wales*, and CIE in consultation with meter installer, Murray–Darling Basin Authority MDBA *Availability of Pattern Approved 'non-urban' Water Meters Including indicative metering requirements for the Basin* https://assets.new.siemens.com/siemens/assets/api/uuid:6aec1879-58dc-4b61-8021-1f985defbbc9/pattern-approved-non-urban-water-meters-august-2019.pdf

A.10 Voluntary telemetry uptake (forward looking)

	NUM Policy	Option 2
	Per cent	Per cent

Source: CIE.

A.11 Water recording and reporting

Type of meter	NUM Policy / 1a / 1b	Revised recommendation (Option 2 onwards)
Meter with LID and telemetry	Not required	Not required
Meter with LID but without telemetry	Monthly – 15 mins	No longer exists
No meter with LID	Annually – 15 mins	Not possible
Meter with no LID (reg)	Didn't exist	Quarterly – 15 mins
Meter with no LID (unreg & GW)	Didn't exist	Annually – 15 mins
No meter, no LID	Annually – 15 mins	Annually – 15 mins

31 ABS 6337.0 Employee Earnings, August 2022, Median Hourly earning Agriculture, forestry and fishing

In addition to the costs presented above, water users have to pay additional charges in relation to the non-urban metering reform. Those charges are based on an IPART determination to recover WaterNSW's costs:[32]

- **Scheme management charge** (all licensed customers): Cost recovery for the scheme management costs which include the wider costs of introducing the reform, such as recording and reporting, customer self-reporting, general enquiries and education. They also include metering scheme management costs such as compliance activities, water take assessments, meter reading and meter data services.
- **Telemetry charge** (per installed meter): Cost recovery of initial site inspection, downloading of LID data (not connected to telemetry) and operation and maintenance of the DAS and DQP portal.
- **Meter service charge** (per GOM): Cost recovery of the costs that WaterNSW incur in upgrading and maintaining existing GOM. This charge is only applied to water users who have a GOM installed on their works.
- The scheme management and telemetry charge are tiered depending on the proportion of *voluntary telemetry uptake*[33]. This gives water users who do not need telemetry an incentive to install telemetry.
  - Note that there will be impacts on the ability to realise the full reduction in scheme and telemetry charges as a result of the review recommendations as these charges are built on the number of works adopting telemetry as opposed to the volume of entitlement metered. The objective reducing the charges is different to the objective of the framework. For this analysis, we assume that water users will have an incentive to install telemetry (see table A.12). Additionally, we consider that if water users do not install telemetry, it will result in additional costs for WaterNSW, which will ultimately be passed on to the water users.

Table A.12 shows the charges for the financial year 2023/24. However, it's important to note that these charges were determined in 2021, assuming that meter installation and compliance would align with the policy and the set completion dates.

- Due to this, we have made adjustments to the charges over time, taking into account the costs we estimate for WaterNSW.

A.12 Non-urban metering reform charges

Proportion of Voluntary Telemetry Uptake	Scheme management charge (per water licence)	Telemetry charge (per meter)	Meter service charge (per meter)	Meter service charge channel (per meter)
	$2023-24	$2023-24	$2023-24	$2023-24
0-25%	82.39	254.73	1 011.21	7 094.3
25%-50%	74.24	234.77	1 011.21	7 094.3
50%-75%	66.08	215.28	1 011.21	7 094.3
>75%	57.91	204.82	1 011.21	7 094.3

Note: Adjusted for inflation. The meter service charge is only applied to water users who have a GOM installed on their works.
Source: IPART *Final Determination WaterNSW Prices for Bulk Water Services from 1 October 2021*, Table 15 to 17

32 IPART (2021), *Final report Review of WaterNSW's rural bulk water prices From 1 October 2021 to 30 June 2025*

33 The share of meters with telemetry that do not require telemetry according to the policy.

WaterNSW

WaterNSW is responsible for the operationalisation and implementation of the metering reform. This means support for water users to help them understand the policies and to work together with the Water Group to test metering and telemetry equipment for use with the framework. In addition, WaterNSW is responsible for the compliance and maintenance of GOMs.

Our approach to estimate total cost to WaterNSW is:

- The cost to operate and implement the NUM are based on the 2021 IPART determination mode. We have adjusted the model to use our baseline metering uptake scenario and extended the models appraisal period in accordance with our completion dates. We have kept most of the parameter assumptions the same, and only adjusted parameters which had a clear link to the original rollout timeframe.
- The total cost to upgrade and maintain GOMs is based on Cardnos's report for the IPART determination.[34] This report outlines the total expected capital and operating cost until the end of the financial year 2024/25 (table A.13):
  - We assume that the GOMs rollout will be compliant and within the set completion dates.
  - Ongoing operating costs of GOM's are assumed to be equal to the meter service charge set by IPART.

A.13 Government-owned meter cost and rollout

	FY22	FY23	FY24	FY25	Total
	$m, 23/24	$m, 23/24	$m, 23/24	$m, 23/24	$m, 23/24
Cost					
OPEX ($23/24)	1.0	2.0	2.5	2.4	7.8
CAPEX ($23/24)	2.8	8.0	4.2	0.4	15.3
Rollout of meters					
Standard GOM	182	38	1776	826	2822
Standard GOM - Cumulative	182	220	1996	2822	
Channel GOM	1	0	12	6	19
Channel GOM - Cumulative	1	1	13	19	

Source: IPART.

Irrigation Australia

IAL undertakes several key activities:

- Initial training and certification of DQPs, and
- Continuing Professional Development and revalidation.

34 Cardno (2021), *WaterNSW's Non-Urban Metering Reform Charges*

Since the rollout of the NUM, 222 DQPs have been certified and registered in the DQP portal. Today, about 184 DQPs are still registered and certified.

Table A.14 shows the cost and model parameters used. Those are mainly based on consultation with Irrigation Australia.

A.14 Cost and model parameters

	Parameter	Source
Maintenance training program	$50 000/annum	IAL
Certification management	0.5 FTE/annum	IAL
Travel cost per training	$3 000	IAL
Systems to support the total training and certification	$100 000/annum	IAL
Systems to support the certification after training ceases	30 per cent	CIE assumption
No. of training per year	5	CIE assumption
Average FTE salary	$145 000/annum	CIE assumption
Average no. of DQPs trained (NSW)	44/annum	CIE assumption based on 222 trained DQPs to date over the course of 5 years

Source: IAL, CIE.

The majority of costs are fixed cost except for the travel cost to conduct the trainings. We have assumed that under the baseline metering DQPs will be trained until 2030. After that IAL will only be responsible for ongoing CPD.

DQPs

A duly qualified person (DQP) is an individual possessing the necessary qualifications, skills, or experience to perform specific tasks related to metering equipment. Under the non-urban metering rules, only DQPs are authorised to install and validate metering equipment, including components like local intelligence devices (LIDs) and tamper-evident seals.

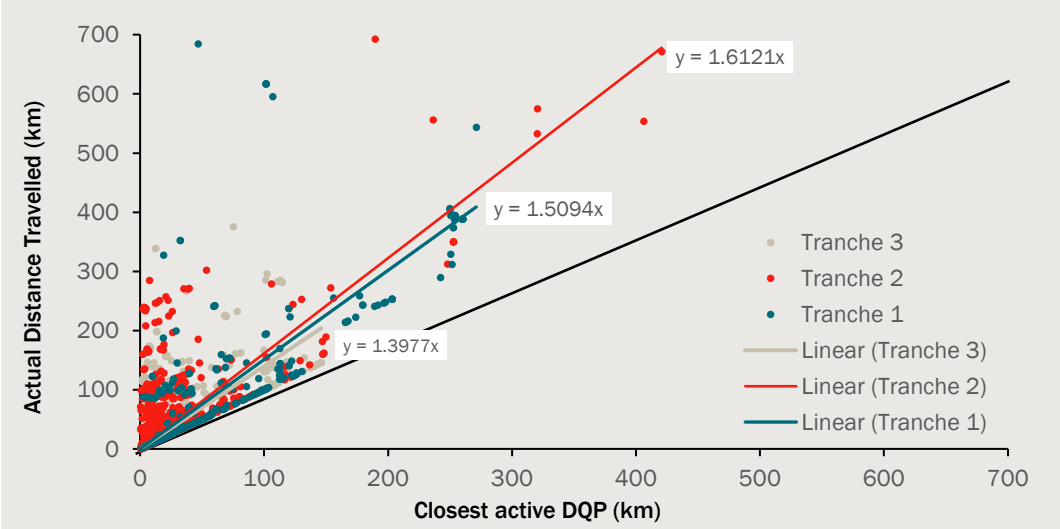
DQPs cost related to the NUM are:

- Certification ($2 500 training course)
  - The total cost for certification is based on the number of DQPs trained per year in accordance with the assumptions in table A.4.
- Re-certification (every 2 years) ($310)
  - The total cost of re-certification is based on the cumulative numbers of DQPs that remain active.
  - Based on the DQP portal only 35 per cent of DQPs have had at least one installation in the past years and only 17 per cent have had at least 10 installations. We have applied this rate to the total cumulative number of registered DQPs to estimate the total number of re-certifications.
- Travel cost to customers for meter and LID installation/replacement and revalidation and administrative burden associated with those.

We have also conducted a travel distance analysis for DQPs based on the installations to date. Chart A.15 shows the distance DQPs have travelled to install a meter (y-axis) versus the distance to the closest active DQP (more than 1 installation):

- Across all tranches we observe that meter installation in generally not conducted by the closest available DQP. We note that one reason could be that during the time of installation the closest active DQP was not registered yet. Data with each active DQP at the time of meter installation is not publicly available.
- On average water users engage DQPs which are 40 to 61 per cent further away than the closest active DQP (this is shown by the formula in the white boxes for each tranche).
  - This observation is in line with an analysis undertaken by NRAR which suggest that the majority on installations is done by a small number of DQPs, usually employed by a company in the irrigation business.
  - Our consultations with a meter installer confirmed this. The meter installer employs three DQPs who travel distance of over 600 to 700 kilometres.

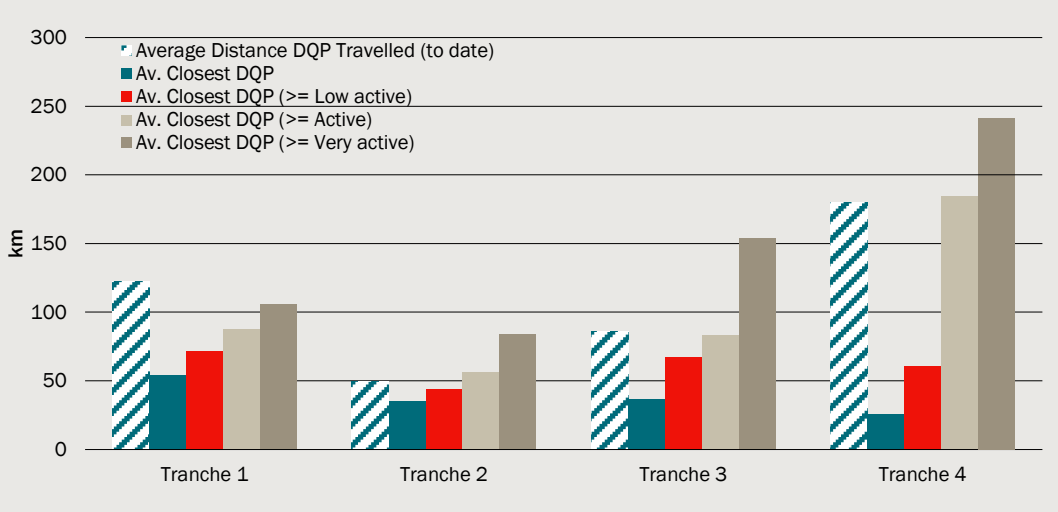
A.15 Actual DQP distance travelled versus closest active DQP



Data source: DQP Portal, The Water Group, CIE.

For the purpose of this baseline costing analysis, we have used the average distance to the closest active DQP (tan bar in chart A.16). This assumes that the current problems are not resolved and only a few active and very active DQPs install the majority of meters.

A.16 Average DQP travel distance



Data source: DQP Portal, The Water Group, CIE.

To calculate the average travel cost per installation we have used the TfNSW economic parameters (table A.17).

Total cost per installation (return trip) are estimated at $100 to $323. The average cost are highest for tranche 4 and lowest for tranche 2.

A.17 Resource cost associated with travel

Metric	Vehicle type	Assumption	Cost
			$/km
Value of time	Utility vehicles	Non-Urban	0.38
Vehicle operating cost	Utility vehicles	Freeway, av. speed 60 km/h	0.32
Capital Cost	Utility vehicles	$50k, 300 000km lifetime	0.18

Note: Inflated to $2023/24 dollars.

Source: TfNSW (2022), *Economic Parameter Values.*

In addition to the travel cost, DQPs have to register each meter in two separate systems. According to our consultations this can be done within an hour. We have valued this using the TfNSW value of time parameter at $34/hour.

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