

Meter Action Plan

August 2020

Our Strategic Outcomes

Safe, skilled, engaged people

Satisfied customers,
trusting partners

Innovation, data and
technology driven services

Sustainable business,
viable customers

Water security and other
water values are recognised



Excellence



Honesty



Accountability



Courage



Caring

Acknowledgement

GMW proudly acknowledges the Australian Aboriginal and Torres Strait Islander people of this nation. We pay our respects to ancestors and Elders, past and present.

GMW acknowledges Aboriginal people as Australia's first peoples, and as the Traditional Owners and custodians of the land and waterways where we work and live.

We recognise and value the ongoing contribution of Aboriginal people and communities to Victorian life, and how this enriches us all.

We recognise that Aboriginal cultures and communities are diverse, and the value we gain in celebrating these cultures and communities.

We acknowledge that the land is of spiritual, cultural and economic importance to Aboriginal people.

We recognise the intrinsic connection of Traditional Owners to Country and acknowledge their contribution in the management of land, water, the natural landscape and our built environments.

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1 Executive Summary

Non-urban water metering has a vital role in Goulburn-Murray Water’s (GMW) management of our precious and limited water resources. The water measurement provided by metering is essential to:

- account for the distribution and use of water;
- support planning and allocation decisions;
- enable compliance with water resource management laws and initiatives like the Murray-Darling Basin cap and sustainable diversion limits under the Basin Plan;
- levy use charges (where applicable); and
- safeguard compliance with entitlement volume, trade or reporting obligations.

This GMW Meter Action Plan (MAP) identifies GMW’s:

- current meter fleet profile relative to the measurement requirements;
- current processes to select, inspect, validate, maintain and replace meters;
- steps to achieve compliance with the *Victorian Non-Urban Water Metering Policy* (March 2020); and
- improvement actions

The key actions committed to in this MAP to support the objectives of the *Victorian Non-Urban Water Metering Policy* (March 2020) are:

Actions	By when	Refer to section
1. GMW will commence automated data reporting of CSP Compliant status with water use data in the Victorian Water Register.	June 2021	2.3.2
2. GMW will collect and analyse relevant data to inform the development of a prioritised investment program. The program will address meters currently assessed as ‘Outside Contemporary Standard’ and resolve the segment reported as ‘Data Validation Required’.	June 2021	2.3.3
3. GMW will install compliant meter and telemetry on the one identified High-Risk site as a priority.	June 2021	2.3.6
4. GMW will develop a business case to assess the feasibility of broadening the application of meter telemetry.	June 2021	2.3.6
5. GMW will develop a risk based strategy to manage metering and compliance on Customer Service Points that are very infrequently used.	June 2021	3.3.1
6. GMW will enhance the standardisation and capture of annual meter inspection data to inform the efficient management of our meter maintenance and compliance obligations.	December 2020	4.4
7. GMW will update GMW’s Asset Class Management Plan for Customer Service Points	December 2021	4.9.2

This MAP:

- is linked to GMW strategies including: GMW’s Asset Management Strategy, GMW’s Service Strategy, GMW’s Investment Framework and Water Theft Compliance and Enforcement Plan; and
- will be continually be reviewed and updated.

2 Overview and Background

2.1 Introduction

Goulburn-Murray Water (GMW) and our customers face significant sustainability challenges. These challenges arise from reduced water availability due to a drying climate, water recovery programs and water markets transferring water away from our operating area.

GMW is responding to these challenges. GMW's:

- vision of 'Delivering for our region and our future' recognises the significant role GMW has in contributing to the prosperity of our region and our customers
- core values of Excellence, Honesty, Accountability, Courage and Caring, will form the foundation of our success
- strategies and practices will adapt GMW to this changing world

Water is a precious but limited resource. Our regional communities, industries, economy, land and waterways depend on water to support a healthy environment and for our region to grow and prosper.

Water measurement is essential to account for the distribution and use of water. It supports planning and allocation decisions and enables compliance with water resource management laws and initiatives like the Murray-Darling Basin cap and sustainable diversion limits under the Basin Plan.

Meter data can also be used to levy charges and to safeguard compliance with entitlement volume, trade or reporting obligations. Meters used for water measurement need to meet design, installation and maintenance standards to make sure they provide accurate and reliable data.

GMW, our customers and community will work together to protect our precious water resources.

This Plan is a living document, with ongoing review of timing and sequencing to incorporate changes in business requirements, technology advancements and ensure constant alignment with our Business Vision – *"Delivering for our Region and our Future"*.

2.2 Plan Framework

2.2.1 Purpose

This GMW Meter Action Plan (MAP) identifies GMW's:

- current meter fleet profile relative to the measurement requirements;
- current processes to select, inspect, validate, maintain and replace meters;
- steps to achieve compliance with the *Victorian Non-Urban Water Metering Policy* (March 2020) in a staged approach to align with GMW's Asset Investment Strategies; and
- improvement actions

GMW's Statement of Obligation (SoO) requires GMW to develop a MAP.

2.2.2 Meter Action Plan Content

This plan includes information on the following components.

Background and Business Context	Current metering obligations, GMW's objectives, current metering fleet profile and actions to support achievement of GMW's metering obligations.
Processes to assure accurate meters	Meter selection, installation, commissioning and on-going maintenance, validation and verification of meters.
Meter data management	Overview of data collected and the systems and databases used to transfer and store data
Meter fleet profile	Detailed analysis of current metering fleet and telemetry
Meter investment plan and finances	GMW Investment Framework and GMW's 2020-2024 Pricing Submission (approved by the Essential Services Commission) which outlines planned operating and capital expenditure.
Compliance provisions	Certified staff and training requirements
Meter statistics	Current status and projected position

2.3 Background

2.3.1 Statement of Obligations and the State policy

Section 7-4 of the Statement of Obligations Department of Land, Water and Planning (DELWP) 2018 requires Victorian water corporations that undertake non-urban metering to do so in accordance with the Victoria Non-Urban Metering Policy and Implementation Plan.

Appendix A provides a link to the *Victorian Non-Urban Water Metering Policy* (March 2020). This sets the requirements for Water Corporations to meet the national Metrological Assurance Framework (MAF) for metering.

Under the Policy, the State has issued Guidelines for the development of Meter Action Plans. The Policy and guidelines identify the circumstances where the metering requirement can be varied. In summary, the primary circumstances where the metering requirement may be varied, relevant to GMW, include where:

- use is below a nominated 'low-use' threshold;
- the cost of metering is disproportionate to the benefits;
- the take is from an irrigation drainage system; or
- the take is authorised under a registration farm dam license

The Victorian Non-Urban Water Metering Policy lists all of the circumstances where the metering requirement can be varied.

2.3.2 Metering objectives

GMW's metering objectives align with the *Victorian Non-Urban Water Metering Policy* (March 2020).

Those objectives are:

- To encourage comprehensive metering of Non-Urban water extraction in a way that is consistent with risk to water resources
- To provide for water take to be measured accurately and reliably
- To provide that meters installed are accurate and well maintained
- The benefits of water measurement outweigh the costs

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- To improve reporting by linking the meters compliance data with water use data in the Victorian Water Register (VWR)
- Mandatory requirements and resources are targeted to higher risk users (that is those that have a greater capacity to take water) and high-risk water systems

In addition to these objectives, GMW will monitor and analyse meter data using its Asset Management Information System (Maximo) to:

- ensure meters used to measure water take are auditable, verifiable and accurate;
- capture information to support GMW's categorisation and compliance of the meter fleet;
- identify measurement risks through the capture of maintenance and fault reporting; and
- develop investment strategies to prioritise non-compliant meter replacement and upgrade programs

Action 1 GMW will commence automated data reporting of CSP Compliant status with water use data in the Victorian Water Register.

2.3.3 Metering fleet profile and categories

The metering standards for non-urban water are specified for two main categories of meters:

- full flowing pipe meters; and,
- open channel meters

GMW manages metering devices across the following customer groups:

- Gravity Irrigation : includes 6 gravity Irrigation Areas
- Pumped Irrigation - includes 3 pressurised piped irrigation systems
- Diversions - includes natural carrier resource services listed as Regulated, Unregulated and Groundwater.

GMW's metering fleet primarily is made up of full flowing (closed conduit) meters and a limited fleet of open channel meters. GMW also has some large bulk offtakes that utilise stream gauging metering technologies as no AS4747 compliant meters are available for these flows and outlet sizing.

The table below provides a summary of the number and location of GMW's 39,464 Customer Service Points.

Table 1: GMW Metering Fleet per service

GMW Total Metering Fleet per Service	
Service Name – Area	Customer Service Points
Gravity Irrigation	
Murray Valley	3,273
Shepparton	3,866
Rochester	6,971
Central Goulburn	3,093
Loddon Valley	1,824
Torrumbarry	4,558

Pumped Irrigation	
Woorinen	303
Nyah	528
Tresco	318
Diversions	
Regulated	4,155
Unregulated	3,870
Groundwater	2,140
Undefined	
Data Validation Required	4,565
Total	39,464

The *Victorian Non-Urban Water Metering Policy* (March 2020) provides direction for the categorisation of meters to assess compliance and meter requirements. Table 2 and Table 3 provide an overview of this direction. The categorisation is an important step in standardised reporting. GMW will update our Asset Information Management System to enable data to be captured consistent with the Policy.

Table 2: Non-urban water meter compliance codes

Compliance category	Code	Description
Compliant	AS	Pattern approved meter, installed by a certified installer, complies with the AS4747 standard and has a certificate
Contemporary (also called Interim)	CO	A meter that can operate within the maximum permissible error of +/-5% under in situ conditions and provides for on-going validation. This would include pattern approved meters that fail to meet all the requirements of AS4747.
Outside contemporary standard	OT	All other measurement devices that are unable to meet validation requirements. These devices may or may not measure within the accuracy standards.
Unmetered	UM	Unmetered

Table 3: Non-urban water meter requirement codes

Requirement	Code	Description
Accurate meter required	AM	Site is to have a maximum permissible error of +/-5% under in situ conditions
Exempt - outside scope	EXOS	Exempt as water use is for D&S licence, drain diversion licence, stormwater, meters managed by other Water Corporations
Exempt - low use	EXLU	Below the threshold for high accuracy meters
Exempt - high cost	EXHC	Disproportionate cost to benefit. This may be due to extra costs required to overcome technical challenges such as iron bacteria in groundwater

Requirement	Code	Description
		causing changes to flow patterns outside the meter requirements. The benefit assessment would consider the use volume together with the management objectives for the water resource area.
Exempt - supply system change planned	MO	Meter is located within an area planned for modernisation or reconfiguration and the meter upgrade, relocation or removal will be part of modernisation or reconfiguration.

To enable an assessment of GMW existing metering fleet against the new meter compliance categories, GMW have mapped our existing data based on the following table.

Table 4: Mapping of existing GMW compliance categories

Existing GMW Compliance Category	New Compliance Category (as per Policy)
Compliant	Compliant
Interim	Contemporary (also called Interim)
Exempt, Non-Compliant	Outside contemporary standard
	Unmetered
Data Validation Required	

The following tables summarise the compliance assessment status of GMW's existing metering fleet.

Table 5: Current total metering fleet compliance assessment

Compliance Type	Customer Service Points	Fleet %
Compliant	661	1.7%
Contemporary (also called Interim)	14,330	36.3%
Outside contemporary standard (Exempt)	16,426	41.6%
Outside contemporary standard	3,537	9.0%
Data Validation Required	4,510	11.4%
Grand Total	39,464	100.0%

Table 6 represents GMW's non-urban metering fleet with the removal of service points which are exempt under the 'low use, low risk' threshold in the *Victorian Non-Urban Water Metering Policy* (March 2020).

The data in Table 6 over page is the primary focus of this Metering Action Plan.

Table 6: GMW Metering fleet excluding identified exempt customer service points

Compliant Type	Customer Service Points	Fleet %
Compliant	661	2.9%
Contemporary (also called Interim)	14,330	62.2%
Outside contemporary standard	3,537	15.4%
Data Validation Required*	4,510	19.6%
Grand Total	23,038	100.0%

* GMW needs further data and analysis to categorise

Table 7 combines GMW’s assessment of the meter Compliance Category, the meter requirements code, the number and total usage through Customer Service Points in each category.

Table 7: Cross reference of Compliance Type vs Average annual usage

Compliant Type	Compliance Category	Meter Requirements Code	Customer Service Points	Average Annual Use (4 year Ave) (ML)	Average Annual Use (4 year Ave) %
Compliant	AS	AM	661	65,109	3%
Contemporary (also called Interim)	CO	EXHC	14,330	1,273,603	64%
Outside contemporary standard	OT / UM	AM / EXOS / MO	3,537	187,968	10%
Outside contemporary standard (Exempt)	UM/OT	EXOS	16,426	374,755	19%
Data Validation Required	OT	AM or EXOS	4,510	74,607	4%
Total			39,464	1,976,042	100%

GMW will continue to update the information in these tables based on GMW’s progressive assessment and data validation processes.

Table 7 identifies that GMW’s non-urban metering fleet consists of:

- 39,464 service points with a 4-year average usage (take) 1,976,042 ML per annum.
- 67% (1,338,712 ML) of the overall average annual take is via either a Compliant or Contemporary meter.
- 19% (374,755 ML) of the average annual usage is primarily domestic and stock (D&S) outlets. These outlets are:
 - exempt under the *Victorian Non-Urban Water Metering Policy* (March 2020)
 - managed under GMW’s Measuring of Water Not by Meter Policy and Procedure: GMW’s Water Theft Compliance and Enforcement Plan (August 2020) includes an action that this Policy and Procedure will be reviewed by June 2020. Please note that a proportion of GMW’s D&S service points are metered. These points are metered to ensure GMW’s deeming practice and methodology is robust. GMW will continue to:
 - review the risk around these exempt service points

- o elect to install meters where appropriate providing the installation or replacement of meters does not result in disproportionate costs from the potential benefits.
- sites assessed as Outside Contemporary Standards (10%) and Data Validation Required (4%) which are the subject of actions within this MAP.

The following additional GMW meter fleet information supports the compliance categorisation of these meters:

- 661 meters compliant with AS4747 (AS) requiring no further action (outside of ongoing maintenance and validation requirements)
- 14,330 contemporary meters (CO): GMW installed these meters:
 - o consistent with the Australian Technical Specification *Meters for non-urban water supply* (ATS4747)
 - o before the release of *Victorian Non-Urban Water Metering Policy* (March 2020) which requires use of AS4747 Meters for Non-Urban Water Supply
 - o to approved GMW meter designs and fleet tested against the national metering standards to provide an acceptable level of confidence that measurement performance under insitu conditions is within a maximum error of $\pm 5\%$, no further action will be taken with this segment of the fleet at this stage (outside of ongoing maintenance and validation requirements).
- 3,537 meters are assessed as 'Outside contemporary standard'. Of these:
 - o 2,698 (84%) have used less than an average of 50ML per year over the last 4 years
 - o 463 (13%) have used 100 ML or above per season over the last 4 years,
 - o 282 (8%) are located in the GMID and are candidates for treatment as part of the remaining Connections Modernisation Project or future water efficiency modernisation projects (subject to Government approval)
 - o 182 (5%) are located within the Diversions business and will be reviewed and prioritised to enable GMW to commence an upgrade program in Water Plan 5 capital metering program. Priority will be placed on the capital meter replacement of 13 Diversions sites which use >1000 ML annually.

Action 2: GMW will collect and analyse relevant data to inform the development of a prioritised investment program. The program will address meters currently assessed as 'Outside Contemporary Standard' and resolve the segment reported as 'Data Validation Required'.

2.3.4 Availability of pattern approved meters

The National Measurement Institute (NMI) maintains the register of pattern approved meters and meters that are in the process of seeking pattern approval. Often the NMI approves a family of meters in the one NMI document, and this covers a meter-model over a range of sizes.

The list of meters is available at the (National Measurement Institute, 2019) website.

The Murray Darling Basin Authority provides a useful summary of all the meters with pattern approval and meters in the process of seeking pattern approval on their web site.

2.3.5 Availability of certified meter installers (CMI) and validators

Irrigation Australian Limited (IAL) provides training and certificates for Meter Installers and Validators (Irrigation Australia, 2019).

GMW has developed internal training modules for servicing, maintaining and testing our metering fleet assets. This includes frontline maintenance and service technician staff

undertaking certification via the IAL training and assessment program. All staff who complete this training are then added to GMW's CMI Register and provided with specific coded seals and pliers to seal meters on completion of maintenance and compliance checks.

Appendix B - Lists GMW staff and contractors that are Certified Meter Installers and Validators.

2.3.6 Telemetry

The specification of telemetry is outside the scope of the metering standard AS4747. The standard does contain some in-direct reference to telemetry for in-situ volumetric testing.

The *Victorian Non-Urban Water Metering Policy* (March 2020) requires that any individual site using >5,000ML annually (defined as High-risk take) to be equipped with a compliant meter and telemetry. GMW has identified:

- one site which takes >5,000ML annually. This will be prioritised for a meter and telemetry installation.
- a further 3 sites have been identified as taking >3,000ML annually: GMW will further investigate these sites to determine the benefits of prioritising these into the capital telemetry investment plan.

GMW over the last decade has implemented an extensive network of telemetry meters as part of various Modernisation programs. These programs have been focused on the upgrade of infrastructure in our Gravity Irrigation Areas. Our current telemetry standards (for the Gravity Irrigation Areas) are detailed in our Modernisation Principles.

GMW recognises the benefits of Telemetry in supporting the objectives of the *Victorian Non-Urban Water Metering Policy* (March 2020). GMW will develop a business case to explore the feasibility of broader adoption and implementation of telemetry across the metering fleet. Where appropriate the agreed telemetry standards will be specified in our Asset Class Management Plans.

The business case will explore appropriate site prioritisation and implementation options to ensure that customer price impacts are carefully considered.

Action 3: *GMW will install compliant meter and telemetry on the one identified High-Risk site as a priority.*

Action 4: *GMW will develop a business case to assess the feasibility of broadening the application of meter telemetry.*

3 Business Context and Levels of Service

3.1 Water resource management areas

GMW assesses our metering fleet across the following Water Resource Management areas.

3.1.1 Gravity & Pumped Irrigation

Gravity Irrigation includes 6 Gravity Irrigation Areas: Murray Valley, Shepparton, Central Goulburn, Rochester, Loddon Valley and Torrumbarry.

This gravity irrigation system has received significant investment in modernisation over the last 15 years through major externally funded programs including the Shepparton Modernisation Project and the Connections Project.

Pumped Irrigation includes Woorinen, Tresco and Nyah. Many sites within these Districts were the first to have modernised electronic meters installed. These are pressurised pipeline systems with main extraction points from either the Murray River or Torrumbarry gravity system. Woorinen and Nyah have planned projects to upgrade bulk offtake (extraction) meters.

3.1.2 Diversions - Regulated Surface Water

GMW's Diversions Business Unit (Diversions) manages extraction from all of the key major river systems within the 68,000 square kilometre footprint. These include the Ovens, King, Mitta Mitta, Goulburn, Broken, Murray, Campaspe, Loddon and Bullarook regulated river systems, and the associated storages within.

The regulated system has a mixture of metering assets that range from local read mechanical meters through to contemporary electronic metering devices. While the works (pump/suction/delivery) associated with the extraction of water from regulated rivers and storages is owned by the customer, the meter and emplacement is the responsibility of GMW to maintain and operate. The costs to perform maintenance and replacement activities are recovered through annual customer fees and charges.

3.1.3 Diversions Unregulated Surface Water

GMW is responsible for the issuing of S.67 (works) and s.51 (take & use) licenses for customers who extract from unregulated streams within its area of management.

GMW have developed Local Management Plans (LMP) that clearly articulate the rules that apply to extraction from unregulated streams. The LMP's articulate the specific attributes of each stream, the compliance points where monitoring occurs, and the various flow regimes at which rostering and restrictions are enforced.

Similar to that of the Regulated Surface Water and the Groundwater customer categories, the existing meter fleet is made up of a mix of interim standard mechanical, and contemporary electronic meters. Historically, the total annual extraction from the unregulated streams is around 30 percent of the total licence volume held.

3.1.4 Diversions Groundwater

GMW issues S.67 (works) and s.51 (take & use) licenses to customers who extract groundwater resources within GMW's operational area.

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There are 17 groundwater units that are intensely managed within Water Supply Protection Areas or Groundwater Management Areas. Customers who hold licences outside the intensely managed groundwater areas are considered unincorporated.

There are additional challenges in effectively metering groundwater extraction due to the varying water quality because of higher salinity levels and the presence minerals within the water. The life expectancy of metering assets within the groundwater customer group is less than similar assets in surface water installations.

The existing meter fleet is made up of both mechanical and electronic meters, with funding to replace and maintain the assets recovered fully from customer's annual fees and charges.

3.1.5 Average usage by Resource Area

The following table provides a summary of the average (calculated over 4 year period) usage within each of the Water Resource areas described.

Table 8 – displays Resource source vs annual usage (4yr avg.) vs No. Service Points

Resource Source	Usage Volume Avg (ML)	Number of Service Points
Goulburn Murray Irrigation Districts - Gravity Channel System	1,109,303	25,778
Regulated Surface Water	584,976	4,156
Unregulated Surface Water	30,871	3,871
Groundwater	120,048	2,146
Data Validation Required	130,841	3,499
Grand Total	1,976,039	39,450

3.2 Strategic plans affecting metering

3.2.1 Irrigation modernisation plans

Connections Project

The Connections Project is currently operating throughout Goulburn-Murray Water's (GMW) Gravity Irrigation system. The Project has installed the majority of modernised contemporary and compliant Customer Service Points within the current GMW Metering Fleet. The Project will be delivered by October 2020.

Capital Investment Plan

GMW will re-evaluate the Gravity Irrigation system on the completion of the Project to understand the remaining scope for metering programs. GMW will include the results of this re-evaluation in the development of its forward capital investment plan.

Water Efficiency Program

GMW and the Victorian Government have identified further Water Efficiency Project (i.e. separate to the Connections Project) opportunities. The proposal is currently in the engagement phase to confirm the ability for the project to achieve positive or neutral socio-economic

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outcomes prior to determining whether it should be submitted for consideration through the Commonwealth Government's \$1.5B Water Efficiency Program.

The proposed scope of the Water Efficiency Project (Project) includes modernisation and rationalisation works across the Gravity Irrigation Areas. The Project is expected to benefit approximately 1,000 customers by modernising or decommissioning more than 250 km of channels and upgrading or rationalising more than 1,000 customer service points.

Water Plan 5

GMW has allocated and approved capital funding within Water Plan 5 to replace failed non-compliant Service Points to meet the *Victorian Non-Urban Water Metering Policy* (March 2020). Please refer to Section 5 for more detail.

3.2.2 Irrigation reconfiguration plans

GMW has included the requirements and direction contained within the *Victorian Non-Urban Water Metering Policy* (March 2020) within the scope of development of proposed Modernisation programs and GMW Capital works.

GMW has developed an extensive data driven (Channel x Channel) tool to assist in risk based planning in the Gravity Irrigation Areas. The tool supports appropriate asset investment decisions based on a range of localised factors.

The direction provided through GMW's Meter Action Plan ensures that as asset reconfiguration/replacement works are being planned the requirements to satisfy metering obligations are incorporated.

3.3 Management priorities for metering and telemetry

In determining priorities for metering and telemetry, GMW will have regard to the following.

GMW will ensure its measurement of water used by customers is:

- appropriate;
- consistent with the National Framework for non-urban metering;
- consistent with the Victorian State Implementation Plan (VicSIP) and the Victorian Non-Urban Water Metering Policy (March 2020);
- meets regulatory obligations; and
- is cost effective taking into account associated risks

GMW's Measurement of Water Use Policy (Appendix C) is supported by the following documents:

- Measuring Water Not by Meter Policy (Appendix D)
- Measurement of Water Use Guidelines (Appendix E)
- GMID Modernisation Principles (Appendix F)

GMW's Management documents that will support the implementation of Non-Urban Metering Policy include:

- GMW's Corporate Plan
- GMW's Water Plan 5 (Price Submission) approved by the Essential Services Commission (ESC)
- GMW's Compliance and Enforcement Framework
- GMW's Asset Management Policy

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- GMW's Risk Management Policy
- GMW's Statement of Obligations

Meter compliance programs will be determined by assessing risks across the non-urban metering systems and prioritised consistent with the below planning and assessment criteria:

- Cost/benefit analysis – MAF Risk Framework
- Asset Class Management Plans
- Automation and reconfiguration program opportunities
- Addressing non-urban High Risk sites

3.3.1 Local water management plans

As per the Victorian Non-Urban Water Metering Policy (March 2020) Local Management Plans play an important role in determining whether metering exemptions are applicable.

GMW's Groundwater Management Plans are available by accessing the following link <https://www.g-mwater.com.au/water-resources/ground-water/management>

Please note that most (if not all) of GMW's plans refer to licensed bores being required to be metered. However there are some licensed bores within the plan areas which are not metered because the cost is prohibitive or the individual site uses <20ML annually.

GMW's unregulated Local Management Rules are available by accessing the following link <https://www.g-mwater.com.au/water-resources/surface-water/unregulated-local-management-rules>

Unregulated catchments are experiencing some form of change because of climate variation. Each managed stream has a Local Management Rule. These generally do not stipulate metering requirements, but do identify the trigger flows at which rostering and restrictions are applied.

Some of the streams in the Western region have not been off suspension for a several years due to low/no flow. A risk based management strategy will be developed to manage metering and compliance on Customer Service Points that are very infrequently used (i.e. the Bullock Creek has been dry for 3 years).

Action 5: GMW will develop a risk based strategy to manage metering and compliance on Customer Service Points that are very infrequently used.

The Shepparton Irrigation Region Groundwater Management Area otherwise known as Shepparton Shallow has a dedicated resource management plan as it is exempted from the National Metering Standards. A copy of the Management Plan is available by accessing the following link <https://www.g-mwater.com.au/water-resources/ground-water/management/sheppartonirrigationregiongma>

3.4 Levels of Service for customers, government and regulators

GMW customers can access all their water license and usage details via the Waterline website customer portal. This service allows customer to see their usage statements, place orders, see pending or operating orders and contact planners for further assistance.

This web service also provides customers with the ability to enter their own meter readings if they have a local read meter. Readings can be entered within a certain level of tolerance to protect against incorrect and/or false meter readings. Anything outside of a pre-set tolerance will be referred to GMW for a field verification reading.

GMW is required to comply with government reporting policy requirements that includes financial and performance reporting to a range of stakeholders. These reports include but are not limited to:

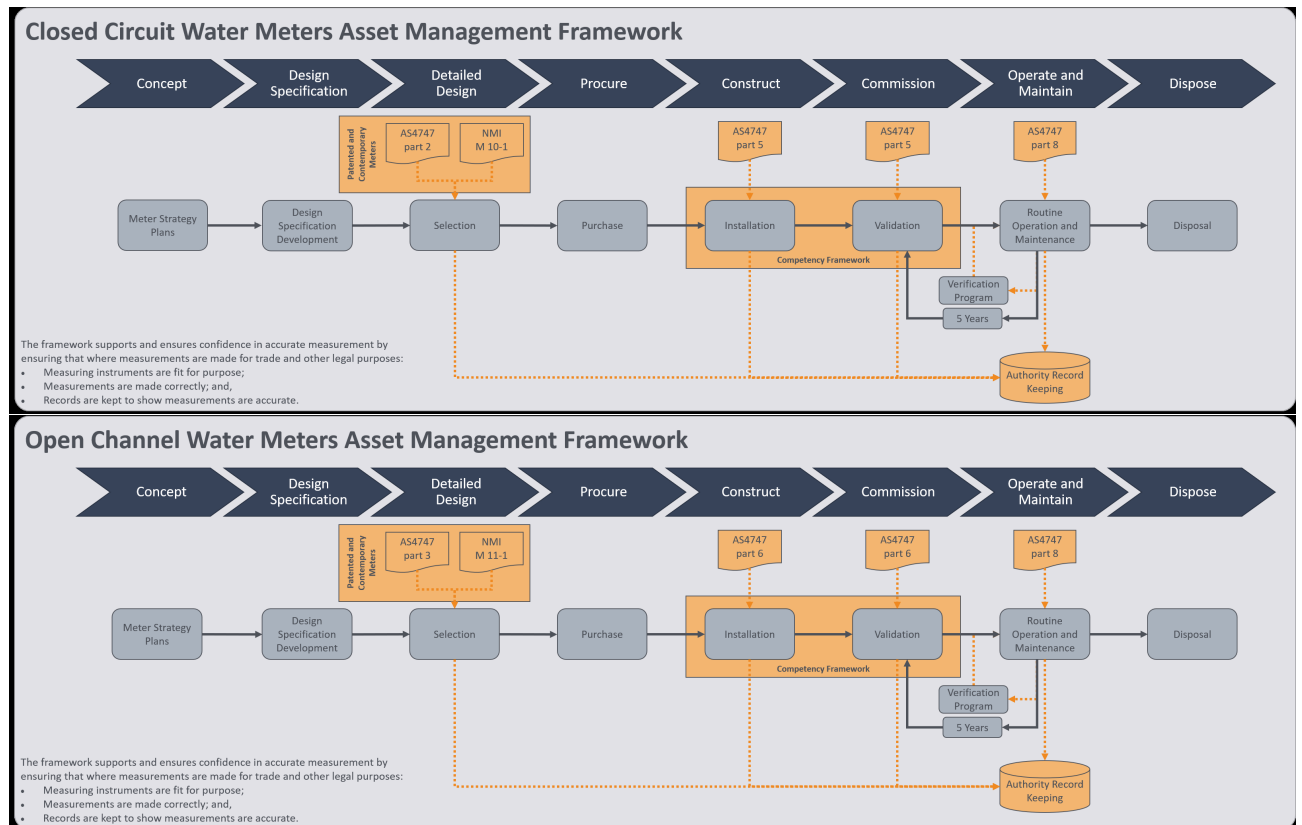
- GMW Annual Report
- Financial Management Act Attestation
- Asset Management Accountability Framework Attestation
- ESC Pricing Submission
- Water Planning and Management Information
- Bulk Entitlement Compliance

4 Meter Lifecycle Management

The meter lifecycle management plan details how the organisation plans to manage and operate its meters at the agreed levels of service while optimising life-cycle costs.

4.1 Overview of meter lifecycle management

The following life-cycle diagrams show the main steps from developing Meter Action Plans through to disposal. The diagram shows the links with national standards.



4.2 Meter selection

4.2.1 General selection requirements

GMW's Measurement of Water Use Policy and Procedure ensures that all new installations of non-urban metering is to meet AS4747 standards (including the use of a Pattern Approved Meter), have an approved design plan/drawing and is fit for purpose. This direction will meet all the of the metering standards assurance framework detailed in the MAF table below:

Table 9 - Assurance framework for non-urban water meters

Requirement	Documents
Overall measurement requirement	Measurement Assurance Framework [2009]
Measuring instruments are fit for purpose	NMI M 10 for full flowing pipe meters [2010] and NMI M 11 for open channel meters [2009]

	Approved meters are called - pattern approved
Measurements are made correctly	AS 4747 – Sections 1, 2, 5 & 8 for full flowing pipe meters AS4747 – Sections 1, 3, 6 & 8 for open channel meters These standards include the requirement for duly qualified personnel for most tasks – called Certified Installers and Validators. AS4747 first edition was 2008 and the current 93 rd) edition was in 2013]
Record-keeping to prove measurements are accurate	NMI retains records on meter testing for pattern approval AS4747 specifies the data to record

For new installations GMW only select meters which have passed New Meter Assessment Testing and are identified on the GMW Approved Meter List.

This currently allows for the installation of Pattern Approved Siemens Mag8000 and Aquamonix i500 Irriflow Electromagnetic flow meters. Both these meters are listed on the NMI website for Pattern Approved Meters.

There are cases where non-Pattern Approved Meters have/will be installed, these form part of innovation and/or modernization pilots for purpose of testing and field assessment.

There is also non-Pattern Approved meters installed across the exempt non-urban metering fleet to assist with deeming principles and methodology.

4.2.2 Full flowing pipe meter selection process

For full flowing pipe meter sites, important information to inform the meter selection includes:

- Connection pipe details upstream and downstream
- Proposed power supply source details: mains, battery, solar (noting solar will require checking on shading and orientation)
- Flow range
- Water quality
- Site access constraints and safety
- Checklist of possible technical challenges

4.2.3 Technical challenges for full flowing pipe meters

Individual site situations can make accurate metering difficult to implement. Factors that may affect metering performance include:

- Unusual flow conditions upstream and downstream of the meter that might result in the meter being unfit for purpose, for example, excessive swirl
- Water quality and floating debris that affects the meter
- Air entrapment
- Loss of power supply
- Vibrations from pumps that may affect the meter performance and its life
- Tampering

4.2.4 Full flowing pipe meter availability

As at August 2020, there are seven full flowing meters that have pattern approval. All these meters are magnetic flow meters. The NMI is considering other models for pattern approval. Details of these are available on the MDB website.

Meter Action Plan

GMW Meter Selection is the responsibility of GMW's Technical Standards & Support (TSS) team. TSS follow standard design assessment criteria to determine and select a standard approved GMW Meter Outlet design which is:

- fit for purpose
- compliant
- meets any other compliance or performance requirements including but limited to flow rate, automation and telemetry

GMW will manage meter selection where a compliant non-urban meter is required to be replaced or upgraded using only GMW approved meter emplacement designs and metering equipment. The Customer Service Point design is critical to meeting GMW's modernisation principles which provide for flow rate and automation (control & monitoring equipment) requirements. The type of meter will be selected from GMW's Approved Meter List (AML) which is an internal register of all meters that have met all performance and accuracy criteria under the Meter Acceptance Testing Framework (Appendix G – NMAT Framework). The GMW AML has been developed over many years since the introduction of the National Metering Standards and Framework.

The acceptance testing framework uses the following criteria:

1. Production Identification
2. Design Review
3. Pattern Approval
4. Performance and Acceptance Testing (PAC)
5. Insitu Re-Verification Testing (REVS) – must meet +/-5% accuracy in field conditions
6. Benefit Assessment
7. Risk Management

4.2.5 Open channel meter selection process

For open channel meter sites, important information for meter selection includes:

- Water level range upstream and downstream of the meter
- Flow patterns in the supplying channel, particularly cross flow relative to the meter inlet
- Proposed power supply source details: mains, battery, solar (noting solar will require checking on shading and orientation)
- Flow range
- Water quality - including silt load, algae
- Site access constraints and safety
- Checklist of possible technical challenges

4.2.6 Technical challenges for open channel meters

Individual site situations can make accurate metering difficult to implement. Factors that may affect metering performance include:

- Unusual flow conditions upstream and downstream of the meter that might result in the meter being unfit for purpose
- Weed growth upstream or downstream of the meters after the meter is installed
- Water quality, including cumulative silt build-up, and floating debris that may affect the meter
- Loss of power supply
- Tampering

4.2.7 Open channel meter availability

As at August 2020, there are no open channel meters that have pattern approval. The NMI is considering two models for pattern approval. Details of these are available on the MDB website. If these meters gain pattern approval, the meter market will still not provide meter options over the full range of flows and site conditions for open channel supplies. Consequently, the selection of some interim standard meters is still required together with a selection process like AS4747 meters.

GMW Meter Selection is the responsibility of GMW's Technical Standards team in consultation with GMW's Metering Support Team. GMW follows standard design assessment criteria to determine and select a standard approved GMW Meter Outlet design that is fit for purpose, compliant and meets any other compliance or performance requirements including but limited to flow rate, automation and telemetry.

GMW will manage meter selection where a compliant non-urban meter is required to be replaced or upgraded using only GMW approved meter emplacement designs and metering equipment. The Customer Service Point design is critical to meet GMW's modernisation principles that provide for flow rate and automation (control & monitoring equipment) requirements. The type of meter will be selected from GMW's Approved Meter List (AML) which is an internal register of all meters that have meet all performance and accuracy criteria under the Meter Acceptance Testing Framework. The GMW AML has been developed over many years since the introduction of the National Metering Standards and Framework.

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6. Benefit Assessment
7. Risk Management

4.3 Meter installation

AS4747 – Part 5 covers the installation requirements for full flowing meters and AS4747 – Part 6 covers the installation requirements for open channel meters.

GMW has no plans to install any non-approved open channel meters within the next Water Plan 5 planning scope for this MAP.

GMW Meter Installations will be installed in accordance with AS4747.5 & 6 under an approved asset replacement work flow procedure documenting QA and compliance requirements. This will be achieved using project work packs that on completion of the installation are uploaded into GMW's Asset Information Management System Maximo.

4.4 Meter maintenance

Section 2.7 of AS4747 – Part 8 covers the maintenance requirements for both meter categories. Appendix C of the standard informs the preferred competencies and activities as follows.

Table 10: Meter maintenance, compliance and accuracy testing standard programs

Program	Activity	Schedule / Timing
Annual Meter Inspection (ITP)	Preventative Maintenance – Compliance checks	Annually
Meter Validation	Meter accuracy checks against manufacturers procedure – compliance	When corrective maintenance is completed on meter which could affect the metrology of the metering device
Insitu Reverification (REVS)	Infield volumetric accuracy testing as detailed in AS4747.8 and Metrological Assurance Framework (MAF)	Fleet sample program completed annually between 30-50 service points As required

GMW performs Annual Meter Inspections as part of approved Preventative Maintenance Programs. This annual maintenance and compliance program is captured in Maximo via work orders containing standard Inspection Test Plan (ITP) questions/meters/metrics/specifications suited for the CSP Design, Operation and Compliance Type.

GMW's annual program:

- supports the identification of failed flow meters
- enables GMW to prioritise the replacement of meters that have reached end of life, are not operational or have deteriorated to the point that the meter warrants significant attention
- uses standardised inspection plans completed through our Asset Management Information System. This enables GMW to monitor and analyse the cost of maintaining and replacing Customer Service Points. This information will inform future maintenance programs and operating budgets.

Action 6: GMW will enhance the standardisation and capture of annual meter inspection data to inform the efficient management of our meter maintenance and compliance obligations.

4.5 Meter validation

Section 2.4 of AS4747 – Part 8 covers the validation requirements for both meter categories. GMW will implement the meter validation required as per AS4747.8 of the Standard. This means compliant meters will require a meter validation when corrective or preventative maintenance activities are conducted that will have an impact on the metrology of that metering device.

Meters will also be monitored within Maximo to schedule a meter validation within a 5-year period if corrective maintenance has not triggered a meter validation within this period. All meter validation work will be captured within Maximo and form part of GMW's standard compliance reporting. Dedicated meter validation Inspection Test Plan's (ITP) have been created to facilitate this activity. Specific Job Plans have also been developed within Maximo to capture and monitor this requirement across the GMW metering fleet.

4.6 Meter verification

Section 2.5 and 2.6 of AS4747 – Part 8 covers the in-situ volumetric measurement and verification requirements for both meter categories. These are non-mandatory sections of the standard and with current methods, these tests only apply to a single flow supply situation (as all variables must be maintained during the test) and can be costly to complete.

Meter Action Plan

GMW will undertake both in-situ and laboratory testing on a sample of its meter fleet in order to provide an acceptable level of confidence that measurement performance is within permissible limits of error of +/-2.5% in the laboratory and +/-5% in the field.

GMW have invested in an annual insitu reverification program to coincide with the release of the National Metering Standards and Framework as well as the large rollout of new modernised meters and emplacement designs. GMW's Program aims to test 30-50 Customer Service Points annually.

The insitu volumetric testing continues to inform design and technology decision making and suitability of metering designs and assets.

The program has been used primarily for testing new metering devices and emplacement designs for compliance against the National Standards of +/-5% to manage the ongoing risks with meter accuracy and meter performance.

Insitu Reverification Testing is part of GMW's Meter Acceptance Testing framework and will be used to confirm compliance with the National Standards (as Pattern Approval is not enough on its own to quantify meter accuracy in field conditions).

4.7 Telemetry

Telemetry may be added when the meter is first installed or be retrospectively added to installed meters.

GMW's telemetry requirements are included within our Modernisation Principles which covers any CSP installed within GMW's Gravity Irrigation Areas.

Telemetry requirements specified within the updated Victorian Non-Urban Metering Policy as described within the MDBA Compliance Compact will be subject to the completion of the business case to assess feasibility as outlined in section 2.3.6.

4.8 Disposal and decommissioning plan

The disposal plan is to cover the disposal of the meter and the archival of meter use records with the meter manufacture-model used for the measurement.

GMW's CSP decommissioning and disposal plans will be updated as an outcome of the Asset Management Strategy (currently in development). These will be included into this MAP once completed and approved.

4.9 Improvement plan

4.9.1 Improvements to meter fleet

Table 7 in section 2.3.3 outlined GMW's current metering fleet assessment. This will be used on an ongoing basis to develop prioritized investment plans focusing on high use customer service points, meters assessed as 'Outside contemporary standard' and areas of stress within certain resource management areas.

GMW 3,537 meters are assessed as 'Outside contemporary standard'. GMW' improvement plan in relation to this segment of the meter fleet is to:

- develop a prioritised investment program to address these meters. The development of the investment program will focus on converting meters that do not satisfy the exempt criteria to compliant meters.
- Commence the delivery of the investment program utilising available Capital funds as allocated through GMW's Water Plan 5 (Pricing Submission).
- GMW's current metering fleet of non-compliant Dethridge wheels are contained to the Gravity Irrigation Areas and are progressively being upgraded under the Connections Project. GMW will undertake a fleet assessment on the remaining Dethridge Wheels on completion of the modernisation project (October 2020). This assessment will determine improvement strategies and investment opportunities with consideration of further Water Efficiency projects.

GMW has 4,510 meters where further data validation is required to accurately perform the compliance assessment. GMW will prioritise the collection of data for these sites.

GMW has 14,330 service points that meet the contemporary (interim) standard. These were installed prior to any pattern approved meters being available and are in compliant emplacement designs that have had extensive insitu reverification fleet testing. The cost to upgrade to AS compliant meters would be outweighed by any benefits. GMW's improvement plan in relation to this segment of the meter fleet is:

- to replace these meters with compliant meters at the end of their useful life;
- develop a meter inspection and validation program to maintain the accuracy and compliant life of these metering assets
- assess these meters on a risk-based approach, with any additional funding allocated to modernising identified service points with compliant meters if/when the benefits can be quantified

GMW has 16,426 classified as Outside Contemporary Standard (Exempt) (EXOS) service points that are primarily for domestic and stock (D&S) applications.

- A percentage of this fleet is metered to a lesser standard than AS4747
- Risk assessments and compliance monitoring will assist with identifying sites to be included in the compliant metering fleet to support the risk management of this resource management plan
- D&S service points have been limited to a maximum size of 50mm to manage risk of increased take
- Monitoring and deeming assessment programs are completed across these sites to manage unauthorised (overuse) take

GMW will review the cost to benefit when current D&S metered service points fail, meter replacement could be to a lesser standard than AS4747 or depending on availability of cost effective fit for purpose AS compliant meters.

4.9.2 Improvements to meter management processes and systems

GMW has robust meter management systems and processes currently in use that have been developed to support the rollout of various State and Federal funded modernisation programs over the last 15+ years. To continue to improve these systems and process GMW will:

- Finalise the review of our Asset Management Strategy. This strategy will result in the development of revised Asset Class Management Plans (ACMP). The ACMP for Customer Service Points has been prioritised for review. Once complete this will be added as a supporting document to this Metering Action Plan.
- Review and update our meter management systems and procedures as required.

- evaluating an Asset Repurposing Program which recognises changes in customer's service requirements and/or usage and identifies opportunities to repurpose underutilised equipment to upgrade non-compliant service points.

Action 7: GMW will update GMW's Asset Class Management Plan for Customer Service Points

4.10 Forward look capital program

GMW have dedicated \$5.7m (excluding modernisation project funds) over the next four years to invest in our metering fleet. This investment will be targeted at upgrading our meter fleet as outlined in section 4.9.1 (Improvements to Meter Fleet).

GMW have identified one (1) service point that falls within the high-risk category (as defined in the Victorian Non-Urban Water Metering Policy (March 2020)), this will be a priority site for inclusion in the 2020-2021 capital program.

GMW's data currently indicates there is a further 1,505 meters that are 'outside contemporary standard' (and use >10ML/year) in the Gravity Irrigation Areas. A portion of these meters will be updated as part of the remainder of the Connections Project. GMW is also currently proposing a further Water Efficiency Project for Government consideration, which if successful will replace a large portion of the remaining meters. The estimated value of meter replacement for the 1,505 meters is \$37.6m (@\$25,000 per site). Once the outcomes of the modernisation projects are confirmed GMW will assess the forward program for meters in the Gravity Irrigation Areas. GMW has allocated \$3.18m (excluding modernisation programs) for meter replacement in the Gravity Irrigation Areas.

The Pumped Irrigation systems have 22 meters that are outside contemporary standard (and use >10ML/year). It is estimated that upgrade of these meters would require an investment of \$550,000 (@\$25k per site). GMW has allocated \$900,000 to meter upgrades in Pumped Irrigation areas, recognising that a portion of the Contemporary (also called Interim) meters are approaching end of life and require replacement.

Table 11 overpage identifies the meters that are outside contemporary standard in the Diversions business. GMW has allocated \$1.24m to upgrading meters in the Diversions business over the coming four-year period. Accordingly, GMW will undertake a risk based prioritised investment program to commence the replacement and upgrade of these meters. The program will also consider reactive meter failures that are reported during ongoing operational maintenance and compliance programs.

All service replacement priority will be reviewed against annual take thresholds and risks to resource management areas, this risk assessment will guide the priorities for replacement and upgrades.

Table 11: Diversions forward look Capital Program

Diversions	Meters Outside Contemporary Standard	Average Upgrade/Replacement Cost	Cost Estimate	Budgeted Allocation (Water Plan 5)
Regulated Surface Water	253	\$15,000	\$3,795,000	\$644,000
Unregulated Surface Water	53	\$15,000	\$795,000	\$320,000
Diversions Groundwater	189	\$15,000	\$2,835,000	\$280,000
Data Validation Required	18	\$15,000	\$270,000.00	
Grand Total	513	\$15,000	\$7,695,000.00	\$1,244,000

5 Financial Summary

5.1 Operational and capital budgets

GMW's Operational and Capital budget has been developed to align with GMW's Strategic Outcomes and our Vision 'To deliver for our region and our future'.

Meter maintenance budgets have been included in GMW's Operational budgets where operational and maintenance staff are to deliver these programs managing operational and compliance risk to delivery best outcomes for our customers. Operational budgets are developed at an activity level (e.g. Maintenance) not an individual program level. GMW will continue to track expenditure against meter maintenance and compliance activities through the effective use of our Asset Management Information System.

GMW's capital plan is outlined in our Water Plan 5 (Pricing Submission) which is reviewed and approved by the Essential Services Commission. GMW has made the following allowances in our Capital program to progress objectives and actions within this Meter Action Plan.

Table 12 – Capital Metering Program Budget 2020 -2024

Project/program Name	20/21	21/22	22/23	23/24	Total
Gravity Irrigation - Meter Program	\$600,000	\$690,000	\$900,000	\$990,000	\$3,180,000
Woorinen Pumped Irrigation - Pump Meters Program	\$75,000	\$75,000	\$ -	\$ -	\$150,000
Woorinen Pumped Irrigation - Customer Meters Program	\$30,000	\$30,000	\$30,000	\$30,000	\$120,000
Nyah Pumped Irrigation - Pump Meters Program	\$75,000	\$ -	\$75,000	\$75,000	\$225,000
Nyah Pumped Irrigation - Customer Meters Program	\$90,000	\$90,000	\$90,000	\$90,000	\$360,000
Tresco Pumped Irrigation - Meter Program	\$90,000	\$90,000	\$120,000	\$120,000	\$420,000
Regulated surface water - Meter Replacement Program	\$161,000	\$161,000	\$161,000	\$161,000	\$644,000
Unregulated surface water - Meter Replacement Program	\$80,000	\$80,000	\$80,000	\$80,000	\$320,000
Groundwater - Meter Replacement Program	\$70,000	\$70,000	\$70,000	\$70,000	\$280,000
Total	\$1,271,000	\$1,286,000	\$1,526,000	\$1,616,000	\$5,699,000

5.2 Funding Strategy

GMW has incorporated funding in our Water Plan to ensure that prioritised meter upgrades can occur across the Gravity Irrigation, Pumped Irrigation and Diversions businesses.

GMW is exploring funding opportunities through Water Efficiency Projects funded by Government. This not only supports Victoria's Basin Plan commitments but also limits the impacts on customer pricing associated with upgrading the meter fleet to meet the expectations of the Victorian Non-Urban Water Metering Policy (March 2020).

GMW have developed and implemented an Investment Framework to guide expenditure ensuring that it is aligned with the strategic direction of the business, customer service requirements and is fit for purpose.

GMW is conscious that our investments in maintenance and (customer funded) capital programs are required to be recovered from our customers through price. Ensuring that these programs are delivered as effectively and efficiently as possible, whilst achieving our compliance obligations is a key focus for GMW.

5.3 Financial measures

GMW's Water Plan 5 (Pricing Submission) has been reviewed and approved by the Essential Services Commission (ESC). This document establishes a revenue cap for GMW for the 2020-2024 period. The document outlines GMW's forecast Operating and Capital Expenditure over this period. When submitting our next Water Plan in 2024 GMW is required to provide data to assess performance against the forecast expenditure profile.

On an annual basis GMW develops our Corporate Plan that is approved the GMW Board and Minister for Water. The Corporate Plan contains our 5-year financial forecast and identifies key organizational objectives and projects. GMW is required to submit an Annual Report that outlines our performance against the Corporate Plan.

The GMW Board approves our annual Operating and Capital budget. The establishment of the Capital budget is supported by individual Project details. On a monthly basis the GMW Board receives performance reporting which identifies material budget and/or scope variances.

GMW staff are held accountable to allocated budgets and/or projects.

6 Data management, analysis and reporting

6.1 Status of current data management, analysis and reporting

GMW has commenced a project with the Department Environment, Land, Water and Planning (DELWP) to automate the data between GMW's Asset Management System (Maximo) and the Victorian Water Register.

GMW produce a monthly Reconciliation Report that cross-references all Customer Service Point data sets located within GMW's data warehouse, which is linked to the following data management systems:

- IPM – Irrigation Planning Module (SCADA System)
- SAM – Customer Billing System
- Geocortex – GIS System
- Maximo – Asset Information Management System
- VWR – Victorian Water Register

This report identifies any inconsistencies enabling the data to be cleansed on a routine basis.

6.2 Meter fleet analysis

GMW have developed a standard report from our Asset Management Information System, which covers all aspects of meter fleet analysis. The meter compliance tables presented earlier in this report are generated from this reporting process. GMW uses this analysis to track meter program progress, prioritise investment plans and monitor compliance targets.

An example of the full report is attached as Appendix H.

6.3 Performance Measures

GMW continually measure its metering fleet against our Service Standards and compliance objectives through infield preventative and corrective maintenance programs. All maintenance activities are reported and managed through our Asset Management Information System. GMW has used this data to establish dashboards to provide effective and timely performance reports.

GMW will review performance measures and key performance indicators (KPIs) as part of GMW's updating of Asset Class Management Plans for Customer Service Points. KPIs will include compliance measurement against this Metering Action Plan and the Compliance and Enforcement Framework.

As detailed within this MAP, the automated data syncing between GMW's Asset Management Information System and Victorian Water Register via our data warehouse for compliance performance measuring will improve accountability in this area.

GMW's current performance against national metering standards shows that nearly 70% of measured take is from either a compliant or a contemporary meter.

GMW believes that through the actions outlined in this MAP it will fulfil the requirements of the *Victorian Non-Urban Water Metering Policy* (March 2020).

7 Appendices

Appendix A: Victorian Non-Urban Water Metering Policy

https://www.water.vic.gov.au/__data/assets/pdf_file/0030/459831/NonUrbanWaterPolicy_2020.pdf

Appendix B: Lists staff and contractors that are Certified Meter Installers and Validators

IAL CERTIFIED METER INSTALLER - TRAINING RECORDS

<https://ecm.gmwater.com.au/documents/A2384652/details>

Appendix C: Goulburn-Murray Water Measurement of Water Use Policy

POLICY - MEASUREMENT OF WATER USE

<https://ecm.gmwater.com.au/documents/A1670593/details>

Appendix D: Goulburn-Murray Water Measuring Water Not by Meter Policy

POLICY - MEASURING WATER NOT BY METER (AND PROCEDURE)

<https://ecm.gmwater.com.au/documents/A1607489/details>

Appendix E: Goulburn-Murray Water Measurement of Water Use Guidelines

MEASUREMENT OF WATER USE GUIDELINES - MAY 2015

<https://ecm.gmwater.com.au/documents/A2567538/details>

Appendix F: GMW's Modernisation Principles (GMID Telemetry Guidelines)

<https://ecm.gmwater.com.au/documents/A2376758/details>

Appendix G: New Meter Acceptance Testing Framework

– NMAT - New Meter Acceptance Testing Framework

<https://ecm.gmwater.com.au/documents/A3672660/details>

Appendix H: Meter Fleet Analysis Report

Meter Fleet Analysis Report

<https://ecm.gmwater.com.au/documents/zA22533/details>