Key Data
to Inform
Government
Asset
Management
Policies
September, 2019
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<td>AM</td>
<td>Asset Management</td>
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<td>AMP</td>
<td>Asset Management Plan</td>
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<td>AUD</td>
<td>Australian Dollar</td>
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<td>AWWA</td>
<td>American Water Works Association</td>
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<td>BCR</td>
<td>Benefit-to-Cost Ratio</td>
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<td>CCR</td>
<td>Consumer Confidence Report</td>
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<td>CIP</td>
<td>Capital Improvements Plan</td>
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<td>CMMS</td>
<td>Computerized maintenance management system</td>
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<td>CWSRF</td>
<td>Clean Water State Revolving Fund</td>
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<td>DWSRF</td>
<td>Drinking Water State Revolving Fund</td>
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<td>FSP</td>
<td>Fiscal Sustainability Plan</td>
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<td>IPART</td>
<td>Independent Pricing and Regulatory Tribunal</td>
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<td>JTMUA</td>
<td>Jackson Township Municipal Utilities Authority</td>
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<td>LOS</td>
<td>Level of Service</td>
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<td>LSB</td>
<td>Local Service Board</td>
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<td>MDEQ</td>
<td>Michigan Department of Environmental Quality</td>
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<tr>
<td>MGD</td>
<td>Million gallons per day</td>
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<td>MOI</td>
<td>Ministry of Infrastructure</td>
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<td>NHDES</td>
<td>New Hampshire Department of Environmental Services</td>
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<td>NJDCA</td>
<td>NJ Department of Community Affairs</td>
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<td>NJDEP</td>
<td>New Jersey Department of Environmental Protection</td>
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<tr>
<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
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<td>NSW</td>
<td>New South Wales (Australia)</td>
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<td>POTW</td>
<td>Publicly Owned Treatment Works</td>
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<td>SAW</td>
<td>Stormwater Asset Management and Wastewater</td>
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<td>USEPA</td>
<td>US Environmental Protection Agency</td>
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<td>WICA</td>
<td>Water Industry Competition Act 2006 (NSW, Australia)</td>
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<td>WRF</td>
<td>Water Research Foundation</td>
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<td>WSAA</td>
<td>Water Services Association of Australia</td>
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<td>WQAA</td>
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1 indicates dates of key interviews with case study contributors
1 INTRODUCTION

Water utility assets are critical to public health, safety, and the vitality of communities. The importance of properly managing infrastructure assets is widely recognized throughout the water supply community, and many models, tools, and protocols have been developed to help guide utility practice. However, optimizing infrastructure asset management (AM) practices continues to pose many challenges for water utilities and regulators alike. The 2015 AWWA “Establishing the Level of Progress in Utility Asset Management Survey Results” report showed that while some utilities have achieved a high level of AM practice, many are struggling with even the most basic AM principles.

Based on the results of the 2015 Survey, the AWWA's Asset Management Committee (AMC) decided to undertake a series of actions to aid utilities. Over the past several years, the AMC published multiple reports designed to improve utilities' understanding and adoption of good AM practice. It also provides training, educational resources, and an online resource page to promote advanced AM practices for the sector. The committee determined that this project should be conducted to further its mission, which includes promoting proactive and cost-effective management of utility assets. The AMC's interest in conducting this project is to better understand how legislative requirements and other government agency efforts to advance the practice of asset management are being implemented.

Advanced AM utilities have documented reductions in costs as the result of AM implementation while maintaining or improving service levels and reliability. Figure 1-1 shows that the average Australian utilities implementing AM reduced operating costs per property by almost 20 percent over 10 years. Hunter Water Corporation (one of the case studies examined as part of this project) achieved nearly a 40-percent reduction in operating costs and reduced capital expenditure by $185 million (USD equivalent) while improving service levels (International Infrastructure Management Manual 2006). Seattle Public Utilities reported a capital improvements plan (CIP) cost avoidance of about $60 million (18 percent of the CIP) and between three- and six-percent reductions in operating costs (between $7 and $16 million) annually after four years of implementation (Kelly 2017). The City of Columbus (Ohio) Department of Public Utilities reported a CIP cost avoidance of about $75 million (along with additional social and environmental benefits) as a result of implementing a business case evaluation process for reviewing and assessing capital project alternatives using asset management principles (Campanella and McKinney 2014).
Given that the water sector is the most capital-intensive utility sector (NAWC 2008), and infrastructure renewal is expensive, with over $1 trillion in buried asset investment required between 2012 and 2037 across the United States (AWWA 2012), the potential returns of improved AM practices are significant.

Compounding the challenges of implementing AM is the fact that the full benefits of investing in buried water assets are often not appreciated by governing boards, elected officials, and even customers. Delivery of high-quality drinking water has become an “invisible service” often taken for granted because, in most communities, water is both reliable and affordable. Other public services (education, public safety, road repairs) garner more attention (and therefore funding) from elected officials and the public due to their more visible nature.

Many communities will be hard-pressed to fund their portion of the $1 trillion investment need in buried infrastructure, a fact that water sector practitioners (including governing bodies) have come to refer to as the “funding gap”. Some governing bodies have come to realize that using AM principles and practices as the footing for making water asset related investment decisions—while potentially expensive and challenging—is a cost-effective way for utilities and the communities they serve, both in the near- and long-term. Doing so will improve the reliability of service delivery to customers.

One of the pillars of AM is the use of data-driven analyses to better inform investment decisions. Based on the US Environmental Protection Agency (USEPA) AM guidance, answering “five core questions” of asset management will lead to more-informed and better investment decisions:

1. What are the community’s/customers’ desired levels of service?
2. What is the current state of assets? (What assets are owned, in what condition are assets, and how critical is each asset in the water system?)
3. Based on an understanding of both desired levels of service and the ability of infrastructure (at present and in the future) to meet service levels, what are the most pressing risks?

4. What are the best risk-mitigation investment options?

5. What is the best long-term funding strategy to implement risk mitigation options?

Answering the five core AM questions and implementing best AM practices help communities provide the desired service levels while managing risks and system reliability at the lowest possible cost, ultimately providing the best value to customers.

Beyond the funding gap, water system owners face additional challenges such as improving customer service; finding operating efficiencies; and maintaining affordable rates. Implementing best AM practices can help address the myriad challenges facing today’s water sector.

As a result of the foreboding funding gap, the realization that the AM business model represents a way to decrease the funding gap and the need to address many other challenges, several US states are now encouraging and/or choosing to regulate AM practices. Communities in other countries have come to the same conclusion.

The research contained herein is focused on the governing bodies that have taken steps to encourage or regulate AM and on data they are collecting to determine if their policies have been successful. The goal is to inform governing bodies that are considering AM policy about what has and has not worked. The scope of the study and the governing bodies included in the study are discussed below.

Most of the information in this report’s case studies was collected in 2018. Dates when key interviews were conducted with governing body and utility case study contributors are listed on page ix. Note that some entities included in the case studies may have made changes to their policies since research for this report was completed.

1.1 Background

On June 10, 2014, a major overhaul to the Clean Water State Revolving Fund (CWSRF) Program, the “Water Resources Reform and Development Act (WRRDA) of 2014,” was signed into law by President Obama. Amongst its most significant revisions is a requirement that every Publicly Owned Treatment Works (POTW) CWSRF loan recipient must prepare a Fiscal Sustainability Plan (FSP), which includes many elements that overlap with the contents of an asset management plan (AMP). FSP requirements include:

- an inventory of critical assets that are part of the treatment works;
- an evaluation of the condition and performance of inventoried assets or asset groupings;
- a certification that the recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan; and
- a plan for maintaining, repairing, and, as necessary, replacing the treatment works and a plan for funding such activities; or a certification that the recipient has developed and implemented a plan that meets the additional subsidization requirements.

US state-sponsored State Revolving Fund (SRF) administrators are responsible for administering the federal CWSRF Program in their states. Many began formulating and
enacting policies related to asset management in reaction to the FSP requirement, while others had already begun. Most of these state policies are different. Some states require FSPs/AMPs only for CWSRF projects, while others require plans for Drinking Water State Revolving Fund (DWSRF) projects as well. Some state asset management policies apply to only assets associated with funded projects, while other states require elements of asset management for all public water and/or wastewater systems. Beginning in fiscal year 2017, federal regulations require clean water (CW) systems applying for SRF funds to have an FSP established.

In 2017, AWWA's AMC published a report titled "Clean Water and Drinking Water State Revolving Fund Programs: Survey of Fiscal Sustainability Plans and Asset Management Requirements". Forty-three CWSRF agencies and 41 DWSRF agencies participated in a 2016 survey to assess how the agencies are implementing requirements for FSPs and AMPs. That study found that while 79 percent of agencies had implemented FSP/AMP requirements, most of the requirements applied only to assets for which funding is sought. Seventy-nine percent of CWSRF programs with FSP/AMP requirements did not require the plans to be submitted and only four agencies reported that they reviewed plans.

There are no federal FSP requirements in the DWSRF program, and only 17 percent (seven agencies) of DWSRF administrators had implemented FSP/AMP requirements. Of those seven agencies, only three had follow-up requirements related to implementation, reporting, or periodic update of plans.

Both CWSRF and DWSRF programs reported that very little state-level data related to utility assets and planned investments are available to inform policy-making and regulatory efforts. As a result, two recommendations from the AWWA study were to (1) leverage state experiences and resources, including studying the effectiveness of unique funding programs and incentives that states use to encourage better AM; and (2) collect more data about utility infrastructure needs and AM practices to inform policy decisions. It is the goal of this work to advance these two recommendations.

On October 23, 2018, a reauthorization of the Water Resources Development Act (WRDA) combined with legislation building on the Safe Drinking Water Act was signed into law by President Trump. Section 2012 of that law "encourages the use of asset management by drinking water delivery systems in three ways. First, it requires states, as part of their Capacity Development Strategy, to consider, solicit, and include as appropriate, how the State will encourage the use of AMPs and assist in the use of asset management best practices by public water systems as part of these plans. Second, it requires each state to publish its Capacity Development Strategy report with details of the efficacy of and progress made on the state's efforts to encourage development of AMPs and to engage in relevant training to support implementation of AMPs. Last, it requires the Administrator to, every five years, review and update, if appropriate, educational materials made available by the Agency.” (America's Water Infrastructure Act of 2018)

1.2 Scope of the Study

Working under the direction of the AWWA's AMC and a project advisory committee (PAC), the prime contractor (Burgess & Niple, Inc.) and its subcontractor (OHM Advisors) developed case studies highlighting policies that government entities have implemented (or are considering) to improve water utility asset management. The case studies include five government entities that have implemented or evaluated different policies regarding asset management programs and fiscal sustainability plans. Each case study includes a summary of
• the government entity’s utility-related policies intended to address water infrastructure needs (i.e., documented asset management policy); and
• the data and information the entity uses (or plans to use) to assess water infrastructure needs; develop, implement, and evaluate the policies; and make funding decisions.

The contractor engaged the appropriate government entity when developing each case study, and documented sources of data and insights in this report. Because the 2017 AWWA publication “Clean Water and Drinking Water State Revolving Fund Programs: Survey of Fiscal Sustainability Plans and Asset Management Requirements” warned that little data on the impact of AM policies would be readily available, this study also includes two additional "utility case studies" associated with each "government body case study”.

Based on a review of the government case studies herein, the project team provides some items that governing bodies may consider if formulating or enhancing AM policies.

1.3 Government Entities Selected for Study

Because the 2017 AWWA report on CWSRF and DWSRF programs found a considerable data gap for US government body AM policies, this follow-on study was not confined to just advanced US state polices but also to the policies of certain foreign governments. The scope entailed the study of five governing bodies, including three US states (New Hampshire, New Jersey, and Michigan). The states were chosen for having embraced, encouraged, and regulated specific AM practices for an extended period and for the variety of their AM policies and programs. They are not the only US states that fit that description, but most others have very young or relatively limited AM programs. In addition, both New South Wales, Australia and Ontario, Canada were chosen, the former based on an extensive history of AM implementation and well-documented success, and the latter for its more comprehensive, regional AM approach.

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1.4 References


2 Case Study: New Hampshire Department of Environmental Services

The mission of the New Hampshire Department of Environmental Services (NHDES) is to help sustain a high quality of life for all citizens by protecting and restoring the environment and public health in New Hampshire. The protection and wise management of the state of New Hampshire’s environment are the important goals of the NHDES. The department’s responsibilities range from ensuring high levels of water quality for water supplies, ecological balance, and recreational benefits, to regulating the emissions of air pollutants, fostering the proper management of municipal and industrial waste, and managing water resources for future generations (https://www.des.nh.gov/aboutus/index.htm).

2.1 Drivers for AM Change

A needs assessment conducted by the State of New Hampshire in 2011 identified $380 million of drinking water infrastructure improvements; state wastewater and stormwater needs topped $2 billion combined. The state also understood that utility user rates were not changing to meet these needs. NHDES was concerned primarily with this funding gap, and secondarily about a significant wave of retirements by utility staff with the most knowledge to address those gaps. Promoting, and in some cases requiring, asset management was considered a solution to these concerns.

NHDES goals in offering AM funding assistance, as stated in their Drinking Water and Groundwater Asset Management Program packet, include:

- initiating an asset management program at community water systems that do not currently have a program or to enhance any program that has commenced but failed to reach its goal;
- assisting systems in developing an asset inventory with condition assessment;
- reviewing rates to determine if the existing structure supports future investment needs; and
- communicating these planning efforts to customers and decision-makers.

The stated goal of funding AM is “to create a shift from ‘reactive’ management of a community’s assets to ‘proactive’ management, thereby increasing the impact of community water infrastructure investments. This is considered an important step toward building sustainable communities.”

The state has not reassessed the infrastructure investment gap since 2011 but is confident that their AM policies (discussed below) have been extremely successful in addressing their secondary driver of reducing “brain drain”. Anecdotally, NHDES believes institutional knowledge of assets and asset management practices “has grown exponentially” based on their knowledge of 72 of New Hampshire’s 136 municipally-owned water systems that have prepared asset management plans through AM grants and loans that require specific AM practices discussed herein. Roughly a dozen New Hampshire communities have prepared wastewater asset management plans.
2.2 Overview of AM Policy

The NHDES AM policy emphasizes a significant degree of encouragement and support in addition to relatively modest AM requirements. AM requirements apply to all new public water systems, which must prepare an AM Plan to obtain a permit to operate. In all other cases, existing public systems are subject to AM requirements only when applying for state revolving fund loans, in which case the requirements only apply to the assets funded by the loan. A variety of a principal forgiveness and grant programs are available for both strategic AM projects (e.g., development of a strategic AMP) as well as the implementation of a variety of more specific AM implementation projects. As of mid-2018, NHDES has awarded $1.1 million in grant funding for drinking water AM programs and $2.6 million in principal forgiveness for wastewater and stormwater utility AM programs.

Communities can utilize Drinking Water State Revolving Fund (DWSRF) loans to either (a) fund a project or (b) develop a system-wide asset management plan (AMP). If a loan is used to fund a project, the utility must prepare an Asset Maintenance and Renewal Plan that consists of a good-faith commitment to AM and an inventory of all assets being funded by the loan. Section 2.3.1 describes AM requirements for DWSRF loans in more detail.

NHDES also developed and began funding a Public Water System "Asset Management Grant" program in 2014 (described in Section 2.3.2) and will be providing its sixth round of funding in 2019. The goal of the grant program is to establish a centralized location to provide information, technical assistance, and funding opportunities to assist communities with the development of sustainable AM programs (Grant Application Packet 2019, NHDES). Grant program recipients must not only meet the requirements outlined in the DWSRF loan program but must also develop a strategic (system-wide) AMP that includes, at a minimum, an inventory of assets, development of a CIP and long-term funding strategy, an implementation plan for the AM program, and a community outreach strategy to inform the community of the AM program.

NHDES also provides access to two other independent grant funds related to AM: (a) a leak detection grant, which involves NHDES hiring a third-party contractor to conduct leak detection services for selected grant applicants, and (b) a "record drawing grant" to allow small water systems to generate an asset inventory. These grants are described in Section 2.3.3.

Wastewater and stormwater projects are eligible for up to $30,000 in principal forgiveness per funding phase through the Clean Water State Revolving Fund (CWSRF) loan program for the development of an AM program, and agencies can receive principal forgiveness in up to five phases, depending on the size of the utility. The CWSRF program is described in more detail in Section 2.3.4.

Section 2.3.5 describes how NHDES has been extremely supportive of water systems embarking on AM implementation. They have hosted five annual AM-specialty conferences designed to support water utilities in learning about AM and how to implement, with an emphasis on small-group break-out sessions led by utilities that are relatively advanced in terms of AM maturity. NHDES staff are dedicated to AM implementation in the state and are available to brief both water system staff and governing bodies regarding the expectations of the state and desired benefits. NHDES has also teamed with the Environmental Finance Center Network to assist with rate studies and water audits. In addition, a guidance document has been prepared by NHDES and will be released for use by water systems beginning in April 2019.
2.3 Asset Management Governance

An overview of the AM policy and funding mechanisms associated with the NHDES AM governance is provided below.

2.3.1 AM Requirements for DWSRF Loans


Projects and costs eligible for financial assistance from the DWSRF include:

- Planning, design, and construction of a variety of prescribed infrastructure projects
- Land acquisition costs associated with eligible infrastructure projects
- Preparation of a system-wide strategic AMP, including an "asset maintenance and renewal plan" as defined by NHDES

For infrastructure projects to be eligible, the loan applicant must prepare a planning document that outlines the project and alternatives from the standpoint of function, operation, economics, reliability, safety, efficiency, and environmental compatibility. A cost-benefit analysis for all alternatives is required, as is a statement that the applicant has in place (or will develop) a program for funding the maintenance and eventual replacement of the funded assets (an "Asset Maintenance and Renewal Plan"). The Asset Maintenance and Renewal Plan is defined as "a plan developed and implemented by the applicant to maintain and eventually replace water system infrastructure funded in whole or in part by the DWSRF." The Asset Maintenance and Renewal Plan only has to be prepared for assets associated with the funded project and a form to complete the plan can be found on the NHDES website (https://www.des.nh.gov/organization/divisions/water/dwgb/capacity/documents/nhdes-w-03-185.pdf).

At a minimum, the Asset Maintenance and Renewal Plan should consist of the following components: Part 1. Commitment to an Asset Management, Financing, and Implementation Strategy and Part 2. Inventory of Asset(s) for all assets being funded by the DWSRF program.

If the DWSRF funding is used to prepare a system-wide, strategic AMP (corresponding to the third bullet above), the applicant must document its systematic processes to finance, inventory, assess, operate, maintain, upgrade, and replace assets cost-effectively while maintaining a sustainable level of service that is acceptable to a utility’s customers.

NHDES must prepare a “project priority list” of all DWSRF eligible projects in the order of their priority, and projects are funded starting with the highest priority and proceeding down the list until all available funds have been allocated. If a community has a strategic AMP in place, the community will improve the DWSRF project priority score.

2.3.2 DWSRF Grant Funding

In addition to the DWSRF loan program, NHDES also uses set-aside funds from the DWSRF program to offer a Public Water System “Asset Management Planning Grant” program. This grant is intended to assist any community drinking water systems in developing a system-wide AMP. The program provides a 100-percent matching grant up to $20,000 for water systems to conduct AM initiatives for drinking water infrastructure.
To be eligible for the grant program, the community water system must serve a population of 200 or more. Communities receive a 100-percent match of their costs from the state, up to a maximum of $20,000 per project, and the community cost can be a combination of consulting/contracting fees and in-kind services, so long as staff time contributed to the project is thoroughly documented. The funds are to be used to develop all (or parts) of an AMP. Communities that have already begun developing an AMP can fund finalization of the plan using grant funds.

Projects funded by the grant must include, at a minimum, these AM elements:

- Asset inventory with condition assessment and risk analysis
- Financial review, including the development of a capital improvements plan (CIP) and/or long-term funding strategy for infrastructure needs for the next ten years
- Implementation plan which outlines how the AMP will be used, the frequency of review, and the revision process
- Community outreach strategy to inform staff and customers of the AM program

If a water system has completed or revised the AM elements above within the last three years, it may also apply for grant assistance for these types of AM projects:

- Computerized maintenance management system (CMMS) including software and training
- GIS mapping
- Purchase of computers, software, and other related mobile devices necessary for the implementation of the AM program.

Grant applicants must provide a project description, schedule, objectives, and deliverables. They must also identify the project staff responsible for the AMP and outline their commitment to AM.

Grant applications are ranked based on the elements shown in Table 2-1.

<table>
<thead>
<tr>
<th>Table 2-1. NHDES Asset Management Grant application rating</th>
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<tbody>
<tr>
<td><strong>AM Element</strong></td>
</tr>
<tr>
<td>1. Develops asset inventory and condition assessment*</td>
</tr>
<tr>
<td>2. Buy-in commitment*</td>
</tr>
<tr>
<td>3. Develops a financial plan and/or funding strategy (based on findings of the asset inventory)*</td>
</tr>
<tr>
<td>4. Develops communication/public education and awareness plan regarding assets</td>
</tr>
<tr>
<td>5. Develops GIS/mapping system that incorporates the asset inventory</td>
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<tr>
<td>6. Provides asset management training for the entity’s governing body and employees</td>
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<tr>
<td>7. Conducts a Cost of Service Study and/or rate analysis</td>
</tr>
<tr>
<td>8. Conducts management workshop to determine the desired Level of Service</td>
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<tr>
<td>9. Reviews/optimizes operations and maintenance program and/or incorporated CMMS</td>
</tr>
<tr>
<td>10. Includes an assessment of the criticality of the assets (risk)</td>
</tr>
<tr>
<td>11. Prepares a budget with prioritization of capital projects based on AMP</td>
</tr>
<tr>
<td>12. System size 1,000–10,000 population</td>
</tr>
<tr>
<td>13. System size 200–1,000 population</td>
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</table>

*Elements 1, 2, and 3 must be in the scope, in progress, or already completed for eligibility.
The grant program has been more competitive in recent years. About 12–15 applicants receive funding per year, with the number of applications ranging from 15 to 26 since 2015—there are approximately 2,400 public water systems in NH, 136 of which are municipally owned water systems. Most of the utilities receiving funding are performing projects valued precisely at the grant funding limit (i.e., $40,000 project budget involving $20,000 of utility investment and a 100-percent match of $20,000—the maximum match allowed). A summary of the AM grant program can be found in the document “Guidance and Grant Application Packet 2019” at https://www.des.nh.gov/organization/divisions/water/dwgb/asset-management/documents/nhdes-w-03-021.docx.

Upon receiving state revolving fund (SRF) loan or grant funds, recipients must pledge “to maintain the funded asset(s) using methods and intervals that maximize their value to our customers while sustaining the overall infrastructure.” A final survey must also be completed before the final disbursement of the grant, and a comprehensive asset inventory and condition assessment plan for the funded assets must be submitted. The state has not utilized the survey to draw conclusions on the impact of funding on water asset management practices. The requirements can be found on “Form 7: Asset Management Maintenance and Renewal Plan” at https://www.des.nh.gov/organization/divisions/water/dwgb/capacity/documents/nhdes-w-03-185.pdf.

Smaller systems (population served less than 500) must complete a different form titled, “Asset Management Business Plan for Small Community Water Systems.” The form is more descriptive, including the additional requirement of an organization chart and 5-years of financial history. NHDES interacts with small systems far less frequently and thus requires additional AM documentation to justify the investment of grant funds. The small system requirements can be found at https://www.des.nh.gov/organization/divisions/water/dwgb/capacity/documents/new_pws_business_plan.doc.

To date, the grant program has awarded $1.08 million and assisted 71 community water systems with the development and implementation of the AMPs (See Table 2-2 and Figure 2-1).

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of grants</td>
<td>12</td>
<td>12</td>
<td>7</td>
<td>12</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Total annual value of grants ($)</td>
<td>$170,500</td>
<td>$178,250</td>
<td>$96,810</td>
<td>$165,000</td>
<td>$200,000</td>
<td>$268,750</td>
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</table>
2.3.3 DWSRF Leak Detection Grant and Record Drawing Grant

NHDES uses DWSRF set-asides to promote components of an AM program under different titles or programs. The NHDES’s Water Conservation Program offers a leak detection grant focused on performing condition assessment of water mains for the purpose of detecting leaks. Any utility can apply for the leak detection grant; if they are selected, NHDES hires the leak detection contractor and provides the results to the water system. NHDES expects a “good faith effort” on behalf of the water system to repair leaking water system components but stops short of requiring repairs. Grant money from this fund is not available to perform repairs, so NHDES provides flexibility to allow the water system to determine if repairs are cost-effective and when repairs will be conducted.

The flexibility described above is not afforded to a community water system drawing more water from its source than is permitted—approximately 35 systems fall into this category. In such cases, NHDES requires a Water Conservation Report (with ongoing compliance reports once every three years) and a leak study, and communities are required to repair leaks within 60 days.

About 120 of the 700 eligible community water systems have taken advantage of this grant, with some communities receiving more than one grant. In the past, NHDES has not collected data from the leak detection studies into a centralized database but plans to do so soon. Because less than 20 percent of systems have participated and because there are “many water systems of all different types and sizes, using data collected through the leak detection grant program would not [yet] be dependable for making statewide projections regarding losses or condition of pipe,” according to the NHDES Water Conservation program managers. A summary of the leak detection grant program in terms of the number of grants and grant money awarded is shown in both Table 2-3 and Figure 2-2.

Table 2-3. Leak detection grant award history

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</tr>
</thead>
<tbody>
<tr>
<td>No. of grants</td>
<td>19</td>
<td>8</td>
<td>27</td>
<td>23</td>
<td>25</td>
<td>38</td>
<td>41</td>
<td>34</td>
</tr>
<tr>
<td>Total annual value of grants</td>
<td>$60.0k</td>
<td>$49.6k</td>
<td>$96.5k</td>
<td>$62.2k</td>
<td>$77.3k</td>
<td>$117.6k</td>
<td>$62.6k</td>
<td>$95.1k</td>
</tr>
</tbody>
</table>
As an example of the leak detection results, the calendar year 2016 program resulted in leak detection studies in 39 community water systems spanning almost 1,000 miles of mains. Seventy-five leaks were discovered, totaling just over 800 gal/min (422 million gal/year) of leakage. In 2017, 42 communities inspected just over 500 miles of water main. The largest leak discovered through the program had a leak rate of 775 gal/min.

Grants are available to assist very small water utilities (population served less than 500) with developing a more accurate asset inventory through a “record drawing grant.” Like the leak detection grant, this grant fund operates independently of other AM grants and loans (and it is therefore not subject to the same AM requirements), but NHDES is determining ways to integrate this grant fund with other AM funding to make AM requirements more consistent.

2.3.4 Wastewater and Stormwater Asset Management Funding
NHDES administers the CWSRF program in New Hampshire and has included the federal Fiscal Sustainability Plan (FSP) requirements for all CWSRF loans. To encourage utilities to go beyond the baseline FSP requirements and develop more comprehensive AMPs, NHDES has been offering principal forgiveness for projects involving the development of comprehensive AMPs. The first utility to use principal forgiveness for a project involving an FSP did so in 2015. All publicly owned treatment works (POTWs) are eligible, and to date, no utility applicants have been turned away. Every loan specifically dedicated to AM projects on wastewater collection has been awarded. In addition, stormwater projects are eligible for CWSRF funding and principal forgiveness.

For wastewater projects, principal forgiveness is provided to POTWs in increments of up to $30,000 per AM project “phase”. Communities can receive funding in multiple project phases up to a maximum of five phases for wastewater projects. Eligibility for multiphase funding is determined by NHDES, depending on the size and complexity of the wastewater system. Local governments can receive only one principal forgiveness award for stormwater AM projects.

One of the unique features of the CWSRF program is that for loans issued specifically to develop AMPs, NHDES requires evidence of the creation of a decision-making tool based on AM principles for a deliverable, rather than a report. CWSRF guidance documents outline what constitutes an acceptable tool:
Define an asset management program vision that describes the purpose and overarching goals of what asset management will do for the community.

Create an asset inventory, including a naming convention.

Develop a defined level of service (LOS) with input from all utility disciplines.

Prioritize assets based on condition assessment and criticality.

Analyze life cycle costs, including capital and operation and maintenance (O&M) costs for the life of the asset.

Identify a funding strategy for asset maintenance and replacement.

Develop an implementation plan or statement that explains how the community will continue to maintain and use the asset management program.

Prepare a communication plan with a time frame for completion to inform staff, community management, and customers of the asset management program and its capabilities.

CWSRF funds can be applied to AM projects to fund AM software purchase and implementation; equipment purchases and rental, including GPS units and tablets utilized to capture asset data; in-house personnel assigned to work on AM program elements; and AM consulting fees. NHDES must be invited to attend the project kickoff meeting, the Level of Service (LOS) workshop, and the project wrap-up meeting. NHDES experience has shown that being involved in kick-off meetings and LOS meetings benefits utilities. NHDES shares their experience working with many other utilities regarding how to accomplish the project scope or establish service levels in cost-effective ways that may not have considered otherwise. Requiring NHDES presence at wrap-up meetings forces the utility to communicate with their service community and allows NHDES to provide feedback; in most cases, that feedback is positive and promotes future AM activity.

To date, over $2.6 million in principal forgiveness has been awarded on projects involving AM. A formal “Planning, Projection, and Assistance Supervisor” position was created in 2016 to manage the increasing program administrative responsibilities associated with the CWSRF AM loans. More details on the program for wastewater and stormwater projects can be found in the CWSRF Asset Management Principal Forgiveness Guidance Document at https://www.des.nh.gov/organization/divisions/water/dwgb/asset-managment/documents/cwsrf-am-guide.pdf.

NHDES does not currently analyze the aggregation of data submitted from FSP loan recipients to determine the impacts on the advancement of AM practices.

2.4 Sponsored AM Resources

In addition to its grant and principal forgiveness programs, NHDES is a compelling case study because of its proactive outreach program. The agency hired an environmental program manager to administer the Asset Management Grant Program and employs an AM program manager for wastewater and stormwater systems. NHDES maintains an AM resources website (https://www.des.nh.gov/organization/divisions/water/dwgb/asset-managment/index.htm) that contains information on the latest AM topics, policy and guidance documents, grant and loan application forms, upcoming AM education and outreach opportunities, and links to other AM publications. NHDES staff lead the annual state-wide AM workshops and meet regularly with communities to assist with their AM implementation. They have been nominated for various awards with the New England Water Environment Association because of their leadership in the AM field.
Many of these efforts are discussed below, and in most cases, are available to all utilities, regardless of their participation in loan and grant funding programs.

Some of the benefits of these efforts were captured in discussions with two NH utilities (Plymouth Village Water and Sewer District and Pennichuck Water Works). A representative from Pennichuck Water Works, an investor-owned utility, expressed that NHDES’s approach, one which most NH utilities and regulators would describe as less about requirements and more about support and encouragement through grants and principal forgiveness on loans, has led to improved trust between regulators and utilities. Pennichuck Water Works has received only $20,000 in grant money from NHDES, yet it has taken advantage of the resources provided by NHDES to learn more about AM to run a better, more-informed business. The utility has invested over $4 million in their AM program, which has benefitted and accelerated in part as a result of the resources available from the state.

2.4.1 Guidance Documents
NHDES is developing an “AM Guidance Document” for both drinking water and wastewater/stormwater utilities, which will be released in 2019. The drinking water document describes the AM framework and its benefits, in addition to providing guidance on levels of service, asset inventory, condition assessment, criticality, risk, life-cycle costing, and funding. Some widely published AM resources are referenced, such as the International Infrastructure Management Manual, USEPA’s Advanced AM Workshop materials, John Moubray’s “Reliability-centered Maintenance,” and the Environmental Finance Center-New Mexico Tech’s “Asset Management: A Guide for Water and Wastewater Systems.” In addition to addressing AM principles, the document also contains sections on both internal and external communication of AM. This drinking water guidance has not yet been made publicly available but is expected to be made available soon.

The CWSRF Asset Management Principal Forgiveness Guidance Document, discussed above, does not yet cover the core AM principles in the way that the drinking water document does, but rather focuses on what AM elements are eligible for principal forgiveness. Expansion of this document is expected in the future.

2.4.2 Conferences
The NHDES Drinking Water and Groundwater Bureau in conjunction with the NHDES Wastewater Engineering Bureau have sponsored and conducted five annual AM workshops to support communities wanting to learn about how to implement AM. The focus of each is on hearing from the communities that have gone through the DWSRF Grant Program or the CWSRF Asset Management Loan program. These workshops have been increasingly successful because utility staff at the community level are relaying both their experience in relation to the loan/grant programs as well as their experience with implementing AM in New Hampshire. Any community can attend, regardless of their involvement in NHDES funding programs, and the two utilities interviewed as part of this study were very supportive of these conferences, having taken advantage of them to learn and evaluate potential implementation strategies at their own water systems. Past AM conference themes include:

- Get the Wheels Turning AM Workshop – October 2014 – 49 attendees
- The Art of Momentum AM Workshop – November 2015 – 70 attendees
- Bridging the Gap AM Workshop – December 2016 – 110 attendees
- The Next Dimension AM Workshop – November 2017 – 105 attendees
- The Lost Art of Communication AM Workshop – October 2018 – 110 attendees
NHDES has also hosted many other AM workshops in partnership with the Environmental Finance Center Network, Resources for Communities and People, the Granite State Rural Water Association, and the New England Water Environment Association.

### 2.4.3 Technical Assistance Meetings

NHDES has also provided hundreds of hours in technical assistance with elected officials, boards, operators, and other decision-makers, educating them about the benefits of implementing AM programs. Most of these technical assistance meetings include small group and even one-on-one meetings with elective officials, board members, and/or operators. These outreach efforts are conducted for both the CWSRF and DWSRF funding programs.

While it is difficult to assess the benefits of these meetings, NHDES reports anecdotally that the ability of water systems to communicate AM needs to their governing bodies has increased extensively. Water utilities are now able to communicate their needs to the board with a greater knowledge of the systems they manage, and boards receive that message with greater clarity as a result of meetings with NHDES to explain AM and the goals of the state’s AM programs.

### 2.4.4 Assistance with Water Audits and Rate Studies

NHDES is currently working with the Environmental Finance Center Network to aid with Water Audits and Water Rate Settings. Two communities are currently working with NHDES (as of the end of 2018) to conduct water audits using the AWWA Water Audit Tool. In parallel, the Environmental Finance Center Network is providing technical assistance with the communities’ water rates and providing input on how to improve these rates. The goals with these two efforts are to support water systems in need of technical assistance and to create more robust AM programs within water systems such that long-term funding strategies are consistent with AM needs. Taking advantage of this service is voluntary for water systems, although one utility was pressured by NHDES to participate based on data indicating extremely high water loss.

### 2.5 Data and Information on AM Policy Impacts

NHDES recently established the NH Asset Management Database (NHamD) to provide a clearinghouse for communities that are interested in AM but may be faced with some challenges or do not have the resources to get started. The intention of the database is to provide communities with the contact information of other New Hampshire communities that have implemented AM to foster networking opportunities and promote the sharing of AM knowledge and experiences on the implementation of AM programs. Originally, water systems populated the database on a voluntary basis, but beginning in 2019, NHDES enacted a policy that requires AM grant recipients to populate this database.

Users of the NHamD select an element of AM that is of interest. The output is a list of communities that have implemented those elements. Selecting multiple criteria simultaneously is also possible, and the output is a list of communities that have implemented all the chosen elements. The database is relatively new, and only 17 of the 136 municipally-owned water systems in the state have populated the database (as of the fall of 2018), 12 of which have accepted grant funds and had to complete a final survey to receive the final disbursement of the grant. Some data from the NHamD are shown below in Figure 2-3, which indicates the number of communities out of the 17 in the database that implemented certain AM elements.
NHDES provided anecdotal evidence of AM improvements, beyond the information being gathered for its NHamD. Most significantly, the relationship between the regulated communities and NHDES has improved significantly. Cooperation and collaboration have increased. In addition, buy-in for asset management approaches from the top-down within utilities has been witnessed by NHDES officials that have attended board meetings. Communication with customers has also improved; in one case, a community realized it did not communicate with the vernacular that a typical customer understands and subsequently went so far as to bill in terms of gallons instead of cubic feet to promote understanding. NHDES has indicated that the presence of the database has promoted awareness and comparison of rates by some communities, which have subsequently adjusted rates and contacted NHDES to update the online NHamD database.

NHDES also described unexpected benefits resulting from AM efforts. Two small water systems that share infrastructure (source water and water treatment plant) and a common operator rarely coordinated constructively in the past on how to manage common assets. More recently, each community received a $40,000 grant to address AM, and both communities collaborated to hire the same consultant and will receive a common solution to which they have agreed. Both communities have realized the benefits of collaboration, and the pooling of resources has benefited water customers.

2.6 NH Utility Case Study 1: Plymouth Village Water and Sewer District

Plymouth Village Water and Sewer District (PVW&SD) is in central New Hampshire in the town of Plymouth, just south of White Mountain National Forest. District Management (Superintendent and Administrator) reports to a Board of Commissioners, and the utility owns and operates 25 miles of water mains, 25 miles of gravity sewers, five miles of sewer force mains, and water and wastewater treatment plants. The system has 985 connections and serves a population of about 6,300. Combined sewers were installed before separation efforts in the 1980s and beyond, so most sewers are now relatively new compared to many New England community systems. A majority of water mains, however, date back to 1910–1950 in the downtown village and some pipes are lead-jointed, with lead service laterals. The utility relies heavily on funding from the US Department of Agriculture Rural Development and SRF grants and loans with principal forgiveness to supplement rates.

The “gut feel” decision making of the past is falling by the wayside. – Luis Adorno, NHDES
In the past, the utility was mainly reactive, addressing infrastructure needs only when assets were in a failed state. This was partially due to a lack of planning and a belief that limiting proactive spending would keep rates lower. However, over the last decade, the utility has dramatically advanced their AM practices.

There were several drivers for AM advancement, many of which are related to NHDES funding policies and outreach efforts. Initially, PVW&SD was required to prepare a Capacity, Management, Operations, and Maintenance (CMOM) report in 2010 to renew its NPDES POTW General Permit, and CMOM work (characterized as asset management specifically applied to wastewater collection systems) helped the District locate and document much of its older infrastructure that previously had been unmapped. Following the CMOM work, they saw the potential benefit to continue implementing the asset management approach for both water and wastewater. The AM requirements for CWSRF and DWSRF funds that the utility relies on were further impetus to develop an AM program, such as requirements for principal forgiveness including creation of asset inventories, developing level of service definitions, prioritizing assets based on condition and criticality, and developing a long-term funding strategy (see the CWSRF Asset Management Principal Forgiveness Guidance Document at https://www.des.nh.gov/organization/divisions/water/dwgb/asset-managment/documents/cwsrf-am-guide.pdf). The District participated in the NHDES annual AM conferences and used other resources on the NHDES website. Finally, the District decided that developing a better understanding of its asset register would support a more effective lead service lateral replacement program.

The AM implementation began in the early 2010s and involved GIS mapping of the entire system. Levels of service have been established, and the District feels like it can now have “service–cost trade-off discussions.” Formal condition assessment is completed for sewers using Pipeline Assessment Certification protocol, and water main condition assessment is in the form of break and leak tracking. A water meter replacement program was also implemented based on condition and performance assessments.

There have been many significant benefits from the AM program:

- The water meter replacement program, which began with large meters and now includes residential meters, contributed to reductions in non-revenue water. Non-revenue water decreased from 33 million gallons (22 percent of total water pumped) in 2015 to 20 million gallons (15 percent of total water pumped) in 2016.
- After developing and tracking wastewater levels of service for an extended period, the utility realized that service level targets were not being met. The resultant data-driven discussions have led to additional resources in some cases and relaxed targets in other cases, mainly related to increasing maintenance activity, where previous goals are now understood to have been too aggressive.
- Digital mapping set the foundation for field crews to access information in real time, increasing the efficiency of their work. It also allows them to identify and correct inaccuracies in the database and supplement any missing asset attribute data.
- AM has allowed for continued eligibility for loans and grants.
- More recently, facility asset registers are now captured in electronic format, setting the stage for a potential CMMS implementation that would leverage state funding covered by CWSRF and DWSRF AM grants and loans.
At a higher level, one of the primary benefits of AM implementation is greatly enhanced communication with the Board of Commissioners and the public that allows for more informed decision making. More information is now available for District Management (Superintendent and Administrator) to present to the Board when discussing funding requests, and the District Management has been empowering them with a “full picture” level of transparency. With the support of NHDES, communications with the Board are done using AM vernacular—they understand the concepts of criticality, risk, and life-cycle costing. When funding is requested from the Board, it includes not only a discussion of the costs of the proposed work but also a discussion of the consequences of a failure to act in terms of financial costs and a reduction in the level of service provided to customers.

The Board has greatly appreciated the ability to make more informed, “evidence-based” decisions. The transparent approach supported by AM practices has built trust between the Board, District Management, and customers. The Board understands the priorities laid out in the long-term financial forecast, not just the reactionary, short-term future.

Finally, by implementing AM, developing a better understanding of the District’s infrastructure and where its biggest risks need to be addressed, the long-term capital plan can be developed with more confidence and funding can be more aggressively sought. In the past, the Board had been reluctant to raise rates to address large infrastructure needs. Last year, however, the Board approved a $17-million bond issue for water and sewer projects overwhelmingly despite uncertainty about the ability to secure funding. Subsequently, PVW&SD secured $5.55 million in USDA Rural Development grants, $1.65 million in New Hampshire Drinking Water and Groundwater Trust Fund, and is anticipating $4.4 million in DWSRF and CWSRF funding with the potential for 50 percent grant and principal forgiveness.

Implementing AM has helped PVW&SD navigate their individual infrastructure funding gap, find savings in the process, and ultimately improve service and lower risks for customers. Had NHDES not established its AM policies, it is unlikely that PVW&SD would have made the AM progress it has.

2.7 Summary and Conclusions: NHDES Case Study

NHDES has identified many factors that have been critical to their success in advancing AM. Of the 136 municipally-owned water systems in the state, 72 have received some form of AM-related funding. Another 12 wastewater and stormwater utilities have developed AMPs through the CWSRF program. NHDES AM coordinators believe that the number of utilities (water and wastewater) that had prepared AMPs prior to NHDES forming and implementing its AM policy was less than five, an estimate that was partially based on an informal survey conducted by the University of New Hampshire in 2008. A NHDES survey in 2012 indicated four communities had an AMP in place and 18 communities were getting started by preparing asset inventories and conducting condition assessments.

One of the most significant drivers behind New Hampshire’s AM policy, the estimate of the state infrastructure gap, has not been updated since the 2011 estimates were documented. However, the state is considering an update to that estimate in about 2021, which will in part provide a measure of the effectiveness of the AM policy.

Communities understand that NHDES prefers to provide technical assistance and financial assistance rather than “dropping the regulatory hammer.” Both NHDES and
water systems realized that, ultimately, they share the common goal of providing clean, safe drinking water to customers. The willingness of NHDES to meet with communities in person to answer questions and work with water, sewer, and road utilities directly is believed by regulators to have made an enormous difference in fostering a partnering approach. Rather than jump to enforcement actions or investigations, NHDES often identified opportunities to apply asset management to address issues. Energy audits were also used in some cases to promote better management practices through AM implementation.

In addition, separate departments within NHDES have made significant efforts to not only provide communities with AM resources but also to facilitate improved AM practices to be implemented consistently between water, wastewater, and stormwater sectors. NHDES is sending a very consistent message to the regulated communities about the importance of AM and how to implement AM elements. This consistency has helped communities approach AM holistically and efficiently across their entire asset base, in some cases allowing AM to be implemented when it may not have been otherwise.

NHDES is using its sanitary survey process to monitor whether AM processes are being sustained in communities that have received funding, but admittedly has been reluctant to strongly enforce compliance as opposed to encouraging it. In addition, they believe future improvements will entail encouraging public input when developing service levels. Like any strong AM program, NHDES understands that modernizing processes is an endless endeavor.

As part of the case study involving PVW&SD, the utility noted that their success was the result of learning about all available resources (including educational resources and funding) as well as “putting AM in the hands of the operators, as they will ultimately determine the success or failure of the program, and involving them early will establish buy-in and promote sustainability.” Based on this experience, they suggest that regulators (a) adequately support and communicate information about available resources and (b) provide enough flexibility in AM requirements to allow utilities developing AM programs to design the program in a way that best suits their operating context, which in turn leads to more sustainable programs.
3 Case Study: New Jersey Department of Environmental Protection (NJDEP)

The task of the New Jersey Department of Environmental Protection (NJDEP) is to oversee the protection of New Jersey’s water resources to ensure safe, adequate, and reliable water supply is available to the public and to restore, enhance, and maintain the integrity of the waters of the State. NJDEP regulates municipal utility AM in New Jersey (NJ). In addition, the state has a large proportion of private, investor-owned utilities, which are economically regulated to a large degree by the NJ Board of Public Utilities.

3.1 Overview of AM Policy

Until recently, NJDEP’s AM policy was mainly focused on implementing CWSRF FSP requirements, as described in Section 3.2.1. Like NHDES, NJDEP offered priority points to utilities implementing specific elements of an AM Plan when considering SRF funding requests. In 2016, the state legislature passed the Water Quality Accountability Act (WQAA), now considered one of the more prescriptive AM regulations in the country (see Section 3.2.3 for details). While many of the requirements embedded within the WQAA have only recently come due or will come due soon, it is the specificity of the WQAA that gave rise to the inclusion of New Jersey’s policy in this study.

NJDES has prepared and organized a variety of AM policy and guidance documents on its website as well as links to other guidance documents and AM tools (https://www.nj.gov/dep/assetmanagement/index.html). These resources are described in Section 3.3.

3.2 AM Governance

3.2.1 State Revolving Fund Loan Program

By 2012, NJ was participating in AM workgroups and began offering utilities SRF priority points for each of the following: an asset inventory (25 points), a rate setting study (25 points), and development of a five-year CIP (50 points). Since that time, the NJDEP has established regulations requiring proper operation and maintenance of systems and their components, which includes maintaining the technical, managerial, and financial capacity to do so as outlined in the NJ Safe Drinking Water Act and the NJ Water Supply Management Act. The NJ Environmental Infrastructure Finance Program (NJEIFP)—the funding arm of NJDEP—requires that utilities applying for loans have an AM Plan either established or under development for the assets associated with the loan.

The NJDEP’s Capacity Development Program (CDP) promotes water systems’ technical, managerial, and financial capacity, and on September 28, 2000, the USEPA approved New Jersey’s original Capacity Development Strategy (CDS), which it implemented as an element of the current DWSRF program. Since approval of the original CDS, the CDP developed the guidance manual “Criteria and Benchmarks for Technical, Managerial, and Financial (TMF) Capacity” which revises New Jersey’s approved CDS to incorporate asset management as a central tool—these revisions were enacted in 2010 with the primary purpose of incorporating AM benchmarks in the evaluation of systems. The manual helps utilities develop long-term planning for water infrastructure and identifies benchmarks to measure whether a public water system has adequate TMF capacity for long-term viability. Benchmarks can be found in Capacity Development Program: Criteria and Benchmarks for Technical, Managerial, and Financial (TMF) Capacity document,
published by the State of New Jersey Department of Environmental Protection Division of Water Supply in 2010. The capacity assessment asks one strategic benchmarking question for each of the following aspects of the public water supply:

- Source
- Groundwater
- Surface Water
- Treatment
- Storage
- Distribution
- Personnel
- Certified Operators
- Managerial Capability
- Financial Capability


NJDEP uses the benchmarks before funding to help determine which utilities to provide AM support to, and again three years after funding is provided to determine if supported utilities achieved the desired improvements. According to NJDEP,

> “Resources such as site visits, Technical, Managerial, and Financial (TMF) Self-Evaluation Forms, internal system databases, compliance history, and staff recommendations, are used to complete the criteria and benchmarks and provide a score for the system. The criteria and benchmarks can also be used as guidance for systems not on the list to see how adequate their system capacity is. The criteria and benchmarks are not used to award or penalize a system more so than being used as guidance where improvements, whether required or recommended, can be made. Once the criteria and benchmarks are used for those systems on the strategy list, it creates a starting point with how the CDP looks to help the system whether that is in the form of training, technical assistance, financial assistance, or some other form of assistance best fit for the system.”

The NJDEP can set aside up to ten percent of each capitalization grant for State program management activities, which includes establishing and funding the CDP.

The New Jersey Water Bank (NJWB) is a partnership between the NJDEP and the New Jersey Environmental Infrastructure Trust (NJEIT) to provide low-cost financing for drinking water infrastructure projects. The DWSRF is administered as part of this partnership. NJEIT issues revenue bonds which are used in combination with zero-percent interest funds to provide very low interest loans for water infrastructure improvements. The NJDEP administers a combination of Federal State Revolving Fund (SRF) capitalization grants as well as the State’s matching funds, loan repayments, state appropriations, and interest earned on such funds.

In addition to the requirement of having an asset management plan, applicants seeking a DWSRF loan are required to file a letter of intent online with NJEIT to be placed on the Project Priority List for potential funding. Principal forgiveness funds are available for development of an AMP for eligible municipally-owned water systems.

DWSRF loans are provided based on a priority ranking system that assigns points from various predefined categories. A project must qualify for points from Category A to be eligible for ranking. The categories are outlined as follows:

- Category A: Compliance and Public Health
• Category B: Water Supply Plans/Studies — points are assigned under this category for each project that demonstrates that its water system structurally inspects its finished storage facilities every five years and for systems that have a valve exercise program

• Category C: State Designations

• Category D: Affordability

• Category E: Population

All projects are placed on the Project Priority Comprehensive List according to their ranking. The order of project priority for funding is as follows:

1. Emergency projects
2. Small systems serving less than 10,000 persons, up to 15 percent of the DWSRF
3. Lead service line location and replacement projects
4. Other projects currently on the comprehensive list

(https://www.state.nj.us/dep/dwq/pdf/njeifp_2018P_cw-dw_ppl.pdf#nameddest=Appendix3)

3.2.2 NJDEP Loan Terms

Through fiscal year 2018, projects were funded in ranked order so that the highest priority public health projects were funded. Highly ranked projects received the following loan terms:

• Publicly-owned water systems: 50 percent NJDEP interest-free/50 percent NJIB market rate
• Privately-owned water systems: 25 percent/75 percent with $10 million cap per project; balance NJIB market rate
• Water systems with an action level exceedance, lead service line replacement projects: 90 percent principal forgiveness/10 percent NJDEP interest-free capped at $1 million per municipality served that has a median household income less than the median household income of the county

• Affordability
  • Publicly-owned water systems: 75 percent NJDEP interest-free/25 percent NJIB market rate with $10 million cap for those water systems located in a municipality with a median household income less than 65 percent of the State median household income; balance 50 percent NJDEP interest-free/50 percent NJIB market rate
  • Small water systems (<10,000 customers)
    • $5M set-aside
      • $1M for water systems serving <500 customers: 50 percent principal forgiveness/25 percent NJDEP interest-free/25 percent NJIB market rate (same as proposed FFY2018/SFY2019 IUP), projects capped at $500,000 principal forgiveness
      • $4M for 75 percent NJDEP interest-free/25 percent NJIB market rate, projects capped at $1 million

As of September 2018, there were inadequate funds available to finance drinking water projects anticipated for funding in SFY2019 and SFY2020. To address this issue, the NJDEP plans to reevaluate the process for prioritizing drinking water projects for funding and readiness as well as financing packages offered to maximize the effectiveness of
the limited funds. On September 24, 2018, a formal notice to amend the drinking water portion of the Intended Use Plan (IUP) was issued with the following changes proposed:

- Changes to funding priorities, e.g., lead service line projects are still funded, but in priority order according to the ranking system
- Fund all drinking water projects in the project priority order, not readiness to proceed, based on the ranking methodology
- Modifications to loan rates for publicly-owned water systems, privately-owned water systems, small water systems, and water systems that do not meet the affordability criteria in the IUP to increase the number of high priority projects funded
- Eliminate the 100-percent principal forgiveness asset management set-aside program for small drinking water systems

Updates to the budget estimates for drinking water program funding program can be found on the NJDEP website. Current (as of late 2018) DWSRF obligations and project applications exceed the amount available in State Fiscal Year 2019 (sources estimated at $216 million), and the currently anticipated 2020 sources total only $60 million.

Conversations with the NJDEP about this SRF funding shortage point to the increasing demands on utilities to deal with aging infrastructure, lead and copper service line replacement needs, asset management rules, water conservation impacts on revenue, and regulatory and other pressures.

### 3.2.3 Water Quality Accountability Act (WQAA)

The Water Quality Accountability Act (WQAA), enacted by the Senate and General Assembly of the State of New Jersey on July 21, 2017, establishes requirements for purveyors of public water to improve the safety, reliability, and administrative oversight of water infrastructure. As a requirement of the WQAA, purveyors must create and implement an AMP; locate, inspect, mark, and flush hydrants routinely; and locate, inspect, and exercise valves routinely according to very specific standards. Additionally, purveyors with Internet-connected control systems are required to create cybersecurity programs. The law is intended to enhance the reliability and safety of the State’s drinking water and applies to all NJ water purveyors. Each of the elements of the WQAA must be certified by a local officer on an annual basis.

Based on interviews with NJDEP, AWWA-New Jersey Section AM Committee members, and regulated utilities, both the timing and specificity of WQAA took many utilities by surprise. Originating in the state legislature and informed by a bipartisan legislative task force concerned with lead service connections and aging infrastructure following the Flint water crisis, neither NJDEP nor professional drinking water associations like AWWA-New Jersey were involved to as significant a degree as would have been optimal. As a result, developing the regulations to implement the WQAA by NJDEP with AWWA-NJ’s input has lagged substantially, and there has been substantial pushback by some municipal utilities on the lack of flexibility with portions of the WQAA.

Each hydrant must be marked with paint, brand, or a soft metal plate indicating ownership and an identification number or symbol by which the location of the hydrant can be determined on records. To the extent possible, each hydrant must be located using a satellite-based global positioning or other technology. Each water purveyor must also create a plan to “test every fire hydrant in its system in order to determine the hydrant’s working condition. Each water purveyor shall formulate and implement a plan for flushing every fire hydrant in the public water system, and every dead end of a main in the public water system.”
Valve inspections and exercising (excluding service connection and shut-off valves) are required for all valves and must take place at least every two years for those more than 12 in. in diameter and at least every 4 years for all smaller valves. Inspections include cleaning to allow full access and a dynamic test of each valve as specified by the manufacturer or to at least 15 percent of the number of turns to fully open/close the valve. As with hydrants, each valve must be located using global positioning system (GPS) to the extent possible.

Each water purveyor with more than 500 connections and an Internet-connected control system must also develop a cybersecurity program for identifying and mitigating cyber risk to the public water system. Utilities must establish responsibilities and accountability for risk management activities and must put practices and procedures in place to assess and manage cyber risks to the public water system. Purveyors must create and exercise cyber-emergency response and recovery plans.

The WQAA requires every water purveyor to implement a system-wide AMP by April 19, 2019. WQAA AM requirements apply to all system assets, whereas AM requirements as part of SRF funds only apply to the assets associated with the funded projects. The AMP must include:

- A water main renewal program designed to achieve a 150-year replacement cycle unless otherwise specified based on an engineering analysis of water main condition
- A water supply and treatment program designed to inspect, maintain, repair, renew, and upgrade treatment facilities and equipment

Each water purveyor is required to dedicate funds to address and remediate the highest priority projects as determined by its AMP. Each water purveyor must prepare an AMP update every 3 years thereafter, and each version must be certified by the licensed operator or professional engineer of the water system. The AMP must include a summary of capital works completed in the past year and planned for the coming year to address AMP priorities.

Finally, the WQAA requires certification by the responsible corporate officer (if privately held), executive director (if an authority), or mayor or CEO (if municipally owned) of the water system each year, indicating that the requirements set forth in the Act are met. The full text of the WQAA can be found at https://www.njleg.state.nj.us/2016/Bills/PL17/133_.PDF.
is communicating expectations for 2019 and beyond. As an example provided by NJDEP during the November 2018 interview, if a utility has a plan in place to develop a full inventory on a defined and acceptable schedule, they could achieve compliance in April 2019, so long as progress is made and reported subsequently. Both New Jersey utilities interviewed as part of this study (see Sections 3.5 and 3.6) recognize and appreciate the efforts on NJDEP’s part to involve stakeholders in the rule-making process.

3.2.4 Water Infrastructure Improvement Bond Act of 2018 (not enacted as of December 2018)

On February 1, 2018, the “Water Infrastructure Improvement Bond Act of 2018” was introduced to the New Jersey Senate and General Assembly (as Bill A. 2693) and would authorize bonds for $400,000,000 for the purposes of financing water infrastructure improvement projects. The legislature is concerned that “much of the State’s drinking water infrastructure has aged past its useful life and is breaking down due to decades of underinvestment.” This has led to “increased water main breaks and service interruptions, more frequent and costly emergency repairs, insufficient water flow and pressure, and a lack of sufficient water infrastructure to support local and State economic growth.” There are concerns with water loss and lead service lines. For the full text of Bill A 2693, see [www.njleg.state.nj.us/2018/Bills/A3000/2693_I1.PDF](http://www.njleg.state.nj.us/2018/Bills/A3000/2693_I1.PDF).

Funds would be made available to NJDEP and the New Jersey Infrastructure Bank for integration, to the greatest extent practicable, into existing programs and resources in the New Jersey Environmental Infrastructure Financing Program.

Of the aggregate, $125 million is proposed for asset management activities (as shown in **bold**):

1. **$100,000,000** shall be allocated to the department for the purpose of providing matching grants and zero interest loans to local government units to finance the cost of projects to repair and rehabilitate public water systems, including, but not limited to, projects to reduce water loss. Priority shall be given to local government units that have established asset management programs pursuant to the rules of the Water Quality Accountability Act: section 7 of P.L.2017, c.133 (C.58:31-7), or any rules or regulations adopted pursuant thereto;

2. **$100,000,000** shall be allocated to the department for the purpose of providing matching grants to local government units and investor-owned water companies to finance the cost of lead service line replacement projects that primarily benefit at-risk populations, such as pregnant women and children, in economically-distressed areas. Priority shall be given to public water systems that have compiled inventories of lead service lines in use in their distribution systems;

3. **$100,000,000** shall be allocated to the department for the purpose of providing grants, zero interest loans, or other financial assistance to local government units to finance the cost of combined sewer overflow abatement projects, including projects that reduce sewer flows through inflow and infiltration reduction, water conservation projects, and green infrastructure projects. Priority shall be given to local government units that have completed long-term control plans for combined sewer systems;

4. **$50,000,000** shall be allocated to the trust for the purpose of establishing reserves and providing loan guarantees for stormwater management and combined sewer overflow abatement projects financed pursuant to P.L.1985, c.334 (C.58:11B-1 et seq.) or this act;
5. $25,000,000 shall be allocated to the trust for the purpose of providing grants to local government units to finance the cost of developing asset management programs for public water systems, wastewater treatment systems, and stormwater management systems; and

6. $25,000,000 shall be allocated to the trust for the purpose of providing grants to 30 local government units to finance the costs of developing long-term control plans for combined sewer systems.

3.3 Sponsored AM Resources

NJDEP has offered written AM technical guidance as early as 2012 as well as an AMP Assessment Guide. NJDEP also coordinates with water industry agencies and associations regarding AM policy and offers AM training courses and certification for utilities, their fiscal officers, mayors, and key decision makers.

3.3.1 Guidance Documents

NJDEP’s “Asset Management Technical Guide” provides detailed information on the components of an AM program and aids owners and operators of wastewater and drinking water systems in developing and improving their AM program. AM program components listed on the NJDEP website follow the Five Core Asset Management Questions, per the Water Research Foundation’s AM Framework (for the Five Core Questions, see http://simple.werf.org/Books/Contents/z-ready-to-delete/Wastewater-Training-Module/Five-Core-Asset-Management-Questions):

- (Current State of Assets): Asset inventory, mapping, and condition assessment
- Levels of Service
- Criticality / Prioritization Assessment
- Life-cycle Costs
- Long-Term Funding Strategy

The NJDEP website provides guidance on the content expected for each component of the AM Program. The “AM Plan Assessment Guide” is a document supplied by NJDEP that can be used to evaluate and improve the accuracy and completeness of a facility’s AMP. For example, the NJDEP website page for the “Current State of Assets” section of an AMP includes a list of suggested subsections on asset identification, developing an asset inventory, asset mapping, condition assessment, and determining the remaining useful life of assets. For each subsection, descriptions of content and links to supplemental guidance documents (by others) are provided. AMPs required by the WQAA are also expected to contain a description of the AM activities associated with each of the five elements listed above, so it appears that NJDEP’s technical guide is consistent with the WQAA. The asset management program components website can be found at www.nj.gov/dep/assetmanagement/index.html.

Very similar to the content on its website, NJDEP also created its “Best Practices” document on Asset Management in the wake of Superstorm Sandy. It can be accessed at: www.nj.gov/dep/watersupply/pdf/guidance-amp.pdf

3.3.2 Tutorials and Tools

NJDEP’s Asset Management Program provides links to various tutorials such as Geographic Information System (GIS) and Check-Up Program for Small Systems (CUPSS) as educational tools related to keeping field inventory of system components and tracking capabilities. NJDEP also provides a link to the Environmental Finance Center (EFC) Network Tools, which provide assessment tools, financial models, audit software, and inventory databases.
3.3.3 Training
NJDEP offers a link to the Southwest EFC AM Components Training, which is a resource providing training materials to assess a user’s knowledge of AM practices, planning structures, benefits of AM, and EPA financing programs.

3.4 Data and Information on AM Policy Impacts
To better understand the extent and level of AM progress, in 2016 the NJDEP surveyed both community public drinking water systems and permitted wastewater utilities in NJ. The goal of the baseline survey was to help the NJDEP determine the most effective long-term strategy to support AM. The survey response rate exceeded 75 percent from both drinking water and wastewater systems and helped demonstrate the direction of the industry. The survey was a self-assessment, and responses were not validated.

Results from the study, which focus on basic components of an AM Plan (e.g., inventory, mapping, condition assessment, criticality, and long-term financing) are posted on the NJDEP website as “New Jersey Water System Asset Management Assessment: Baseline Survey Report.” A graphic example of the results from the survey is shown in Figure 3-1. The graph shows the percentage of drinking water systems that have “completed an aspect of” the following AM components: inventory, mapping, condition assessment, and criticality assessment.

One of the most significant findings from the survey was in relation to the amount of time drinking water systems estimated it would take to complete components of an AM program. For four components (inventory, mapping, condition assessment, and criticality assessment), a plurality of utilities stated it would take seven or more years to complete the work necessary. For the 2016 survey report and graphic results, see links on this page of the NJDEP website: https://www.nj.gov/dep/assetmanagement/status.html

The 2016 Survey has not been administered following the baseline. Any future issuance of that survey could be used to compare results and gage relative progress.

3.5 New Jersey Case Study 1: Jackson Township Municipal Utilities Authority (JTMUA)
The Jackson Township Municipal Utilities Authority (the Authority) has been providing residents of Jackson Township with a safe, clean supply of drinking water and sanitary sewer disposal services for more than 50 years. The Authority, which has 50 employees, owns and operates two water systems in Jackson Township: Jackson Township MUA (JTMUA) water system, which provides service to 35,000 customers, and the Six Flags Great Adventure (SFGA) water system. These water systems are supplied by separate treatment and distribution systems but are scheduled to be interconnected by 2020. The Authority operates a wastewater collection system but is not responsible for wastewater treatment.

The JTMUA water system includes two advanced water treatment facilities: one put into service in 2001 and the other in 2010. Together with 11 major production wells drawing from four aquifers and three finished water pumping stations, the JTMUA system can produce 10.4 million gallons per day (MGD). Average production is about three MGD. The JTMUA system includes 179 miles of water mains and eight tanks with a cumulative capacity of 6.05 million gallons (MG).

Until 2018, the SFGA water system consisted of four production wells, a water treatment plant, and two water storage tanks totaling 1.0 MG in storage capacity, providing
potable water exclusively to SFGA. In partnership with SFGA, the Authority constructed a 2,250 GPM Advanced Water Treatment Plant and a one MG elevated storage tank in 2018. These combined facilities are regional and service the northwestern portion of Jackson Township.

3.5.1 AM at the JTMUA
In addition to the AM regulation by NJDEP, the Authority is also economically regulated by the NJ Department of Community Affairs (NJDCA). AM concepts have been incorporated into the Authority’s approach for more than a decade, and the Authority has long been depreciating assets to meet NJDCA’s standards, advancing thought on the financial planning and management of assets with the goal of fiscal sustainability. Master planning and development of a capital improvements program use AM principles. Hydrant flushing has been conducted for 20 years to maintain distribution system functionality. Treatment plants are well maintained, and proactive water main replacement is conducted. SRF funds have been utilized extensively ($45 million over the last dozen years), and while the AMP requirements in SRF loans were not daunting to the Authority, they did help to formalize some of the concepts.

Economic regulation, SRF funding and its associated requirements, as well as the WQAA have all been factors in driving AM development at JTMUA. In addition to access to funds, the Authority cites the main benefit of the SRF funding program and the WQAA as increasing the formalization and structure of AM, both through the policies themselves and the associated guidance documents. With a full GIS and hydraulic modeling supported by SRF funds, an AM program for the water distribution system in 2017 allowed for more formal documentation of critical mains. Based on this AM analysis, portions of the system were looped to increase future reliability, normalize pressures, protect against water hammer, reduce the number of dead-end mains, and reduce fire-flow risks. In addition, some pipes were identified for replacement (e.g., 1960s asbestos cement pipe). Furthermore, the Authority has now implemented a maintenance management system, which is currently used to track customer information, service requests, and financial data, but which may be expanded in the future to support better work and asset management. The maintenance management system will also be used to track additional performance metrics.

The Authority’s Board of Commissioners has supported the proactive approach and optimized life-cycle management approach to AM. The Board did not object to the WQAA requirement for valve exercising, even though the exercising was not formally conducted in the past and it required a significant investment in valve exercising equipment. The Board and Authority recognize the value in terms of risk reduction based on how they have embraced AM concepts.

3.5.2 JTMUA Perspective on AM Regulations
The Authority was asked about their perspective on AM policy in New Jersey and offered some suggestions. First, they believe guidance (such as that on the NJDEP website) should be more well defined to better support efficiency and effectiveness of utilities. The NJDEP guidance manuals are helpful with basic AM concepts, but not as comprehensive and prescriptive as necessary to fully guide utilities to meet regulatory policies. Conversely, the Authority feels WQAA legislation is far too prescriptive (e.g., the reflective tape used by the Authority to label hydrants does not comply with WQAA regulations—hydrants need to be painted and branded with soft metal tags according to WQAA). In the absence of the rules surrounding WQAA that must be provided by NJDEP, most utilities are unclear on how to comply with the impending WQAA deadlines. Loosening the WQAA rules, in the Authority’s perspective, will allow utilities the flexibility
to determine how to implement AM in a way that best suits their customers and community.

### 3.5.3 JTMUA's Advice for Regulators

The Authority was asked about their advice for government agencies contemplating the regulation of AM. Their replies centered on economic regulation as well as support/funding for any requirements. Unless a community is in good financial standing, they may not be able to fund any initiatives and/or projects developed from an AM program. Encouraging (or regulating) sound financial management at all utilities should be a part of AM rules, in the opinion of the Authority. Some other economically regulated utilities interviewed as part of this study expressed a similar sentiment that municipally-owned utilities should be regulated in the same or similar fashion as economically regulated utilities. JTMUA also supports increased funding by states, noting, “There seem to be a lot of recent requirements that involve significant expense to utilities (lead and copper rules, asset management, phosphorus limits, etc.). There are not a lot of carrots left.”

### 3.6 New Jersey Case Study 2: AWWA-New Jersey Section

Interviews were conducted with the AWWA-New Jersey Section AM Committee to gain the perspective of both public and private utilities. Feedback is summarized below.

#### 3.6.1 AWWA-New Jersey Section AM Committee: Perspective on AM Regulation

- Policy to date has been helpful in that AM was introduced as a best practice for operating a utility. Before the SRF program’s AM requirements, the focus had been on financial best practices. Project AM Plans drove the model to replace assets by focusing on probability and consequence of failure scoring.

- Conceptually, at the conclusion/commissioning stage of an asset creation/construction project, obtaining data on asset inventories and asset characteristics (like size, material, as-builts, O&M Manuals, and other asset data) is very important for the future management of assets. Most utilities agreed that this process needed a lot of improvement. While it is up to a utility to turn asset inventory data into useful information/AM knowledge, SRF project requirements drive the gathering of that information.

- In regard to the WQAA, “it’s too early to tell, but there are some pros and cons.” Requiring chief executives, Mayors, and utility directors to be involved in certifying AMPs will potentially elevate AM practices to a higher level of importance. Requiring AMPs will likely bring internal staff (engineering, operations, maintenance, finance, and IT) together and help align their actions, increasing efficiency and effectiveness.

- While the legislation may give utility managers the resources needed to conduct the highest priority work identified in an AMP, rates may need to increase at many utilities. Local utilities and the communities they serve may lose some degree of power to prioritize spending (both within and outside the utility in the greater community), which is a significant concern in financially-impaired communities.

- The WQAA brings utilities (public versus investor-owned) closer in terms of what is required. Most private utilities feel this is a significant positive step to reduce inequities.
• WQAA is very prescriptive and many believe it does not leave enough flexibility for utility managers (and Mayor’s in municipal utility setting). Private utilities, which are regulated more stringently but do not have the additional municipal responsibilities that public utilities do, are less concerned about the issue of flexibility.

• The AWWA-New Jersey Section believes that the benefits of AM are well understood across the NJ water utility sector, but that the benefits of currently-legislated AM (in NJ) are not yet clear.

• The current guidance is still very general and does not provide the “how-to” that is needed by utilities to productively move forward.

3.6.2 AWWA-New Jersey Section AM Committee: Advice for Regulators Considering AM Policy
This section reflects the experiences of professionals currently complying with the WQAA. Information in this section does not necessarily reflect the opinions of the overall AWWA-New Jersey Section or individual section members.

• In some states, legislative requirements have involved deadlines to prepare AMPs before the issuance of rules and with insufficient guidance on the required contents. This has put regulated utilities into a reactive mode that is ineffective and inefficient, counter to the principle of AM.

• Utilities and the water industry (including professional societies that represent a combination of utilities, regulators, utility consultants, and asset/equipment manufacturers) should be involved in a more collaborative effort to develop the AM Policy. While they do not possess the power of lobbying groups, they offer a robust and experienced perspective on utility management.

• There should be a balance between leaving utilities with enough flexibility in developing and implementing AM in their operating context while also providing enough specific guidance about the expectations of the governing body so that AMP can be prepared consistently with overall policy expectations.

• Outreach and educational training are needed well in advance of AM deadlines. AM takes time to implement, and it will not be effective if utility staff are not trained first.

• When the state promulgates new AM requirements, particularly to the level of specificity of the WQAA and to the degree that it required the implementation of projects identified in AMPs, they should be accompanied by appropriate and associated public funding to allow such requirements to be implemented.

• If metrics/levels of service are required, data should be confidential (as with many water infrastructure records) and target setting should be left to the utilities because they best understand their priorities and trade-offs between performance, cost, and risks.

3.7 Summary and Conclusions: NJDEP Case Study
While it is too early to determine the impacts of the AM legislative policy in New Jersey, there are takeaways that have resulted from the SRF program and promulgation of the WQAA. Most notably is determining the appropriate balance between flexibility and specificity of the AM policy. AMP guidance related to SRF funding were vague, and AMPs were not reviewed by the government to determine their quality and effectiveness. Conversely, WQAA sets overly specific inspection, hydrant flushing, and valve exercising requirements that may not provide the best value to the customers of many utilities.
Funding is of significant concern. Regulatory and other pressure have increased, evidenced by stronger demands for SRF funding to the point that it is not sustainable at past levels. The WQAA requirement to dedicate funds to finance its highest AMP priorities may not be practical in some communities that are financially challenged.

Discussion with NJDEP indicated that they have not arrived at any conclusions about which metrics to require (if any) as part of the Level of Service sections of AMPs. While many utilities advocate for the use of Service Level metrics, they are concerned about that information becoming publicly available, and strongly feel that target setting must be at the sole discretion of the utility.

Finally, NJDEP should consider conducting the “New Jersey Water System Asset Management Assessment Survey” again. The survey was originally administered in 2016, and follow-up surveys conducted in the near term and then again in the years after WQAA deadlines may prove helpful in determining what AM progress has been made and if AM policy is having a positive impact.

**Figure 3-1. Percentage of responding drinking water (DW) systems that have completed an aspect of asset management**

(See chart showing percentage of responding DW systems that have completed an aspect of the following AM components.)

4 Case Study: Michigan Department of Environmental Quality (MDEQ)

The MDEQ (now Michigan Environment, Great Lakes & Energy, EGLE) promotes the wise management of Michigan’s air, land, and water resources to support a sustainable environment, healthy communities, and vibrant economy. Their vision is to reduce public health and environmental risks, assist Michigan communities with addressing infrastructure needs, and build external partnerships to address Michigan's environmental issues through the authorities granted by the Michigan Legislature and Constitution. The Department works under three guiding principles: Be leaders in environmental stewardship; be full partners in Michigan’s economic development; and provide outstanding customer service (https://www.michigan.gov/egle/0,9429,7-135-3306---,00.html).

4.1 Overview of AM Policy

Michigan's policy on asset management is a mixture of MDEQ regulation, encouragement through grants and loans, outreach, and guidance from State-sponsored leadership councils. Michigan's proximity to the Great Lakes provides its residents with an abundant and high-quality water resource. The great challenge for water suppliers lies in protecting the high quality of the resource and managing deteriorating infrastructure. Advancing asset management practice has been recognized by leadership throughout the State as a strategy to ensure safe, reliable, efficient, and cost-effective infrastructure.

The legislative milestones shown in Table 4-1, which have contributed to the development of asset management planning and practices in Michigan municipalities, are discussed in Section 4.2.

<table>
<thead>
<tr>
<th>Year</th>
<th>Milestone</th>
</tr>
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<tbody>
<tr>
<td>2002</td>
<td>Transportation Asset Management Council created, exposing utilities, regulators, and engineers to AM principles and implementation and regulatory frameworks</td>
</tr>
<tr>
<td>2012</td>
<td>AMP requirement added to municipal holders of Major NPDES permits (&gt;1 MGD)</td>
</tr>
<tr>
<td>2013</td>
<td>MDEQ’s Stormwater, Asset Management and Wastewater (SAW) Program established</td>
</tr>
<tr>
<td>2014</td>
<td>SRF funds available for AMP creation; Fiscal Sustainability Plans required for CWSRF projects</td>
</tr>
<tr>
<td>2015</td>
<td>Community water supplies with more than 1,000 people are required by the state to have a Water System AMP by January 1, 2018.</td>
</tr>
<tr>
<td>2018</td>
<td>Michigan Infrastructure Council and Michigan Water Asset Management Council established</td>
</tr>
</tbody>
</table>

4.2 AM Governance

An overview of the AM policy, requirements, drivers for AM change, and funding mechanisms associated with the MDEQ AM governance is provided below.

4.2.1 Transportation Asset Management Council

The Michigan Transportation Asset Management Council (TAMC) was created in 2002. Public Act (PA) 499 formed the Council and dictated that all public roads in Michigan would be managed using the principles of effective AM. The Council was charged
with developing common definitions, condition assessment methodologies, and data collection procedures. The TAMC is required to prepare an annual report detailing its activities during the previous year and its plans for the upcoming year. The Council reports directly to the State Transportation Commission with Council members who are appointed to three-year terms. Municipalities and road commissions provide annual reports for Council review in a common framework. The reports include the condition of roads and bridges as well as financial earnings and expenditures. The Council provides education and training on the benefits of developing road improvement programs using advanced AM principles. The TAMC’s success has been cited as a national model.

The efforts of the TAMC introduced many utility managers, decision-makers, and engineers throughout Michigan to the principles of effective AM and set the stage for adoption of improved AM practice in the water utility sector. The successful implementation of a statewide council has led to a similar approach to coordinate efforts for water infrastructure and between multiple infrastructure systems as discussed in Section 4.2.7 (https://www.michigan.gov/tamc/0,7308,7-356-82161_82415-448213--,00.html).

4.2.2 NPDES Permit Requirements
Municipal wastewater facilities in Michigan that hold a Major National Pollution Discharge Elimination System (NPDES) permit had an AMP requirement added to their NPDES permit at the time of renewal beginning October 1, 2012. NPDES permits establish discharge limits and conditions for discharges from municipal wastewater treatment facilities to waters of the United States. Facilities are designated as Major if they have a design flow of 1 MGD or greater or serve a population of 10,000 or more or cause significant water quality impacts. About 100 of the roughly 400 Municipal NPDES permits in Michigan are designated as Major.

The NPDES permit requires the submittal of an AMP on or before six months after the effective date of the permit, to include a schedule for developing and implementing an AM Program. The MDEQ made a distinction between the Plan and Program. The expectation of the AMP is to lay out the foundation and schedule for implementation of the AM Program. The AMP should list aspects of the AM Program which shall be implemented to fulfill the requirements of the NPDES permit. The timeframe for developing and implementing the AM Program should be within three to five years, as approved by the MDEQ. The goal of regulating AM Programs is to ensure communities develop the tools and processes so that sufficient revenues will be available sustainably to cover expenses.

The AM Program includes the four major elements described below:

1. Maintenance Staff – The permittee shall provide adequate staff to plan and carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of the permit.

2. Collection System Map – A comprehensive map of the sewer collection system owned and operated by the utility. The map should include all sewer lines, manholes, known or suspected cross-connections, outfalls or overflows, pump stations, force mains, treatment facilities (including treatment processes), and surface water. Details on assets should include the pipe diameter, date of installation, type of material, the distance between manholes, and the direction of flow; and the manhole interior material, rim elevation (optional), and invert elevations.
3. Inventory and assessment of fixed assets – The permittee shall complete an inventory and assessment of operations-related fixed assets. Fixed assets are assets that are normally stationary (e.g., pumps, blowers, buildings). The inventory and assessment shall be based on current conditions and shall be kept up-to-date and available for review by MDEQ.

   · The inventory must include the following: a brief description of the fixed asset, its design capacity (e.g., pump: 120 gal/min), its level of redundancy, and its tag number if applicable; location; installation year; depreciation value; and current replacement cost.
   
   · The assessment shall include a “Business Risk Evaluation” that combines both the probability of failure and the criticality of each fixed asset, each on a scale of 1–5 (low to high), with each asset’s Business Risk Factor calculated by multiplying the failure rating by the criticality rating.

4. Operation, Maintenance, & Replacement (OM&R) Budget and Rate Sufficiency – An assessment of its user rates and replacement fund, including the following:

   · beginning and end dates of the fiscal year;
   · name of the department, committee, board, or other organization that sets rates for the operation of the sewer system and treatment works;
   · amount in the permittee's replacement fund in dollars for the year specified in accordance with approved schedules;
   · replacement fund of all assets with a useful life of 20 years or less;
   · expenditures for maintenance, corrective action, and capital improvement taken during the fiscal year;
   · OM&R budget for the fiscal year; and
   · rate calculation demonstrating adequate revenues to cover OM&R expenses. If the rate calculation shows there are insufficient revenues to cover OM&R expenses, the permittee shall document, within three fiscal years after submittal of the AMP, that there is at least one rate adjustment that reduces the revenue gap by at least 10 percent.

Each year, permittees are required to submit an AM Program Update report summarizing AM activities completed during the previous year and planned for the upcoming year. The report must include updates and plans for:

   · staffing levels;
   · inspections and maintenance activities (preventive and corrective activity);
   · expenditures for maintenance and repairs;
   · assets/areas identified for inspection/action;
   · capital and maintenance budgets for the upcoming year that consider the implementation of an effective AM Program;
   · asset inventory; and
   · rate schedule with a plan to address insufficient revenues for AMP implementation, if any.

See www.michigan.gov/deq/0,4561,7-135-3313_71618_3682_3713-341866--,00.html for details.
4.2.3 Stormwater, Asset Management and Wastewater (SAW) Program
Michigan's Stormwater, Asset Management and Wastewater (SAW) Program was developing as changes were being made to the CWSRF and Water Resources Reform and Development Act (WRRDA) of 2014 at the national level. The SAW Program provided grants to enable communities to develop robust AMPs for their stormwater and wastewater systems. Effective January 2, 2013, the program uses funding from general obligation debt as authorized by the Great Lakes Water Quality Bond. The Great Lakes Water Quality Bond Proposal authorizing the sale of $1 billion of general obligation bonds overwhelmingly passed as a ballot initiative in November 2002. The Act created a new revolving fund called the Strategic Water Quality Initiatives Fund (SWQIF). Public Act 562 of 2012 authorized a portion of the Great Lakes Water Quality Bond to be deposited into the SWQIF for the SAW Program. Per statute, the debt service on these bonds must be paid using General Fund dollars. See www.michigan.gov/documents/deq/deq-ess-mfs-SWQIF-SWBond_249310_7.pdf for details.

A total of $450 million was made available to fund the SAW Program: $430 million was set aside for grants and $20 million was available for loans per the stakeholder group that developed the SAW Program requirements. Applications were accepted beginning on December 2, 2013, and on that day 673 applications totaling $541 million in requested funds were received by the MDEQ. Due to the vast number of applications received on the first day, a lottery process was used to determine the funding order for applicants.

The SAW grants were made available for: planning and design of stormwater or wastewater projects to improve water quality; stormwater management plans; AMPs for stormwater or wastewater; and the demonstration of innovative technology for stormwater or wastewater projects. Applicants could request funding for multiple eligible activities. Of the applications received, 481 requested funding for wastewater asset management planning, 277 for stormwater asset management planning, 111 for stormwater management planning, 101 for design activities, and 148 for either planning activities, rate methodology development, disadvantaged construction activities, or innovative technology activities. Most grants, roughly 68 percent, were awarded for wastewater and stormwater asset management program development.

The grant maximum for each local agency is $2 million. Ten percent of the first million dollars granted by the state must be matched by the local agency. The second million dollars must be matched by the local agency at 25 percent. Matching from the local agency could be as direct dollar contributions, or, in-kind services like the agency’s labor cost. If a local agency is determined to be disadvantaged, as defined in the statute, then the match requirement is waived. Disadvantaged local agencies also qualified for $500,000 towards the construction of a project identified in an AMP.

Local agencies have three years to complete grant activities from the date of the award. Money has been allocated in six funding rounds as shown in Table MI-1. A total of 571 grants were awarded in the first six funding rounds (see Table 4-2). Many completed grant projects have been coming in under budget. The additional money available is being reallocated to the next local agencies in the lottery. Since all rounds of funding have not yet closed, it is unclear if every local agency on the lottery list will receive grant funding or if there will be funding remaining once all grants have been awarded and the grant activities were completed.
### Table 4-2. SAW grant funding summary by year

<table>
<thead>
<tr>
<th>Funding Round</th>
<th>Grant Award Date</th>
<th>Total Grants Awarded</th>
<th>Number of Grantees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>May 2014</td>
<td>$71.4 Million</td>
<td>92</td>
</tr>
<tr>
<td>2nd</td>
<td>October 2014</td>
<td>$91.0 Million</td>
<td>115</td>
</tr>
<tr>
<td>3rd</td>
<td>November 2015</td>
<td>$100 Million</td>
<td>134</td>
</tr>
<tr>
<td>4th</td>
<td>November 2016</td>
<td>$96.6 Million</td>
<td>137</td>
</tr>
<tr>
<td>5th</td>
<td>December 2017</td>
<td>$63.9 Million</td>
<td>80</td>
</tr>
<tr>
<td>6th</td>
<td>November 2018</td>
<td>$8.18 Million</td>
<td>13</td>
</tr>
</tbody>
</table>

All Grantees have a deliverable that must be submitted at the close of the three-year grant period. The type of deliverable depends upon the type of grant received. Grantees who received funding for wastewater or stormwater asset management planning activities are required to submit a certification and an executive summary providing an overview of the results of their grant activities. Section 603 of Public Act 84 of 2015, established a new grant condition for SAW Asset AMPs. All SAW AMP-grant recipients must submit a summary of the AMP, which includes identification of the major assets of the plan, and a copy of the AMP must be made available to the public for at least 15 years. The summary of the AMP must be submitted with the Wastewater or Stormwater AMP Certification of Project Completeness once the grant activities are completed. The Certificate of Completeness is a one-page document signed by an authorized representative from the municipality certifying that activities specified in the grant application have been completed. For wastewater AMP grants, this document also indicates the funding structure is adequate to meet expenses or has a plan to adopt rate increases to achieve an adequate funding structure. Each AMP had to include:

- Asset Inventory
- Levels of Service
- Critical Assets
- Revenue Structure
- Capital Improvement Plan

Grantees for wastewater and stormwater asset management planning grants were required to include their entire system; however, the system could be generalized (e.g., an asset description could contain "50 manholes along Pine Street"). There were limits placed on condition assessment activities for critical assets. For instance, cleaning and televising of sewers was eligible for grant funding, but the sewers needed to be at least 20 years old.

In addition to the required elements, grant funding could be used to pay for hardware and software expenses. Many local agencies purchased GIS and maintenance management software as part of their approved project. Funding limits for hardware and software purchases were established and limited based on the population served.

Wastewater AMP grants have a payback clause tied to accepting the grant funds. A grantee must show significant progress toward establishing an adequate funding structure within three years. Significant progress is defined as the implementation of at least one rate increase within three years of the executed grant. The rate increase must be at least 10 percent of the gap in the current revenue needed to meet expenses. The grantee needed to provide a five-year plan to address the remaining gap between revenues and expenses. The MDEQ provided clarification that only OM&R expenses were to be included in the rate sufficiency. It was decided that a future political board could
not be held responsible for rate increases for capital improvements that had not yet been constructed. Due to the clarification that capital expenses did not need to be included, very few communities were required to increase rates. Only six of the 293 wastewater rates that have been reviewed by the MDEQ have had a gap between revenues and expenses. Without including capital programs in the gap assessment, it is difficult to draw conclusions regarding the sustainability of the water utilities’ operations with an affordable rate structure.

Updates on the SAW grants are available on the MDEQ website: [www.michigan.gov/deq/0,4561,7-135-3307_3515_4143-294952--.00.html](http://www.michigan.gov/deq/0,4561,7-135-3307_3515_4143-294952--.00.html)

The SAW program also included $20 million set aside for low-interest loans. The interest rate was set at 2.5 percent with 20 year payment terms. Two applicants received a SAW loan in Round 1 totaling $18.5 million and one applicant received a SAW loan totaling $2.3 million in Round 2. SAW loans were provided to agencies for construction activities if the project was addressing a water quality issue and identified in an asset management program, or an approved stormwater management plan, or includes innovative technology approved by the MDEQ. The purpose of the SAW loan was to help agencies implement AMP-identified capital improvements.

### 4.2.4 State and Drinking Water Revolving Funds

Michigan has historically funded water and wastewater infrastructure projects through state revolving fund loan programs. Their state Clean Water State Revolving Fund (CWSRF) is the Water Pollution Control Revolving Fund, known simply as SRF. SRF funds are used to construct pollution control facility projects that fall under wastewater or nonpoint source categories. Federal DWSRF loans are administered through the Michigan fund called the Drinking Water Revolving Fund (DWRF), which provides loans to water suppliers to finance the construction (including upgrades/expansions) of public drinking water systems. Both state revolving funds issue low-interest loans averaging two percent. Loan terms are typically 20 years but can be extended to 30 years for disadvantaged agencies. Both programs offer principal forgiveness for energy efficiency, green projects, and subsidizing disadvantaged agencies. The amount of principal forgiveness varies each year. For example, in FY 2018, SRF principal forgiveness for disadvantaged agencies was set at 75 percent.

The Michigan SRF program was originally enacted in 1988 as PA 317, the Clean Water Act. The SRF is currently enacted as Part 53, 1994 PA 451, also known as the Natural Resources and Environmental Protection Act. As of October 1, 2017, the SRF program has provided low-interest loans for 582 projects, totaling $4.8 billion.

The Federal Water Resources Reform and Development Act of 2014 (WRRDA) amended the Federal Water Pollution Control Act, which includes the administration of the Federal SRF program. WRRDA requires SRF loan recipients to implement a fiscal sustainability plan. The requirement specifically says that treatment works proposed for repair, replacement, or expansion must develop and implement a fiscal sustainability plan that includes at a minimum the following four items:

- Inventory of critical assets that are part of the treatment works
- Evaluation of the condition and performance of inventoried assets or asset groupings
- Certification that the recipient has evaluated and will be implementing water and energy conservation efforts as part of the plan
- A plan for maintaining, repairing, funding, and as necessary, replacing the treatment works.
Michigan began requiring the fiscal sustainability plan elements on October 1, 2014. Fiscal sustainability plans are not required for new treatment works (where there is no existing system) or for nonpoint source projects.

A fiscal sustainability plan is like an AMP in that it is a living document that is regularly reviewed, revised, and expanded. A key difference is that the fiscal sustainability plan only needs to pertain to those assets that are part of the SRF-financed project and does not need to be system-wide, whereas an AMP typically includes all system assets. Michigan SRF will provide up to $2 million in loan funds to complete a fiscal sustainability plan or a more comprehensive AMP if the applicant has an eligible SRF construction project (to address a water quality problem).

In 1996, Congress reauthorized the Safe Drinking Water Act (SDWA) and included provisions to establish the federal Drinking Water State Revolving Fund (DWSRF). This program is modeled after the CWSRF. To implement its DWRF, Michigan adopted legislation to add Part 54 to the Natural Resources and Environmental Protection Act, P.A. 451 of 1994. Each state must operate its DWRF in accordance with federal and state laws and regulations. Eligibility requirements, rates of interest, prioritization for funding, and application procedures are among the areas of flexibility afforded to the states. The federal government has authorized DWSRF capitalization funds since fiscal year 1998, and Michigan anticipates continued capitalization from EPA. The state must provide a 20-percent match to receive these federal funds. As of October 1, 2017, Michigan DWRF program has provided low-interest loans for 288 projects, totaling $949 million.

While there is no fiscal sustainability plan or AMP requirement for DWRF funded projects, the MDEQ recognizes the importance of encouraging agencies to advance AM practices. Therefore, the MDEQ allows agencies to fund asset management activities with DWRF funds if those activities are identified and discussed in the DWRF Project Plan and are developed in conjunction with a funded construction project. Eligibility details are still being finalized, but they are expected to be like the fiscal sustainability plan elements of the SRF program.

Each agency’s SRF and DWRF funding application serves as their respective Project Plan. The Project Plan is a report that documents the project need, alternative solutions considered, cost-effective analysis of viable solutions, the anticipated environmental impact of the construction, and mitigation measures to be taken. A public hearing is required for (a) public participation and (b) environmental clearance from different state and federal agencies, as required for issuing a “Finding of No Significant Impact.” Project Plans are due by May 1 for DWRF and by July 1 for SRF. Once the Project Plans are submitted, the MDEQ scores them based on a priority point system (the priority point system does not currently include priority points for AMPs, but this is being considered for future inclusion). Projects are then listed in descending point order on the MDEQ Project Priority List that is included in the annual Intended Use Plan. Once the amount of funding has been finalized, the MDEQ established the “fundable range.” The MDEQ then identifies those projects intended to be funded for the upcoming fiscal year (October–September) beginning with the highest-ranked project.

4.2.5 Rule 1606 PA 399 Update for Water Asset Management Requirements
The need for drinking water AMPs in Michigan is essential as roughly 75 percent of Michigan residents are served by community systems. There are 1,390 community water systems that provide water for household, business, and industrial uses as well as fire suppression. Most of these systems were built between 50 and 100 years ago, while
some in the state’s oldest cities date back to the 1800s. Key assets of many of these systems are quickly approaching, or have already exceeded, their expected lifespan.

Through the passage of Rule 1606 PA 399 in 2015, MDEQ required all community drinking water systems serving more than 1,000 people to develop and implement an asset management program by January 1, 2018. The objectives are to ensure that water systems are considering all costs as they plan. There are currently 526 water supplies serving more than 1,000 people. The requirements are defined in Rule 1606 within the Administrative Rules for Act 399 (1976 PA 399, as Amended) and are listed below:

- Details of the system used to maintain an inventory of assets
- Description of the methodology to assess criticality considering the likelihood and consequence of failure
- Statement of the level of service goals
- Five-year and 20-year capital improvements plans
- Summary of the revenue structure and rate methodology to provide sufficient resources to implement the AMP


The MDEQ provided training in the fall of 2017 for community water suppliers on how to meet this requirement as many water suppliers were unaware of the upcoming deadline. Recognizing that AMPs are dynamic and always being updated, the MDEQ worked with each water supplier to meet this requirement. The final deliverable was a summary of the five AM components listed above. Roughly 75–80 percent of communities submitted their plans by the deadline. While the MDEQ can request an update at any time to these plans, it is anticipated that they will be updated every five years to coincide with the water suppliers’ Water Reliability and General Plan updates also required through PA 399.

To facilitate completion of AMPs, MDEQ provided a checklist: www.michigan.gov/documents/deq/deq-dwmad-cws-AMP-ReviewChecklist_604872_7.pdf

4.2.6 21st Century Infrastructure Commission and Infrastructure Asset Management Pilot Project

Executive Order 2016-5 established the 21st Century Infrastructure Commission on March 10, 2016. Comprised of an advisory board of 27 members representing business, government, nonprofit, academic, and communities, the Commission delivered a final report that included 110 comprehensive recommendations and a long-term vision for Michigan.

The Commission’s final report was published in November 2016. It identified that the first key issue facing Michigan in developing a 21st century infrastructure system is determining how to get more value out of assets over their entire service life. The Commission identified that the best way to accomplish this is through advanced asset management—the set of practices of identifying and managing infrastructure in a cost-effective and efficient manner based on a continuous collection of data. The Commission recommended the establishment of a regional infrastructure pilot to identify existing infrastructure data and gaps, determine an appropriate comprehensive database system to house this data, and begin to coordinate asset management data and planning across infrastructure sectors.

The underlying aim of the infrastructure pilot (Pilot) was to determine a framework for implementing effective asset management across the state of Michigan, identify
barriers and solutions for common issues, evaluate best practices and experience gained from addressing asset system failures, and develop a plan for statewide implementation, ultimately improving Michigan’s infrastructure and enhancing the quality of life for residents, communities, and businesses. From April 2017 through April 2018, the Pilot brought together experts from across the state, at every level of government, and in collaboration with numerous stakeholders to pilot a statewide asset management process across asset classes including transportation, drinking water, wastewater, stormwater, energy, and broadband. The Pilot focused on data collection in two regions—Western Michigan (in the area surrounding the City of Grand Rapids) and Southeast Michigan (in the area surrounding the City of Detroit). Overall, the data collection process was considered extremely successful, with data collected covering the geography of 158 communities. The data collected from communities that signed a data sharing agreement is shown in Table 4-3. Information on installation date, material, location, and condition was requested. Available information provided varied widely.

| Table 4-3. 21st Century Infrastructure Commission and Infrastructure AM Pilot Project – AM data summary |
|---|---|---|---|---|---|---|
| Drinking Water | Wastewater | Stormwater | Roads | Bridges | Culverts |
| Segments/Number | 540,121 | 335,273 | 324,289 | 4,856 | 14,338 |
| Miles | 15,104 | 13,505 | 6,673 | 23,023* | 14,338 |

* 22,462 miles supplied by TAMC plus 563 miles collected directly from communities

This Pilot helped to identify existing infrastructure data and gaps, determine an appropriate comprehensive database system to house this data, and began collaboration between asset owners to encourage planning across infrastructure sectors. The Pilot achieved this by identifying regional infrastructure asset management processes and database system functionality across infrastructure types. This initiative engaged a wide range of communities, agencies, and stakeholders to build a statewide culture emphasizing asset management improvement. By understanding the varying conditions, personalities, needs, and nuances of Michigan communities, Pilot participants began to develop consistency in how to approach statewide asset management standards and practices. State government leadership feels the Pilot set the stage for meaningful future collaboration. See the following link for details: [www.michigan.gov/documents/snyder/Michigan_Infrastructure_Asset_Management_Pilot_Final_Report_V20_622484_7.pdf](http://www.michigan.gov/documents/snyder/Michigan_Infrastructure_Asset_Management_Pilot_Final_Report_V20_622484_7.pdf)

4.2.7 Michigan Infrastructure Council and Water Asset Management Council

Recognizing the need for guidance at the state level, the Governor’s office led the establishment of the Michigan Infrastructure Council (MIC). In June 2018, Public Acts 323 and 324 of 2018 were signed into law, creating the MIC and the Water Asset Management Council (WAMC), respectively. The vision of the creation of the MIC and WAMC stemmed from the 21st Century Infrastructure Commission’s idea of leading the nation in creating infrastructure systems that include a collaborative and integrated asset management and investment approach to enhance the quality of life in Michigan.

The MIC’s mission is bringing together local utility and infrastructure owners, regional representatives, finance and policy experts, and state departments to coordinate infrastructure goals, safeguard investments, and develop a long-term strategy for Michigan’s infrastructure assets. The MIC is comprised of nine appointed voting members who are representative of one or more of the following: (1) asset management experts from the public and private sectors with knowledge of and expertise in the
areas of planning, design, construction, management, operations, and maintenance for drinking water, wastewater, stormwater, transportation, energy, and communications; (2) financial and procurement experts from the public or private sector; and (3) experts in regional asset management planning across jurisdictions and infrastructure sectors.

The nine voting members serve three-year terms. Five of the voting positions are appointed by the Governor, one by the Senate Majority Leader, one by the Speaker of the House, one by the Senate Minority Leader, and one by the House Minority Leader. The MIC is also comprised of nine nonvoting members representing state agencies, the Water Asset Management Council (WAMC), the Transportation Asset Management Council (TAMC), and the Michigan Public Service Commission. The politically-appointed voting members will vote on many different issues as they arise with one of the most important being the annual appointments to WAMC. The MIC is charged with developing a three-year Strategy for establishing a statewide integrated asset management system by March 2019 and a 30-year Integrated Infrastructure Strategy by July 2021. The three-year Strategy is expected to evaluate the findings of both the 21st Century Infrastructure Commission and the regional Asset Management Pilot and utilize that information in forming the strategy. The 30-year Strategy will be updated every five years and includes statewide condition assessment and infrastructure priorities, performance goals, and investment needs. The MIC is strategically housed under the Michigan Department of Treasury since there are strong ties between financial decisions and asset management. The MIC will concentrate on informing and educating lawmakers and decision-makers at state agencies on comprehensive infrastructure needs and funding considerations. This outreach will include education on the declining condition of buried assets and the rates or funding required to replace and maintain them.

The WAMC’s mission is applying best practice principles, managing strategic investments, and promoting coordinated activities across Michigan’s drinking water, wastewater, and stormwater systems. Per the legislation, the WAMC is housed under the MIC with support being provided by the MDEQ. Given impending legislative deadlines, both the MIC and WAMC have moved very quickly. The initial nine WAMC voting member appointments were made by MIC in September 2018 and the WAMC held their first meeting on October 18, 2018.

As the discussions of asset management in water infrastructure continue around the state, the role of WAMC will be to lead, guide, and assist communities in the development and/or enhancement of their drinking water, wastewater, and stormwater asset management programs. By October 1, 2019, the WAMC is charged with developing a template(s) that contains requirements for information to be included in an AMP as well as establishing a schedule for submission of those local AMPs to the Council. Like the MDEQ’s existing AM program guidance, the WAMC asset management template must, at a minimum, contain the following items:

Asset inventory
- Level of service analysis
- Anticipated revenues and expenses
- Performance outcomes analysis
- Description of plans to coordinate with other entities
- Proof of acceptance by a local governing body

4.2.8 Pilot Drinking Water Community Water Supply Grants
In May of 2018, the MDEQ provided $9.5 million to 18 communities as part of a Pilot Drinking Water Community Water Supply Grant program. The grant program was funded
by a state appropriation and intended to understand how communities can comply with Michigan's update to the EPA's Lead and Copper Rule. Communities have one year to perform grant activities including an update to their AMP, update inventories of the types of service lines present in the distribution system, and full lead service line replacement. The goal of the pilot is to document lead service line replacement experiences and inform better overall management of service lines.

4.3 Sponsored AM Resources

The MDEQ continuously uses effective outreach methods such as direct mail, electronic media, newsletter publication, and informational meetings to publicize and inform communities of AM requirements and assistance available.

AM requirements and programs throughout the State have led to the formation of several agencies and professional organizations dedicating resources to AM.

- The Michigan Section of the American Water Works Association and Michigan Water Environment Association Joint Asset and Infrastructure Management Committee holds quarterly meetings to share best practices and regulatory requirements for asset and infrastructure management.
- Michigan Rural Water Association Asset Management Assistance Program

4.3.1 Guidance Documents and Workbooks

MDEQ has developed the AM Guidance Documents with corresponding Microsoft Excel workbooks for both drinking water and wastewater or stormwater utilities. Recognizing that many communities would not have resources to purchase or implement dedicated AM software, MDEQ developed a simple Microsoft Excel workbook that provides a framework for communities to document their AMP. The documents focus on the five core components they expect included in AMPs: Asset Inventory, Levels of Service, Critical Assets, Revenue Structure, and Capital Improvement Project Plan.

The documents and workbooks are available for download on the Department’s website.

Stormwater/Wastewater:


Drinking Water:


4.3.2 Conferences and Workshops

MDEQ has held several workshops to educate municipalities on AM practices and legislative requirements. This included a series of workshops on drinking water held throughout the State in 2017 (www.michigan.gov/documents/deq/deq-dwmad-cws-AM-WebSlides_605548_7.pdf). SAW Workshops describing the program were held predominently in 2012.

Additionally, many workshops and seminars have been organized by professional organizations. MI-AWWA and MWEA have hosted workshops, well-attended
annual AM seminars, and dedicated AM sessions at conferences for several years. Several MDEQ staff members have been actively involved with the Joint Asset and Infrastructure Management Committee. They have completed a “Survey of Asset Management Software Currently Used in Michigan” and several “Lessons Learned Round Table Workshops” following the completion of SAW funding rounds. These are discussed below.

4.4 Data and Information on AM Policy Impacts

MDEQ currently has approximately 900 AMPs under review through SAW grants, NPDES requirements, and drinking water requirements. They expect this number to grow to 1,200–1,700 in the next four to five years. DEQ does not want to house all the AM information and data associated with these plans and reviewing that many AMPs would represent a sizeable and potentially impractical burden. As such, MDEQ generally only requires summaries and rate sufficiency data to be submitted. The detailed AMP information and documentation should be on file and available for review during routine MDEQ inspections. MDEQ is expecting further guidance on the requirements and review of future AMP iterations from the Michigan Infrastructure Council and Water Asset Management Council. Because of this process requiring only summary data, analysis to determine the effectiveness of policy in advancing AM and inform future improvements to policy has not been conducted. MDEQ is not staffed to perform this analysis even if the data were submitted.

MDEQ sent out a survey to SAW recipients in October 2017 to gain feedback on the SAW program and received 110 responses, a 75-percent response rate. With some exceptions, they found the following:

Communities did not have an AMP in place before grant funding.

- Communities did not have a geographic information system prior to grant funding.
- Capital improvement plan priorities have changed due to AMPs.
- Some communities could use additional funding to complete their AMP.
- There is a great need for funding to address large, capital infrastructure repairs.
- Communities have found that AMPs sparked coordination of infrastructure improvement projects.
- Information collected has enabled communities to improve their infrastructure management practices based on a better understanding of their assets.
- There has been a noticeable positive effect in Grantees’ communities due to grant funding.

Some of the anecdotal feedback MDEQ has received from communities and consultants included:

- Improving AM practice allowed them to capture knowledge from current operators that would otherwise be lost when they leave the organization.
- There is support for AM concepts from all levels of organizations—from City Council or Boards to operators and maintenance staff.
- Many communities were incorporating criticality or risk into the process of developing capital improvement plans for the first time and not just relying on estimated remaining useful life.
4.5 Michigan Case Study 1: City of Saginaw

The City of Saginaw is in central Michigan. The City’s water system includes a 52-MGD water treatment plant, 425 miles of finished water transmission and distribution water mains, 14 miles of raw water transmission mains, five booster pump stations, and 26.8 MG of storage. The water system serves the City of Saginaw and 19 wholesale customers.

The City of Saginaw operates a combined sewer system that includes a wastewater treatment plant designed for a 32-MGD average flow and peak flow of 72 MGD, seven retention treatment basins that operate during heavy rainstorm events, nine pump stations, and 373 miles of combined sewer lines.

The City’s water and sewer systems have many assets installed in the early 1900s. The City is challenged by deteriorating infrastructure, a declining population, and a limited ability to raise funds for improvements.

The initial drivers for AM were the SAW program and NPDES permit requirements. The City was awarded a $2 million SAW grant in 2014. Since Saginaw has a disadvantaged community status, they were not required to provide matching funds. Throughout the development of a comprehensive AM Program, the City learned more about the principles of advanced AM, and key decision-makers better understand the value as a good business practice. Saginaw focused on creating a program that both administrators and staff would find useful and continue to implement rather than attempting to just meet a regulatory requirement. Saginaw had already embraced an improved program of comprehensive AM practice when MDEQ enacted the Drinking Water AM requirements in 2017.

The development of the City’s AM programs has led to stronger connections and cooperation between departments. In the initial stages of AM program development, different departments were brought together to share the SAW grant money. During the development of the programs, the City had a series of workshops and invited staff from a variety of City divisions including IT, customer service, fire department, maintenance, treatment, and several others. This led to cooperation and synergy amongst those involved and the development of fundamental AM capabilities that are carrying the program forward. City staff have embraced advanced AM practice at all levels and have shifted the culture to prioritize effective AM by creating a dedicated AM department. Rather than different groups competing for limited funds, there is a team that works across separate departments sharing data, knowledge, and experience.

Prior to the development of the City’s drinking water and wastewater AMPs, improvements to roads drove the rehabilitation and replacement of water or sewer assets. Now, there is a coordinated approach considering what is best for all City utilities. Being able to consider risk (both asset condition and consequence of failure) has allowed the City to shift priorities. Having staff trained in different aspects of AM, such as condition assessment, rather than hiring contractors or consultants, lets the City be more efficient with resources and funding. The City is now proactively cleaning and inspecting its sewers to a much greater degree than previously, rather than mainly reacting to issues or emergencies as they arise. One of the key benefits Saginaw has experienced is more effective communication across departments and better justification of management decisions.

There are several lessons that the City learned during the creation of their AMPs. It is important to be able to gauge success and track the progress with key performance indicators or level of service goals. These could be shared internally or externally but
must be easily measured. The support from leadership and decision-makers allows the program to succeed. Having a leader in the organization to drive the program is crucial. There is a large amount of coordination, training, and data management required. When introducing advanced AM practice, it is important to identify AM efforts currently being done even though they are not explicitly labeled as AM. This validates existing practices while enhancing the understanding of effective AM.

The encouragement through grants or loans without prescriptive requirements enabled the City to create programs tailored to their needs. It would be beneficial if the regulators could provide more feedback and follow-up on the deliverables. The groups administering AMPs within MDEQ could consider making the requirements more consistent across various utilities. For example, NPDES requirements are extremely prescriptive and require an annual update while Drinking Water AMPs were submitted as summaries with an expectation of updates every three to five years or as requested. The initial development of the AMPs was a very time-and-resource-intensive process. The quality of the program could be improved with an extended schedule and interim deliverables or milestones that are approved as they are completed.

4.6 Michigan Case Study 2: City of Dexter

The City of Dexter is in Southeast Michigan, about 50 miles west of the City of Detroit and ten miles northeast of Ann Arbor. Dexter has approximately 30 miles of water mains, a 0.5 MG elevated storage tank, four community wells connected to a 0.86 MGD Iron-Removal Water Treatment Plant, and one additional well with a chemical feed treatment system.

Dexter was originally introduced to advanced AM techniques during their Water Treatment Plant Operation and Maintenance (O&M) Manual updates in 2010. Because it was incorporated in the O&M Manual, the AMP was created with DWRF funds. The AMP was paper-based and included an inventory, risk assessment, and prioritized CIP for vertical assets. Horizontal assets like water mains were not included. The City did not have an active AM program and did not have a way to update the AMP with O&M activities or equipment replacement. As a result, staff rarely made use of it in daily operations.

The January 1, 2018 deadline discussed in Section 4.2.5 prompted the City to expand its AMP beyond the original 2010 document. During the update, the City digitized horizontal asset information and documented the operator’s institutional knowledge. The City of Dexter recognizes that their staff and operators are a major asset. They aim to provide a supportive environment, encourage training/licensing, and staff autonomy. Empowering staff to take a meaningful role resulted in higher quality asset data and, ultimately, a much more useful AMP. Staff involvement in the budgeting process led to an ability to change or adapt to higher priority needs and finding additional savings that decision-makers would not have accounted for like enhanced preventative maintenance procedures to extend the life of assets rather than replace them.

Their AMP has served as a valuable communication piece with the City Council. The photographs included in their AMP documenting asset condition allow City staff to demonstrate the need for projects. It allows them to stress the importance of better maintenance as a tool for long-term savings and continuing to provide a consistently high level of service.

The City is currently working on SAW grants for a Wastewater AMP, Stormwater AMP, and Stormwater Management Plan. They expect to complete this work in the fall of 2019. Having three years and funding available is allowing them to complete thorough
mapping and condition assessments within the grant eligibility window. This will also allow for a critical review of current practices and the opportunity to make changes as appropriate. The funding is enabling them to update their GIS and purchase maintenance management software which will allow for the AMP to continue after the grant expires. The City believes using the AMP is saving them money and creating better projects but having software to track some metrics around that will be valuable.

4.7 Summary and Conclusions: MDEQ Case Study

It is crucial for regulators to recognize the time and resources necessary for utilities to develop worthwhile AMPs. Michigan’s SAW Program and AM requirements for NPDES permits and Drinking Water were rolled out in a roughly five-year period. There was a tremendous amount of education that occurred very quickly for regulators, utilities, municipal leadership, and consultants throughout the State. This required training, coordination, and funding. A combination of encouragement, regulation, grants, and loans worked well for reaching the diverse set of municipalities in Michigan. The comprehensive AM initiatives in Michigan have increased the awareness of AM practices for all utilities. The MDEQ-mandated AMPs were the impetus for the creation of many AMP updates, but many smaller communities are often resource-limited. While the case can be made that utilities should develop AMPs on their own to improve infrastructure management, gather data to make more informed decisions and resource allocations, and better predict future needs, many utilities are not aware of how to prepare AMPs and providing a funding source allowed for more rapid progress in AMP development and implementation.

Regulatory authorities should coordinate AM programs well within their agencies. In MDEQ’s case, each program had different requirements, expectations, and deadlines. District Staff were responsible for the review of managerial and technical components, while the Revolving Loans Staff were responsible for financial review. AM requirements for NPDES permits were administered by another group within the MDEQ. The districts across the State also had conflicting expectations and understanding of requirements. This made it difficult to review AMP deliverables and provide feedback in a timely manner. MDEQ currently has about 900 AMPs under review through SAW grants, NPDES requirements, and drinking water requirements. This number is expected to grow to 1,200-1,700 in several years. As the number and maturity of AMPs grow, a method for tracking progress, required deliverables, and benefits accrued should be developed.

In addition to a method to track progress, there is a need to periodically review what is required of an AMP and the data being collected; what benefits accrued as a result of it; what improvements could be made to the requirements; and whether a return on the State’s investment (helping water systems advance AM practices) has been realized in terms of better performance, efficiency, reliability, and cost of service. Under current governance, this will be difficult to assess. While reviewing 1,200–1,700 AMPs may not be practical given MDEQ resource limitations, requiring and reviewing only AMP summaries and rate sufficiency data will also limit the ability of regulators to assess (and drive) advancement of AM practices. An example of the potential shortcomings of what is required in AMPs relates to capital investments: As was mentioned in Section 4.2.3, only six of 293 utilities indicated there is a gap between revenues and project expenses (capital expenses were not required in that analysis), but utilities also responded to a survey described in Section 4.4 of this report that there is a significant need for funding to address large capital infrastructure repairs. This may be an indicator that many utilities are facing significant capital infrastructure challenges, yet because utilities are not required to include such data in an AMP, addressing those challenges by advancing AM practices to determine the most appropriate investments may not result.
A diverse group of infrastructure experts like the State’s MIC and WAMC (discussed in Section 4.2.7) is keenly adept to assist municipalities in advancing their AMPs by providing realistic strategies for more effective implementation. A state-level leadership group will help educate decision-makers, influence future policy decisions, and create incentives for better management practices. Asset management provides a better understanding of capital needs and financial statements. This knowledge of infrastructure and funding needs can ensure that municipalities are more efficiently using their funding and coordinating their AM efforts across utilities. The MDEQ will be working closely with these groups to determine the types of quantifiable data that should be collected to determine progress and to develop effective funding strategies with well-defined outcomes.
5 Case Study: Ontario, Canada

5.1 Overview of AM Policy

The approach to asset management policy in the province of Ontario stands out for many reasons. Most notably, for over a decade AM has been encouraged and regulated at the municipal level and applies to all municipal assets, not individual utilities or independent municipal departments. While early funding programs that encouraged AM focused on “core assets” (water, wastewater, stormwater, roads, and bridges), more recent regulations require all municipal assets to be characterized in one AMP, allowing municipalities to coordinate projects across entire jurisdictions.

In addition, Ontario municipalities have been exposed to a variety of federal and provincial AM policies over the last decade. Ontario is shifting from a stance of pure encouragement (i.e., significantly grant-funded) to a combination of encouragement and requirement through regulations. Early policies supported local municipalities by allowing them to utilize federal and provincial funds on critical infrastructure projects and AM-planning capacity building. The capacity-building component of the funding has made it easier for local governments to justify spending their own resources on nonphysical infrastructure projects, like asset management planning; some members of the community (and possibly governing boards) may not realize the value of implementing AM and/or are reluctant to spend funds on projects that do not produce a visible, tangible outcome. The success of those funding programs has led to the shift to AMP requirements for all 444 municipalities and local service boards in Ontario.

AM policy impacts a variety of infrastructure sectors in Ontario (transportation, utilities, sporting, cultural, and tourism infrastructure). As a result, several Ministries track AM progress within their line of sight. For the purposes of this report, interviews were conducted with the Ministry of Infrastructure, which administers some of the Provincial funding programs discussed herein. Additionally, the Association of Municipalities of Ontario (AMO) was studied, as they administer the Gas Tax Agreement with Ontario. Results from their audits of AM progress are included.

5.2 AM Governance

A timeline of AM governance impacting municipalities in Ontario is shown in Figure 5-1.
5.2.1 Federal PSAB Regulation 3150

The groundwork for government-regulated AM was laid in 2006 with the passage of “Public Sector Accounting Board (PSAB) 3150 – Tangible Capital Assets.” Effective on January 1, 2009, Canadian municipalities were required to report on all tangible capital assets on annual financial statements, much like what was always required of private sector businesses; those assets must be listed, valued, and depreciated over time. Values are inclusive of acquisition, construction, overhead costs directly attributable to construction, and/or refurbishments and carrying costs. This requirement significantly changed the way municipalities prepared financial statements. Municipalities must
define assets and develop a complete asset register. Once the register is developed, values and expected useful life estimates need to be assigned to allow for estimates of depreciation (PSAB at a Glance: Section PS 3150 – Tangible Capital Assets, BDO, March 2014; https://www.bdo.ca/en-ca/insights/assurance-accounting/psas-at-a-glance/section-ps-3150-tangible-capital-assets/)

For some municipalities, the result of PSAB 3150 was a better understanding of their infrastructure gap through the recognition that asset depreciation was outpacing reinvestment. The City of Fredericton, New Brunswick, for example, identified a Water and Sewer fund deficit of $117 million (Case Study: Asset Management in the City of Fredericton, Public Sector Digest, 2015). That understanding ultimately led to a long-term financial plan designed to better maintain existing infrastructure while allowing for future development. In the case of Fredericton, the Water and Sewer Fund long-term financial plan was subsequently adjusted such that 90 percent of the spending was dedicated to renewals.

5.2.2 Municipal Infrastructure Investment Initiative (MIII)

Ontario launched the Municipal Infrastructure Investment Initiative (MIII) in 2012 and was the first province to require its municipalities to complete an AMP and to provide funding to assist with the process. MIII applies to municipalities requesting provincial funds and requires municipalities to show how proposed projects fit within a comprehensive AMP, which needed to be submitted by 2013. $60 million in funds were made available for core asset projects (roads, bridges, water, wastewater, stormwater). Core assets represent 67 percent of Ontario’s municipal capital assets. Of that, $9 million was set aside for small municipalities and Local Service Boards (LSBs). MIII goals included further strengthening municipal AM practices and providing federal and provincial support for the most critical core infrastructure, particularly in communities that could not otherwise afford those asset projects.

Municipalities needed to complete comprehensive AMPs by December 31, 2013, to receive funding, but could nominate projects to upgrade critical infrastructure prior to that date if a draft AMP identified the project as critical. Project nominations were due on January 9, 2013. The MIII program included a pre-screening process and subsequent application process to identify the projects that would receive funding. Municipalities that had projects chosen were eligible to request a maximum of 90 percent of total project costs up to $2 million. Municipalities with joint interests could apply for joint funding projects. For example, two municipalities could apply for up to $4 million.

Eligible costs included environmental assessments, design and engineering, project management, materials, construction, and contingencies (maximum 15%). Ineligible costs included land acquisition or leasing, financing charges, and legal fees. Municipalities had to provide a rationale for the funding request amount and demonstrate how they would assist in remaining project costs. Projects funded under MIII had to be completed by December 31, 2014.

Funding was awarded based on three criteria:

1. Description of the level of existing AM practices for all core assets, as outlined in an AMP (compared to the AM elements laid out in “Building Together: Guide for Municipal Asset Management Plans”); also, the level to which the project would advance AM practices.

2. Project criticality
   a. Roads – based on a reduction in collisions and collision severity
   b. Bridges – based on current condition and improvement in condition
c. Water – based on avoidance of regulatory failures, public health advisories, low-pressure events, and any other failures to meet the design or operational requirements

d. Wastewater – based on a reduction of discharges and exposure to raw sewage, disruptions in service, threats to drinking water supplies, and phosphorus loading (for discharges into the Lake Erie watershed)

3. Applicant’s need for funding (based on project cost per household, the community’s average household income, and weighted property assessment per household)

In 2016, Ontario introduced a requirement for municipalities to complete an AMP that includes all asset categories covered by the Federal Gas Tax Fund (see below)—previous provincial programs like MIII only required core asset categories to be included in municipal AMPS (roads, bridges, water, and wastewater). While some communities are still working on completing their comprehensive AMPS, nearly every municipality in Ontario now has a plan with at least core assets included.

5.2.3 Small Rural Northern Municipal Infrastructure Fund (SRNMIF)

In 2013, Ontario launched the Small Rural Northern Municipal Infrastructure Fund (SRNMIF), asking municipalities to identify a critical infrastructure project in their AMP for provincial funding. This funding was largely an expansion of the MIII, and total funding for the program was $100 million. Municipalities with 100,000 or fewer residents; 25 percent or greater rural residents; or those located in Northern Ontario were eligible to apply.

The fund was announced following consultations led by the Ministries of Infrastructure and Rural Affairs which sought advice on the design/allocation for the funding program and advice on options for a permanent fund to be considered in the 2014 Budget (see OCIF below). SRNMIF allocations were as follows:

- $25 million for 21 projects which passed the pre-screening process for the Municipal Infrastructure Investment Initiative in 2012 but were not funded because the program was fully allocated;
- $71 million for applications for new projects, including applications resubmitted from the 2012 MIII; and
- $4 million for municipalities under 5,000 population to complete AMPs.

5.2.4 Ontario Community Infrastructure Fund (OCIF) and OCIF Top-Up Fund

In 2014, SRNMIF was replaced by the now-permanent Ontario Community Infrastructure Fund (OCIF). Based on the feedback given by many municipalities during the consultation phase for the SRNMIF, the Association of Municipalities of Ontario Board advised the government to use a formula-based methodology for OCIF which would provide funding to all eligible local governments. Ontario followed this advice, and OCIF provides guaranteed annual formula-based funding for AM capacity building activities and critical infrastructure projects. The funding formula is based on multiple factors, including communities’ average household income and the value of communities’ infrastructure assets. Communities receive notices indicating the amount of funding they will receive over the next three years and if they are eligible for top-up funding (see below).

Other OCIF policies regarding AMPs closely match those of MIII. Funds are available for core infrastructure projects, and the required AMP must cover core assets, defined for the purposes of the OCIF as roads, bridges, culverts, drinking water assets, wastewater
assets, and stormwater assets. Municipalities can also use OCIF funds to support hours worked by staff responsible for AM (up to 40 percent of funds, with a maximum of $80,000). Small communities could consider funding an asset manager and could hire a shared resource with other communities using OCIF funding. Recipients could also pool funding for up to five years for a future project (e.g., bank $100,000 per year for five years to fund a $500,000 project).

Another stream of funding—the OCIF Top-up Fund—provides small and northern communities with the opportunity to apply for a "top-up" to their formula-based funding for specific infrastructure projects. If formula-based funding is less than $2 million over the next two-year period and the municipality did not receive top-up funding in the previous funding cycle (or intake), the municipality can apply for additional funds up to the $2 million cap. The total OCIF Top-up Funding intake for 2018 was approximately $100 million. That will be applied to the next round of projects accepted in January 2019, which must be completed by their respective municipalities by the end of 2020.

OCIF Top-up Funds can be applied to either (a) the capital expense of a core infrastructure project (roads, bridges, water and wastewater, including sanitary and stormwater infrastructure), provided it is identified as critical in an AMP, or (b) innovative capital technologies that can help reduce, avoid, or defer asset ownership costs. Top-up applications are judged primarily on critical health and safety benefits, and secondarily, by the comprehensiveness of the municipality’s AMP and the funding need (see MIII criteria).

5.2.5 Federal Gas Tax Fund
The Federal Gas Tax Fund is a permanent source of entitlement-based funding for municipal infrastructure, first introduced in 2005. It is predictable (provided by the federal government upfront to provinces and territories every six months), long-term, and stable, and helps municipal governments address infrastructure deficits. The agreement’s stated goal is to “help communities build and revitalize their public infrastructure that supports national objectives of productivity and economic growth, a clean environment, and strong cities and communities.” In 2005, $5 billion (CAD) in funding was budgeted over a five-year period. Since then, allocations from the Federal Gas Tax Fund have risen to a level of $2.2 billion annually in the 2018–2019 allocation period.

The Canadian government has separate Gas Tax agreements with each province and territory. Provinces and territories then allocate funds to municipalities and administer the agreement. The formula for allocating funding is on a per capita basis. The ten-year Administrative Agreement on the Federal Gas Tax Fund between the federal government, Ontario, the Association of Municipalities of Ontario, and the City of Toronto went into effect on April 1, 2014 and has resulted in total funding to Ontario of $3.8 billion between 2014 and 2018 inclusive. Within this Agreement was a requirement for Ontario fund recipients to develop and implement an AMP that meets the requirements set out in Ontario’s “Building Together: Guide to Municipal Asset Management Plans” prior to December 31, 2016. All but three (99 percent) of the municipalities reported they had AMPS developed before the deadline, with the balance committing to completing AMPS in 2017.

Investments can be made across a variety of infrastructure categories, including transportation, water, wastewater, solid waste, energy, information systems, and other sectors that broadly impact the public. The 2014 Gas Tax Agreement significantly changed Ontario’s previous AM policy because Gas Tax AMPs must cover all assets that are eligible for Gas Tax funding (see below), regardless of how a local municipality
chooses to allocate their funding. Eligible projects are listed in Schedule B of the Gas Tax agreement and include investments in the following categories:

- Transportation – Local roads and bridges; highways; short-line rail and short-sea shipping related to the movement of freight, cargo, and passengers; regional and local airports; public transit
- Utilities – drinking water, wastewater, solid waste, community energy systems, broadband connectivity
- Brownfield Redevelopment
- Sport and Recreational Infrastructure
- Cultural Infrastructure
- Tourism Infrastructure
- Disaster mitigation
- Capacity building – includes investments related to strengthening the ability of municipalities to develop long-term planning practices

The Administrative Agreement on the Federal Gas Tax Fund with Ontario can be found at [www.amo.on.ca/AMO-PDFs/Gas_Tax/Agreements_and_Allocations_GTF/GTF-Administrative-Agreement-Ontario-2014-02-14.aspx](www.amo.on.ca/AMO-PDFs/Gas_Tax/Agreements_and_Allocations_GTF/GTF-Administrative-Agreement-Ontario-2014-02-14.aspx)

Recipients must report on progress annually, including a performance measurement methodology demonstrating that the AMPs are being used to guide infrastructure planning and investment decisions and how funding is being used to address priority projects. Reporting results can be found in Section 5.4.2. The funds must be spent within five years of receipt. If assets funded through the Gas Tax are decommissioned, any funds recovered because of sale or other compensation must be reinvested in eligible infrastructure projects. Eligible expenditures include acquiring, planning, designing, constructing, or renovating tangible capital assets. The development of AMPs, AM software, AM training, and long-term infrastructure plans are also eligible for funding.

Annually, a subset of communities receiving gas tax funding is audited for compliance with the requirements of the Fund. In 2017, 44 of the 443 Ontario municipalities administered by AMO (AMO monitors all municipalities except Toronto) were audited for compliance. Results are shown in AMO annual reports. The 2017 annual report indicated that every audited municipality had an AMP fully developed and had reported its prior-years’ outcomes to AMO. Very few compliance exceptions were noted.

**5.2.6 Infrastructure for Jobs and Prosperity Act 2015 (Bill 6)**

Most recently, the Ontario Government has moved from incentivizing proper asset management planning—through the provision of resources like the “Building Together Guide” and AM capacity-building funding—to regulating proper AM planning. Recognizing the progress that has been made to date, the Ontario Government passed the Infrastructure for Jobs and Prosperity Act (commonly referenced by its former status as “Bill 6”) in 2015, launching the process of regulating asset management planning at the local level. When asked about the policy change from incentivizing to regulating in a June 2018 interview, the Ontario Ministry of Infrastructure (MOI) cited no specific driver or event that drove the change. The Ministry was worried that the boom in post-World War II infrastructure was coming of age and simultaneously witnessed what they believed was a significant underfunding of infrastructure renewal starting in the 1970s. In June 2018, MOI still cited a large backlog of infrastructure renewal work and is concerned with utility sustainability challenges.
The purpose of the Act is “to establish mechanisms to encourage principled, evidence-based and strategic long-term infrastructure planning that supports job creation and training opportunities, economic growth and protection of the environment, and incorporate design excellence into infrastructure planning.” The breadth and depths of AMPs are also expanded to include Service Levels as well as financial and life-cycle strategies. Every AMP prepared as required by the Act must be endorsed by the executive lead of the municipality and approved by a resolution passed by the municipal council.

As with any effort to regulate, it was important to the province to standardize planning processes while taking into consideration the differences in capacity and AM maturity across municipalities. Bill 6 consultations took place over the summer months of 2016, with the province collecting feedback on its proposed regulation from municipalities of all shapes and sizes.

In 2017, the province released its draft Bill 6 regulation, allowing for additional comments. According to the regulation, Ontario municipalities needed to complete a strategic asset management policy by January 1, 2019, and the policy needs to be updated at least every five years moving forward. This involves a commitment to examine best AM practices and subsequent alignment of municipal policies.

AMP requirements are broken into three phases. Phase 1 requires just core infrastructure assets to be included in AMPs. Phase 2 would then require AMPs to include all infrastructure assets, followed by additional AMP requirements for all assets in Phase 3. The regulation outlines the following as necessary components of an AMP by Phase, with deadlines recently revised to allow more time for AMP development:

For Phase I – Core Assets (July 1, 2021) and Phase II – All Assets (July 1, 2023):

- Current Levels of Service
- Inventory Analysis
- Estimated Costs to Sustain Current Levels of Service
- Municipalities with a population over 25,000: Estimated Costs to Service Growth

For Phase III (July 1, 2024):

- Proposed Levels of Service
- Inventory Analysis (updated from Phase I and II)
- Lifecycle Management Strategy
- Financial Strategy
- Addressing Shortfalls
- Population over 25,000: Financial Strategy to Service Growth
- Population over 25,000: Risk Analysis

Several industry associations in Ontario submitted comments to the province indicating that the timeline and expectations may be too onerous for many municipalities, with asset management often landing as an additional responsibility for a single staff member already working at maximum capacity on his or her regular duties.
5.2.7 Federation of Canadian Municipalities: Municipal Asset Management Program

The Federation of Canadian Municipalities (FCM) Municipal Asset Management Program (MAMP) is a five-year, $50-million program designed to help municipalities across Canada make informed infrastructure investment decisions based on sound AM practices. The program is funded by the Government of Canada and began in fiscal year 2016–2017, continuing through fiscal year 2020–2021, and is an additional funding source that will support the implementation of the requirements of the Infrastructure for Jobs and Prosperity Act 2015.

The program helps municipalities in four ways:

- Broadening adoption and reliance on sound asset management practices
- Training and workshops on best practices tailored to the needs of the participating municipality
- Funding to assist with the planning, data management, and analysis undertaken by a municipality or partner
- Gathering and sharing relevant knowledge and lessons learned about the experiences of Canadian cities and communities

The program is implemented in partnership with municipal, provincial, and territorial associations and other key stakeholders that support strengthened municipal AM practices. The program is expected to reach an estimated 750 municipalities through AM training and knowledge sharing and is expected to fund up to 550 municipal projects across Canada. MAMP projects must be completed in 11 months or less.

AM capacity-building funds will fund 80 percent of eligible project costs up to a maximum of $50,000, with the remaining 20 percent to be covered by fund recipients. Municipalities can submit applications for up to three AM-related activities, including asset condition assessment, training for elected officials and staff, program and policy development, the completion of an AMP, and the procurement of AM software. As Ontario’s “Infrastructure for Jobs and Prosperity Act 2015” regulation comes into effect, municipalities will be able to access this additional source of funding to support compliance.

The MAMP “Year 2 Annual Progress Report” was recently released and provides an overview of progress through fiscal year 2017–2018 along with supporting case studies. The report documents how AM awareness was raised through presentations across the country, describes 23 technical assistance events, and summarizes how agencies that completed projects have demonstrated a level-step improvement on the FCM Asset Management Readiness Scale (see Section 5.4.3 for a summary of results).

5.3 AM Resources

5.3.1 Building Together: Guide for Municipal Asset Management Plans

The Building Together: Guide for Municipal Asset Management Plans explains the importance and the features of an AMP for municipal officials with descriptions and examples. It is the document against which municipal AMPs are assessed when Ontario evaluates funding requests. It includes information on the context of AM in Ontario, the basis of AM planning, and the required elements of an AMP. The required elements are:

- Executive Summary
- Introduction
The guide clearly outlines the elements required as part of each of the expected AMP sections listed above. The guide also provides some leeway for communities to tailor their AMPs to meet their needs. Minimal guidance is provided on the processes or expected level of effort to generate the information needed to populate the various elements of the AMP, though that information may be accessible through other outlets.

5.3.2 Association of Municipalities of Ontario (AMO)
AMO’s advocacy focuses on ensuring that provincial policies and programs respect municipal authority. AMO develops a variety of advocacy positions on all matters that impact Ontario’s municipalities. These positions are in the form of backgrounders, policy updates, reports and submissions, and more to inform our membership of current issues affecting the municipal sector.

With respect to asset management, AMO is one of four parties to the 2014 Federal Gas Tax Agreement between Canada, Ontario, Toronto, and AMO. AMO plays a significant role in administering and auditing the AMP requirement of the Ontario Gas Tax Fund.

AMO’s advocacy of municipalities in AM is prevalent. The AMO website contains a vast collection of resources that can be used by AM practitioners, and there is a toolkit for Councilors. AMO hosts an annual Asset Management Symposium, and presentations from each from 2014 through 2017 inclusive are posted on the website www.amo.on.ca/AMO-Content/Asset-Management/Asset-Management. There are also links to background information on regulations, regulatory documents, AM online training material, and a 2018 Municipal Finance Officers’ Association of Ontario Asset Management Toolkit. The toolkit includes an AM Communities of Practice Guide, AM Self-Assessment Test, and a Policy Toolkit.

5.3.3 Asset Management Ontario (AM ONT)
Asset Management Ontario (AM ONT) is a non-profit volunteer community of practice comprised of public sector asset management practitioners across Ontario. The community meets to share information and best practices to satisfy the growing needs of the asset management profession and public infrastructure. Membership spans a variety of expertise and backgrounds including finance, engineering, planning, and other disciplines. AM ONT membership is free for all municipal practitioners and includes:

- Quarterly working group meetings
- Online resources and webinars
- Updates on the changing AM landscape in Ontario, nationally, and globally
- Topic-specific project groups
- Workshops and training sessions
- Annual General Meeting

Materials from the workshops, training sessions, and general meetings are posted on the AM ONT website for members to access (www.amontario.ca/).
5.4 Data and Information on AM Policy Impacts

5.4.1 Pre-Gas Tax Fund Reporting

In 2015, the Ministry of Economic Development, Employment, and Infrastructure provided a report on the progress of municipal AMPs as part of the AMO Symposium (see Figure 5-2). While the number of AMPs developed has increased steadily since the passage of MIII, the quality and comprehensiveness of the plans were reported to have a large variation. It was also reported that while municipalities had a strong understanding of their then-current infrastructure challenges, work was required to identify the desired levels of service, overall asset management strategies, and funding strategies.

Figure 5-2. Progress of municipal AMP preparation in Ontario through 2014

More than 75 percent of the 181 AMPs reviewed as part of the OCIF/Small Communities Fund had “completeness scores” of at least 75 percent for the State of Infrastructure section. Comparatively, about 27 percent of those AMPs had “completeness scores” of more than 75 percent for the Desired Levels of Service section; 22 percent for AM Strategy, and 32 percent for Finance Strategy (see Figure 5-3).

Figure 5-3. Municipal AMP completeness scores in Ontario through 2014

(Source: Scott Pegg, Director, Intergovernmental Branch, Ministry of Economic Development, Employment and Infrastructure, March 23, 2015, AMO Symposium)
5.4.2 Gas Tax Fund Reporting

The Association of Municipalities of Ontario (AMO) administers the Federal Gas Tax Fund in Ontario (except in Toronto) and reported findings in its 2018 Outcomes Report (covering the time period from April 2014 to December 2016) entitled “Benefits of the Federal Gas Tax Fund 2014–2016” (www.amo.on.ca/AMO-PDFs/Gas_Tax/AMO_Reporting_Gas_Tax/Benefits-of-the-Federal-Gas-Tax-Fund.aspx). The report documents that due to the investment of Federal Gas Tax Funds, 90 drinking water projects were completed between April 2014 and the end of 2016. The total cost of those projects was over $97 million, with 42 percent of those project costs ($41 million) paid for using Gas Tax funds. Sixty-five kilometers (40 miles) of water mains were rehabilitated or replaced between 2014 and 2016, helping reduce the number of anticipated water main breaks by 88 per year and improving service to more than 23,000 customers. Additional investments in water treatment reduced the number of adverse water quality events and boil water advisories. AMO also issues annual reports, and its 2017 version documents 31 completed water projects in 2017 valued at $55 million that leverage $16 million in gas tax funding. Ontario’s 2017 Gas Tax outputs for water are shown in Figure 5-4.

Figure 5-4. Ontario drinking water projects completed through 2016 with Federal Gas Tax Funds

<table>
<thead>
<tr>
<th>DRINKING WATER</th>
<th>Projects</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of new water mains (km)</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Length of rehabilitated or replaced water mains (km)</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Reduction in average daily water leakage (ML)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Reduction in days in which boil water advisory was issued in a year</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Increase in number of households with water meters / transmitters</td>
<td>2</td>
<td>10,320</td>
</tr>
<tr>
<td>Reduction in annual number of watermain breaks</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Increase in number of properties connected to fire hydrants and/or with fire protection</td>
<td>6</td>
<td>102</td>
</tr>
<tr>
<td>Number of residents with access to new, rehabilitated or replaced water distribution pipes</td>
<td>21</td>
<td>6,334</td>
</tr>
<tr>
<td>Volume of drinking water treated to a higher standard (ML)</td>
<td>1</td>
<td>108</td>
</tr>
</tbody>
</table>

(Source: Benefits of the Federal Gas Tax Fund 2014–2016)

For wastewater and stormwater collections and treatment, 136 projects with a total cost of $208 million were completed, and 34 percent of that total cost ($71 million) was paid for using Gas Tax funds. Twenty-three kilometers of sanitary and storm sewers were installed, and 50 kilometers were upgraded or replaced, cutting the number of anticipated sewer backups by 93 per year and allowing an additional 4,900 residents to be served. The investments above do not include an additional $20 million invested in condition assessment equipment, AM systems and software, long-term planning efforts, and other AM capacity building projects (Benefits of the Federal Gas Tax Fund, 2014–2016). AMO’s 2017 annual report documents 39 completed wastewater projects valued at $111.5 million that leverage $29.5 million in gas tax funding. Ontario’s 2017 Gas Tax outputs for wastewater are shown in Figure 5-5.
Figure 5-5. Ontario wastewater projects completed through 2016 with Federal Gas Tax Funds

<table>
<thead>
<tr>
<th>WASTEWATER</th>
<th>Projects</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of new sanitary sewers (m)</td>
<td>3</td>
<td>1,798</td>
</tr>
<tr>
<td>Length of new stormwater sewers (m)</td>
<td>12</td>
<td>7,639</td>
</tr>
<tr>
<td>Length of rehabilitated or replaced sanitary sewers (m)</td>
<td>17</td>
<td>11,615</td>
</tr>
<tr>
<td>Length of rehabilitated or replaced stormwater sewers (m)</td>
<td>18</td>
<td>10,785</td>
</tr>
<tr>
<td>Change in reserve sewage treatment plant capacity (ML)</td>
<td>1</td>
<td>511</td>
</tr>
<tr>
<td>Change in serviced area protected by green infrastructure (ha)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Change in number of residents serviced by stormwater/sanitary infrastructure</td>
<td>20</td>
<td>3,053</td>
</tr>
<tr>
<td>Reduction in energy used by treatment system per ML of wastewater treated (kWh)</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Reduction in annual number of sanitary sewer backups</td>
<td>8</td>
<td>35</td>
</tr>
</tbody>
</table>

(Source: Benefits of the Federal Gas Tax Fund 2014–2016)

AMO documented through a survey that in 2016, 80 percent of municipalities reported that their AMPs were used to prioritize investments, with 63 percent stating that the AMPs used levels of service to identify priorities. Ontario’s 2018 “Benefits of the Federal Gas Tax Fund 2014–2016” report shows outputs (tangible benefits directly produced by the investment, i.e., the physical product of the work completed) and outcomes (intangible benefits that are indirectly produced as the result of the investment, i.e., benefits to the public), as shown in Figure 5-6.

Figure 5-6. Federal Gas Tax funded water and wastewater project outputs and outcomes through 2016

<table>
<thead>
<tr>
<th>Drinking Water Outputs:</th>
<th>Total Benefit</th>
<th>Projects Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting a Cleaner Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of new watermains (km)</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Length of repaired, rehabilitated or replaced watermains (km)</td>
<td>65</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drinking Water Outcomes:</th>
<th>Total Benefit</th>
<th>Projects Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting a Cleaner Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in annual number of adverse water quality test results</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Reduction in annual number of watermain breaks</td>
<td>88</td>
<td>23</td>
</tr>
<tr>
<td>Reduction in boil water advisories</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Increase in number of residents with access to new, rehabilitated or replaced water distribution pipes</td>
<td>23,012</td>
<td>44</td>
</tr>
<tr>
<td>Volume of drinking water treated to a higher standard after the investment (ML)</td>
<td>877,872</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wastewater Outputs:</th>
<th>Total Benefit</th>
<th>Projects Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting a Cleaner Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of new sanitary or stormwater sewers (km)</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>Length of repaired, rehabilitated or replaced sanitary or stormwater sewers (km)</td>
<td>50</td>
<td>73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wastewater Outcomes:</th>
<th>Total Benefit</th>
<th>Projects Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promoting a Cleaner Environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduction in annual number of sanitary sewer backups</td>
<td>93</td>
<td>28</td>
</tr>
<tr>
<td>Increase in total number of residents serviced by stormwater/sanitary infrastructure</td>
<td>4,909</td>
<td>44</td>
</tr>
</tbody>
</table>

(Source: Benefits of the Federal Gas Tax Fund 2014–2016)
AMO annual reports also include project listings for every project completed as well as summaries that highlight benefits from the Gas Tax Fund. One example is of the Town of LaSalle, which invested $2.2 million in federal Gas Tax Funds into replacing 85 percent of its water meters that were not producing reliable results. Results include identification of abnormal water use patterns, leading to early leak detection, less water loss/usage, and ultimately more equitable and lower water costs.

AMO administered a survey to 44 of the 443 municipalities it monitors in 2017. The 12 questions along with the number of municipalities that answered “yes” are shown below:

- Q1. Does your municipality have a policy for the financial management of tangible capital assets? (30 of 44)
- Q2. Does your municipality have an SOP to keep financial management of tangible capital assets current? (14 of 44)
- Q3. Does your municipality have a long-term financial plan (including revenue, expenditures, and capital requirements)? (21 of 44)
- Q4. Does your municipality have an SOP for review of capital and operating accounts? (8 of 44)
- Q5. Does your municipality have a capital budget policy? (10 of 44)
- Q6. Does your municipality have an SOP for the annual capital budgeting process? (14 of 44)
- Q7. Does your municipality have a tendering and/or procurement policy? (43 of 44)
- Q8. Does your municipality have an SOP to operationalize the tendering and/or procurement policy? (19 of 44)
- Q9. Does your municipality have an investment policy? (27 of 44)
- Q10. Does your municipality have a policy for reserves and reserve fund financial management (including segregated accounts)? (16 of 44)
- Q11. Does your municipality have an SOP for implementing the reserves and reserve fund financial management policy? (12 of 44)
- Q12. Does your municipality have an SOP for tracking federal Gas Tax agreement compliance? (11 of 44)

5.4.3 Federation of Canadian Municipalities (FCM) Municipal Asset Management Program (MAMP) Reporting

The MAMP “Year 2 Annual Progress Report” was recently released and describes progress through the fiscal year 2017–2018. The report documents how AM awareness was raised through presentations across the country, describes technical assistance events, and summarizes how 227 projects approved between the launch of the program in May 2017 and March 31, 2018, have so far resulted in 15 completed projects, with 80 percent of completed projects demonstrating a level-step improvement on the FCM Asset Management Readiness Scale.

Activities undertaken by MAMP grant recipients are shown in Figure 5-7 (MAMP Year 2 Annual Progress Report).
Figure 5-7. Summary of MAMP funded activities through fiscal year 2018

A summary of the deliverables completed as part of the 15 projects finalized in Year 2 is shown in Figure 5-8.

Figure 5-8. Summary of MAMP funded project outputs through fiscal year 2018

<table>
<thead>
<tr>
<th>Eligible activity</th>
<th>Completed projects: Summary of deliverables/outputs (AM = asset management)</th>
<th># of outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset management system assessments</td>
<td>AM maturity assessments</td>
<td>2</td>
</tr>
<tr>
<td>Asset management plan, policies and strategies</td>
<td>AM policy</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>AM strategy</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>• Council endorsement of AM policy / AM strategy</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>AM plans (AMPs)* updated or developed</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>• AMPs that specified funding gap by asset class</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>• Council endorsed their AMPs (# of projects)</td>
<td>4</td>
</tr>
<tr>
<td>Data collection and reporting</td>
<td>Projects that included fieldwork (# of projects)</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>• Asset inventory* (as part of field work)</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>• Condition assessment* (in-field)</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Condition assessment framework</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Infrastructure report card</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Service levels definition and/or assessments</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Risk analysis</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Software (module or configuration) acquisition</td>
<td>2</td>
</tr>
<tr>
<td>Training and organizational development</td>
<td>AM training</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Establishment of AM team-committee</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Council engagement</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Employee engagement</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Incorporated AM in job descriptions</td>
<td>8</td>
</tr>
<tr>
<td>Knowledge transfer</td>
<td>AM knowledge sharing with peers</td>
<td>0</td>
</tr>
</tbody>
</table>

* Note: the definition of an AMP differs across Canada. For consistency, MAMP counts one AMP for each asset class for which a plan was developed or updated. Similarly, MAMP counts one asset inventory or condition assessment per asset class completed.

(Source: MAMP Year 2 Annual Progress Report)

FCM has posted an “Asset Management Readiness Scale” manual on its website. It describes how asset management maturity is measured in relation to five competency areas: policy and governance; people and leadership; data and information; planning and decision-making; and contribution to asset management practice. The manual can

Twelve of the 15 projects finalized in Year 2 of MAMP funding resulted in an increase in scores on the Asset Management Readiness Scale; many projects resulted in improvements in multiple readiness competency areas, as shown in Figure 5-9.

*Figure 5-9. Completed MAMP projects through fiscal year 2018 by AM competency area*

<table>
<thead>
<tr>
<th>Competency area</th>
<th># of completed projects that advanced a level of the Readiness Scale in this area (of 15)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy and governance</td>
<td>7 (47%)</td>
</tr>
<tr>
<td>People and leadership</td>
<td>5 (33%)</td>
</tr>
<tr>
<td>Data and information</td>
<td>9 (60%)</td>
</tr>
<tr>
<td>Planning and decision-making</td>
<td>8 (53%)</td>
</tr>
<tr>
<td>Contribution to asset management practice</td>
<td>6 (40%)</td>
</tr>
</tbody>
</table>

(Source: MAMP Year 2 Annual Progress Report)

### 5.5 Summary and Conclusions:
#### Ontario Case Study

Ontario has been encouraging the development of AMPs since 2012, and with the added AM requirements for Gas Tax funding established, all 444 municipalities and local service boards had developed AMP by 2016, with rare exception. Prior to that, about one-third of Ontario municipalities had AMPs. Both AMO (which reviews Gas Tax AMPs) and the Ontario Ministry of Infrastructure (MOI, the agency that reviews OCIF and Bill 6 AMPs) have revealed that the AMPs were not as comprehensive as desired, but they are having positive impacts.

There is evidence that the infrastructure gap is closing, despite aging infrastructure. Projects that were identified as critical to health and safety are being completed, raising baseline service levels to customers and the public. Many of these benefits are characterized by the outcomes reporting discussed above. Anecdotally, MOI and AMO both report that more informed discussion with Councils and the public are taking place and that the “value for money” ratio is improving.

Additionally, the municipal-level AMP approach supports the ability of communities to determine where their most critical projects lie, as opposed to taking a separate approach to determining priorities on a municipal department-by-department basis.

Metrics that more directly and comprehensively measure improvements in AM practices in Ontario communities will become available beginning in 2021 when levels of service data will be required of every municipality. Subsequent updates to AMPs will allow for a comparison of service levels over time. Until then, the AMO annual reporting on the Gas Tax will likely be the primary source of information regarding AM improvements.

### 5.6 References

contains links to the three active funding programs (shown below) as well as archived information on MIII and SRNMIF:


Infrastructure for Jobs and Prosperity Act (Bill 6): www.ontario.ca/laws/statute/15i15


OCIF Top-Up Funding: “How to top-up support from the Ontario Community Infrastructure Fund” www.ontario.ca/page/how-to-top-up-support-from-ontario-community-infrastructure-fund

Other general sources used to develop the Ontario Case Study:

“2018 OCIF Top-up Funding Now Available,” Public Sector Digest (publicsectordigest.com/2018-ocif-top-funding-now-available)


“Ontario Government Releases Final Bill 6 Regulation,” Public Sector Digest publicsectordigest.com/ontario-government-releases-final-bill-6-regulation


Scott Pegg, Director, Intergovernmental Branch, Ministry of Economic Development, Employment and Infrastructure, “Municipal Asset Management Planning,” presented on March 25, 2015 at the Association of Municipalities of Ontario (AMO) Symposium

6 Case Study: IPART (New South Wales, AUS)

The formal asset management (AM) business model described in various standards (e.g., ISO 55000, PAS 55) was developed largely by Australian “monopoly utilities” over the last two-plus decades in response to their corporate structure and state-based regulatory frameworks. A significant number of large water utilities in Australia were “corporatized” in the 1990s: corporatized utilities are state-owned—prices and service levels are regulated by the state and utilities pay dividends to their state government. Despite the governments’ shareholder roles, these utilities act in a similar fashion to private utilities for two main reasons: (a) state and national policies encourage competition in the water sector and (b) corporatized utilities share profits with the state. This operating context, in which minimum service levels and maximum prices are fixed for extended periods of time, naturally encourages utilities to develop sound AM practices without the need to regulate the actual practices.

As a result, AM is considered by corporatized Australian utilities as simply how they conduct business, without the AM tag. AM is not a separate endeavor, but rather a descriptor of how the utility operates, with AM practices integrated and aligned throughout the organization. The 2006 International Infrastructure Management Manual states in its section on the Australian national context for AM, “To date, legislation has largely not been used to drive improved AM in Australia. Some organizations, including major private companies, are choosing to implement AM practices to minimize whole-of-life cost for activities associated with service provision, despite having no requirement imposed on them. It just makes good business sense to them.” Interviews conducted as part of this research in 2018 with a New South Wales utility regulator, the Water Services Association of Australia (WSAA), and two major utilities all support those statements, though the regulatory landscape is now changing to require alignment with sound AM practices.

In New South Wales (NSW), Australia, the Independent Pricing and Regulatory Tribunal (IPART) acts as an economic regulator and monitors operating license compliance through audits, including a review of infrastructure management practices. Generally, on a four-year cycle, IPART determines the maximum prices that can be charged for bulk and retail water by most major water suppliers in NSW. IPART reviews those utilities’ operating practices to not only determine if practices are efficient (i.e., to economically protect customers) but also to ensure that the service expectations of customers (i.e., Levels of Service) are satisfied. Both economic and performance audits are conducted on a utility-by-utility basis to acknowledge different operating contexts.

6.1 Development of the Modern Asset Management Business Model

In 1993, the Australian government published “National Competition Policy” (referred to herein as the Hilmer Report, named after Frederick G. Hilmer, Chairman of the Committee of Inquiry for a National Competition Policy Review). The report documented widespread support for a national competition policy to improve international competitiveness and national living standards. The report acknowledged a need to promote competition, based on the assumption that both public and private monopolies were not efficient business models in terms of the overall combination of financial, community, and social welfare.
Most major infrastructure industries, including utilities, had been previously sheltered from competition. This led to the potential for “misuse of market power” which could adversely affect the level of competition in markets. Citing substantial benefits to customers resulting from reduced competitive restrictions within several Australian markets, the Hilmer Report proposed a series of national, pro-competitive reforms in the form of laws, principles, and process as well as the establishment of national institutions (the National Competition Council and the Australian Competition and Consumer Commission) to play key roles in the establishment, implementation, and administration of the policies by all Australian governments. The goals of the proposals were to facilitate effective competition to promote efficiency and economic growth while maintaining a focus on social objectives.

Most notably in the water sector were recommendations to reform the structure of public monopolies as well as government oversight into any public monopoly privatization. The report noted the difficulties in promoting competition in infrastructure-rich industries such as utilities, where market entry by competitors is difficult and inefficient unless entrants are given access to “essential facilities.” As a result, the Hilmer Report, and subsequent state reforms developed as part of the National Competition Policy implementation [such as the Competition Policy Reform (New South Wales) Act of 1995], laid a considerable footing for the “corporatization” of water utilities, a process that was already being considered and in some cases implemented by several state governments in various market sectors.

Corporatization involves transforming government assets or agencies into corporations. In the context of Australian water utilities, the government (generally at the state level) assume the role of the majority shareholder of the corporation. The responsibility of operating the water infrastructure is given to a corporate entity that maintains minority stock ownership. That entity is subject to economic, public health, performance, environmental, and other regulation, and as “monopoly utilities”, are subject to additional oversight, as outlined in Section 6.2 below. Corporatization addresses major aspects of the Hilmer Report: Corporations exist in a competitive environment, where they must compete for new customers, either in newly-developing areas or where they may take ownership of an additional water system. In addition, because the state retains majority ownership of water utility assets, underperformance by the minority corporation could lead to a loss of operating permit or an increase in the ability of the competition to bid and obtain entry into the market with access to the “essential infrastructure.”

6.2 AM Governance

The Independent Pricing and Regulatory Tribunal of New South Wales (IPART), established in 1992, provides independent regulatory advice and decisions to protect and promote the ongoing interests of consumers, taxpayers, and citizens of NSW. IPART is part of the NSW government. It is the independent pricing regulator for water, public transport, and local government as well as the license administrator of electricity, gas, major public water utilities, and other Water Industry Competition Act (WICA) licensees. The WICA established the licensing framework for private sector entrants into the water and wastewater markets. IPART reviews the operating licenses for major public water utilities. IPART addresses all WICA license applications and subsequently makes recommends to the Minister regarding licenses (the Minister determines which license to grant). IPART’s latest approach to compliance and enforcement policy was last updated in a documented titled as such in December 2017 (“Overview of licensing regime under the Water Industry Act 2006”; “Compliance and Enforcement Policy,” www.ipart.nsw.gov.au).
In terms of water asset management, the three largest IPART-regulated “monopoly utilities” are Hunter Water, Sydney Water, and WaterNSW (i.e., Water New South Wales). The NSW Environmental Protection Authority (not IPART) is primarily responsible for environmental regulation of water industry utilities.

6.2.1 Economic Regulation
As part of its responsibility as an economic regulator, IPART determines the maximum prices that can be charged for bulk and retail water services by most major utilities across NSW where competitive forces are not strong enough to promote price control. The framework for IPART’s pricing reviews is outlined in the Independent Pricing and Regulatory Tribunal Act 1992 as well as various acts specific to the utilities (e.g., Hunter Water Act 1991, Sydney Water Act 1994, and WaterNSW Act 2014). Small, local government-owned water utilities are not subject to IPART’s price regulation and instead are regulated by the NSW Department of Industry.

Generally, pricing reviews are conducted every four years and involve not only significant interaction between the utility and IPART but also a public consultation process. IPART publishes “issues papers” and draft pricing reports in advance of finalization and allows the public to submit issues in writing and express them in a public forum. Pricing reports are publicly available on IPART’s website. The pricing reviews are extensive, dictating the maximum charge allowed for high-level items like water usage rates and operational items as minor as the price for customer service items [e.g., an electronic copy of a diagram showing the location of pipes, structures, and service connection point on a property (no more than $6.49 AUD until June 30, 2019)]. IPART sets maximum pricing for each utility independently based on submissions by the utilities pertaining to cost of service studies and revenue requirements designed to meet agreed-upon service levels. Pricing varies from one utility to another.

As part of pricing reviews, utilities must illustrate the cost of providing baseline levels of service (i.e., compliance levels that all utilities must attain in relation to all regulatory requirements). To receive funding for additional work that supports a higher service level, the utility must show that the work will (a) maintain or reduce overall long-term costs, (b) increase service above baseline levels to a level agreed upon with customers after conducting willingness-to-pay studies, and/or (c) reduce future risk of asset failure that would jeopardize service level attainment or increase overall long-term costs.

The utilities interviewed as part of this case study indicated they are conducting scenario planning, defining “risk appetite” (maximum acceptable level of risk exposure), and exploring adaptive management techniques, the results of which often show that lowest cost options in the near-term are not best for long-term sustainability. These analyses enhance the ability to communicate between IPART and the utility and justify potential shifts in investment strategy.

Part of the IPART pricing reviews includes reviewing utility operations to determine if the utility is financially efficient. For major capital investments, IPART reviews whether the utility considers multiple options in its attempt to address a need and how it chooses the project alternative that will be advanced. Once a project alternative is chosen, IPART audits the utility to determine if the projects were efficiently implemented. The onus is on the utility to illustrate these financially-efficient processes during its pricing audits. IPART employs a team of economists and engineers, including expert consultants, to best perform its reviews.
6.2.2 Licensing
IPART administers the Operating Licenses for Sydney Water, Hunter Water, and WaterNSW. IPART also administers WICA licenses. The licenses set the terms and conditions to which each utility must adhere, in order to

- protect customers and consumers;
- ensure service quality and reliable supply (i.e., Service Levels); and
- meet requirements for the utility to protect public health and the environment.

Each license has an associated reporting manual that is an IPART document and sets out the performance and compliance monitoring reporting that each utility must provide to IPART or other stakeholders (e.g., the health regulator, the Minister) or make public by publishing on its website.

These licenses are regularly reviewed by IPART at intervals of no longer than five years, with licenses granted or amended by the relevant Minister of Water and the Governor of NSW. The licenses are annually audited with IPART setting audit guidelines. License reviews and annual audit reports are publicly available, though some information provided to IPART via annual reporting are confidential.

6.2.3 Metrics
In making recommendations on licenses to operate water utilities, IPART is committed to focusing on its desired outcomes rather than regulating the procedures and practices needed to achieve those outcomes. Within each of its operating license agreements with regulated utilities, it agrees to a series of customer-focused performance metrics, synonymous to Levels of Service. Allowing utilities to determine how to achieve desired service levels achieves the IPART Secretariat’s goal of building capacity within utilities to better manage its infrastructure. Most utility licenses now require fewer metrics than in the prior iterations, partially an indication that IPART both understands the level of effort involved in performance management tracking and wants to be results/service-level focused while allowing utilities to manage internal performance.

IPART published “Review of Water Utility Performance Indicators” in June 2018. In it, the desire for a series of universally applied performance metrics is discussed. IPART indicated that stakeholders generally support a single set of performance indicators identifying benefits such as enabling the performance of utilities that provide the same services to be compared and “creating a level playing field for public and private water utilities in terms of regulatory costs imposed.” However, stakeholders agreed with IPART’s view that “where there are justifiable differences between utilities, IPART should consider applying different indicators to different utilities.”

A set of 27 metrics were chosen to be potentially applied to all utilities, subject to operating license reviews moving forward. As of now, not all apply to each utility, instead those relevant to the services provided by the utility (e.g., retail services or network services) or the legislative framework (e.g., the Sydney Water Act 1994 requires Sydney Water to compile metrics on its impact on the environment) are required to be reported.

Hunter Water, Sydney Water, WaterNSW, and WICA licensees operate in different regions and with different overall business models; therefore, the service level metrics that are important to one may not apply to the others. Additionally, IPART places a very high degree of emphasis on customer-focused service delivery, and as such, if the customers of different utilities express different priorities, the level of service metrics measured by their utilities should be different and reflective of those differing priorities.
The 27 metrics listed in the Review of Water Utility Performance Indicators document are categorized into 5 groups:

- Water Quality
- Water Quantity
- Assets
- Environment
- Customers

Within the “Assets” metrics group are metrics that focus on the number of customers that experience unplanned water interruptions, as well as the time taken to resolve the interruptions based on the significance of the outage. Additionally, IPART now expects that Hunter Water, Sydney Water, and Water NSW “maintain and implement an Asset Management System consistent with the requirements of its license.” In the existing major water utilities licenses, there are requirements to maintain an Asset Management System.

In the Sydney Water operating license from 2015, there is a requirement for Sydney Water to achieve International Standard ISO 55000-series compliance (the license requires certification) to meet the requirement for an Asset Management System. However, the operating licenses for Hunter Water and WaterNSW which were last amended in 2017 do not require ISO 55000 compliance and certification, instead requiring an asset management system that is “consistent with” ISO 55000. This reflects a change in IPART’s view to allow for a water utility to determine the best way to demonstrate its consistency with ISO 55000, which is likely to be through certification.

For service level targets that go beyond baseline service levels/regulatory compliance targets, the negotiation between IPART-regulated utilities and IPART regarding the targets established for each metric is less straightforward than establishing a universally accepted target. Just as they are involved in determining which metrics to measure, customers must be consulted in determining the appropriate targets for metrics. A utility may have not only different targets compared to other utilities for the same metrics based on their customers’ expectations, but also different targets within its own service territory if there are significantly different expectations from area to area. The existing licenses deal with service level targets in different ways; in the Sydney Water and Hunter Water licenses, service level targets are set and required to be met; however, in the WaterNSW license, there is a reference to the Asset Management System and customer contracts in setting service levels. To change a service level in a license review, a utility is expected to demonstrate that it has adequately consulted its customers and customers are satisfied with the service level targets chosen. Target service levels are informed by past performance and desired customer outcomes. The utility is responsible for having outlined the financial implications associated with alternative levels of service to facilitate the “willingness-to-pay” discussion with customers.

While in its license reviews IPART generally allows utilities and their customers to establish performance targets, the NSW government can direct performance requirements to satisfy desired policy outcomes through other regulation, such as environmental standards. In many cases, in its licensing review, IPART works with utilities to determine the potential impacts of regulatory policies (related to metrics and otherwise). The expected triple-bottom-line benefits of a policy are evaluated versus the utilities’ cost to implement the policies to generate a benefit-to-cost ratio (BCR), and if the BCR is near 1:1 or less, the policy may be reevaluated.
6.2.4 Transparency
The Hilmer Report placed a significant emphasis on transparency within utility (and other infrastructure rich) markets. “Conduct with anti-competitive potential said to be in the public interest should be assessed by an appropriate transparent assessment process with provision for review to demonstrate the nature and incidence of the public costs and benefits claimed.” IPART operates in concert with that recommendation, making information publicly available at various stages of negotiations with utilities. During operating license reviews for the major water utilities, IPART posts various documents for public consumption and subsequent comment:

- **Issues Paper**, which outlines the existing operating license and discusses proposed changes under consideration
- **Draft Operating License Package**, which incorporates proposed changes
- Notice of a **Public Workshop** to review the Draft Operating License Package, with instructions on how the public can register comments
- **Report to the Minister**, which represents the Operating License Package as agreed by the utility and IPART after negotiation and consideration of public comments
- **Granted License**, as recommended by the Minister and granted by the Governor of New South Wales

6.2.5 Customer Contracts
Many IPART-regulated utilities have service contracts with each of their customers. Service levels are defined in the contracts, and in many cases, rebates are offered to customers if a level-of-service is violated to address the “exceedance.” For residential customers, the service contract is generally a template that is identical from customer to customer and is “deemed” to apply if a customer is connected to the water utilities’ assets and supplied with services. Customer Contract templates can be found in each utility’s operating license submission (publicly available on the IPART website) and for Sydney Water and Hunter Water are included in a schedule in the operating license. For larger customers, these contracts may be negotiated.

6.3 Government Assistance for Asset Management Implementation
IPART does not provide incentives for asset management implementation in the form of grants and loans in the same way some state regulatory agencies do in the United States. However, the government agency “Infrastructure NSW” was established in 2011 by the NSW government when they enacted the “Infrastructure NSW Act 2011.” The objectives of the Act are to:

- secure the efficient, effective, economic, and timely planning, coordination, selection, funding, implementation, delivery, and whole-of-lifecycle asset management of infrastructure that is required for the economic and social well-being of the community; and
- ensure that decisions about infrastructure projects are informed by expert professional analysis and advice.


Infrastructure NSW helps the NSW Government identify and prioritize the delivery of critical public infrastructure for NSW and is responsible for developing:
The 20-year plan “must assess the current state of infrastructure in New South Wales and the needs and strategic priorities for infrastructure in New South Wales for the next 20 years,” considering any triple-bottom-line objectives against which the state’s assets can be assessed and benchmarked. The first 20-year plan was created in 2012 and was updated in both 2014 and 2018.

The five-year infrastructure plan must identify major infrastructure projects (originally, project budgets needed to exceed $100 million AUD to qualify, though projects over $50 million can now be nominated), including their cost, estimated timeframe for delivery, and rationale for their selection.

The sectoral infrastructure strategy statement may include an analysis of existing infrastructure (current state of assets), an analysis of current and future needs (levels of service), options to address gaps between the current state of assets and current and future asset needs, and criteria for evaluating options. A preferred long-term infrastructure strategy for each sector results from the analysis.

Other functions of Infrastructure NSW include the following:

- Prepare project implementation plans for major infrastructure projects
- Review and evaluate proposed major infrastructure projects by government agencies or the private sector and other proposed infrastructure projects (including recommendations for the role of Infrastructure NSW in the delivery of those projects)
- Oversee and monitor the delivery of major infrastructure projects and other infrastructure projects identified in plans adopted by the Premier
- Carry out or be responsible for the delivery of a specified major infrastructure project
- Assess the risks involved in planning, funding, delivering and maintaining infrastructure, and the management of those risks
- Provide advice to the Premier on economic or regulatory impediments to the efficient delivery of specific infrastructure projects or infrastructure projects in specific sectors
- Provide advice to the Premier on appropriate funding models for infrastructure
- Coordinate the infrastructure funding submissions of the State and its agencies to the Commonwealth Government and to other bodies
- Carry out reviews of completed infrastructure projects at the request of the Premier
- Provide advice on any matter relating to infrastructure that the Premier requests.

Projects NSW is a specialist unit within Infrastructure NSW that was established in late 2015 to manage the procurement and delivery of nominated priority infrastructure projects.

In 2011, the NSW Government established the Restart NSW fund to enable infrastructure projects to be funded and delivered throughout NSW. As at June 2018, funds deposited into Restart NSW, since 2011, have totaled $32.9 billion AUD. Restart NSW is the
vehicle for the delivery of the Rebuilding NSW plan, which is the Government’s ten-year plan to invest in new infrastructure. Infrastructure NSW is responsible for assessing and recommending Restart NSW projects which improve the productivity and competitiveness of NSW across all sectors. They include a mixture of NSW Government agency-led infrastructure projects as well as local and community infrastructure projects led by local government, non-government organizations, and other agencies, the majority of which are recommended following a submission-based competitive process.

One of the funding programs supported by Restart NSW is the Safe and Secure Water Fund. Safe and Secure Water is a $1-billion fund securing water supply and sewerage services for NSW regional communities. This multi-phased program provides co-funding to successful applicants such as local councils, water utilities, water corporations, and prescribed dam owners for detailed planning and construction activities to install, replace, augment, or decommission water and sewerage infrastructure. It follows the successful Water Security for Regions program which committed more than $330 million to water projects across NSW, including almost $220 million to local submission-based projects for augmenting dams, pipeline and bore works, and water efficiency mechanisms (Infrastructure NSW: www.infrastructure.nsw.gov.au/).

6.4 Corporate Asset Management Planning

Two corporate utilities were interviewed as part of this research: Hunter Water Corporation and Sydney Water Corporation, along with a Water Services Association of Australia (WSAA) representative. Based on WSAA benchmarking in 2016, “Hunter Water is performing at or above median levels of [asset management] maturity compared to all participants and across all asset management functions investigated in this project.” Both corporate utility representatives described AM as a means to an end. AM is the collection of business practices necessary to maximize competitive advantage in the quest to obtain and maintain a license to operate, as well as how to maximize corporate revenue. With AM practices in place, utilities have a far greater ability to make informed judgments about what resources are needed in the future to perform the work that will need to be done to maintain required service levels.

Asset Management Plans (AMPs) are the communication device used to provide IPART with the justification for the budgets submitted during pricing reviews and as part of operating license reviews. Utility pricing submissions must illustrate financial and operational efficiency. “AMPs were developed out of necessity,” stated one utility representative. They are typically used to not only achieve regulatory compliance but also to document performance relative to benchmark metrics and report internally and to utility Boards on annual results and progress.

The private utility representatives noted that AM initiatives have generally been accomplished with dedicated AM teams, but that many utilities have moved away from placing too much responsibility for AM with that team. Realizing that AM practices are most beneficial when practiced throughout the business, corporate AM teams now take more of a support role for work that others can and should do. AM teams focus more on planning, analytics, defining long-term asset performance targets, developing long-term R&R projections, evaluating impacts of alternative strategies to customers, and exploring ways to otherwise lower costs to meet regulations and customer expectations. For the purposes of this research, it is important to note that, at least for the two utilities studied, AM implementation required dedicated staff to implement, and that those teams have existed over long periods of time. The benefits that have been realized have outweighed the resources needed, but significant resources were utilized.
The 2006 International Infrastructure Management Manual (IIMM) stated, “There is significant reliance on individuals and organizations to identify opportunities that arise from AM improvement. The smarter organizations are achieving valuable benefits. Smaller organizations are still struggling to obtain or allocate resources to the task.” Interviews with the IPART Secretariat in 2018 indicate that, while the industry as a whole has advanced, the imbalance in AM practices between large and small utilities still exists.

### 6.4.1 Water Services Association of Australia (WSAA)

The Water Services Association of Australia (WSAA) is an industry body representing Australia’s urban water industry. WSAA was formed in 1995 as a non-profit organization to foster the exchange of information between industry, government, and the community, and to promote sustainable water resource management in Australia. It is comprised of utility members only and began as a research organization in the absence of an Australian equivalent to AWWA.

WSAA was initially comprised of Australia’s top 20 utilities, and current members (numbering more than 100) provide water and sewerage services to more than 20 million customers in Australia and New Zealand and include many of Australia’s largest industrial and commercial enterprises. WSAA facilitates collaboration, knowledge sharing, networking, and cooperation within the urban water industry. That dialogue is considered highly open and effective as a result of WSAA’s utility-only membership and privacy policies. WSAA retains strong links with policymakers and legislative bodies and their influencers to monitor emerging issues of importance to the urban water industry.

One of WSAA’s initial services to the water industry was the development of an asset management survey. First completed in 2000, the benchmarking survey of AM practices has grown into a comprehensive compendium of AM best practices, against which utilities can assess their practices and identify areas of strength and weakness. Every four years, WSAA administers the AM survey, collects and reports on the results (only to survey participants) through the production of an industry benchmarking report and a utility-specific report, and offers advice on initiatives to improve AM practices. To support the development of the entire industry, WSAA subsequently hosts a “leading-practices workshop” which allows all survey participants to learn from the utilities that scored the highest in relation to a variety of AM practices.

The utilities interviewed as part of this research indicated that they are strong participants in WSAA and that the WSAA AM benchmarking has played a key role in assessing their progress and driving improvements based on the results and knowledge sharing.

WSAA has used the results of the AM benchmarking and input from its members to focus research into AM practices. Past research has produced a better understanding of best practices related to configuration management, organizational leadership, project handover from design to operations, and ways to evaluate design assumptions based on an assessment of alternative costs versus risk reductions.

### 6.4.2 Other AM Resource Organizations

It can be said that many Australian utilities “wrote the book” on asset management—in fact, they literally did. The Institute of Public Works Engineering Australasia (IPWEA) formed its AM Committee in 1993, which published a national AM Manual one year later. The AM Committee subsequently partnered with New Zealand Asset Management Support (NAMS) to publish the first International Infrastructure Management Manual in 2000, an authoritative AM business model document. The fifth edition of the Manual was published in 2015. IPWEA and its National Asset Management Strategy Committee
provided national leadership and support for AM through resources and tools to assist AM practitioners, including reports, conference proceedings, discussion forums, and training on the IPWEA website www.ipwea.org/home.

6.5 Data and Information on AM Policy Impacts

The results of Australia’s and NSW’s policies designed to increase competitiveness in the water industry have had a substantial impact. Because of competition, Australia has seen a great deal of consolidation (about 80 percent in some states, according to WSAA), as less-efficient utilities have given way to more efficient and effective ones. IPART reports that costs have come down significantly because of the competitive market environment. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018. Sydney Water Corporation paid NSW an annual dividend of $700 million AUD in 2018.


It is more difficult to report on progress in terms of level of service changes, partly because the licensees are not directly demanding level-of-service increases. It is left to customers to inform desired levels of service, and those levels could be higher or lower over time depending on their willingness to pay for improved service or desire to reduce costs for lesser service. The IPART Secretariat and researched utilities nevertheless all agree that service is more reliable and that service levels are far better tuned to customers’ desires.

Progress in relation to AM business practice is documented by WSAA through their AM process benchmarking surveys every four years. Utilities that choose to participate assess their AM practices using a comprehensive benchmarking tool, with results subsequently verified on-site by an independent assessment team. The tool was developed by water industry professionals, is based on PAS 55 (British AM standard) and ISO 55001 (international AM standard), and covers seven key function areas of asset management, as assessed through more than 500 questions. AM practices are scored based on their level of development, documentation, effectiveness, and coverage across the organization.

Many Australian utilities are using WSAA benchmarking to assess progress (28 Australian utilities participated in the 2012 WSAA benchmarking; 27 participated in 2016) in terms of their corporate AM approach and practices related to planning, capital investment, operations, maintenance, replacement-planning, as well as the information technology (IT) used to support AM. Hunter Water Corporation, for example, referenced its WSAA benchmarking results prominently in an overview of its asset management system contained in its annual Compliance and Performance Report beginning with the 2012–2013 version through its 2016–2017 version, all of which are publicly available on the Hunter Water website www.hunterwater.com.au.

While WSAA maintains confidentiality of results, it shared some high level, publicly available AM benchmarking data that suggests Australian utilities are amongst the world leaders in AM practices. Results from the 2016 benchmarking [named “Asset Management – Customer Value” (AMCV)] shown in the “spider web diagram” in Figure 6-1 indicate that for all seven major AM functions assessed, utilities from Australia (27 utility participants) and New Zealand (three participants) are practicing AM with a higher level of maturity than utilities in North America (11 participants) and Japan (two participants). Results from the 2012 benchmarking (named “Aquamark”) also showed
utilities from Australia and New Zealand practicing AM at higher levels than North American utilities (see Figure 6-2).

The differences in benchmarking scores between the combination of Australian and New Zealand utilities versus the scores of other regions may not be entirely based on regional policy. The differences may be partially due to the longer history of Australian and New Zealand utilities in pursuit of AM maturity. The two Japanese utility participant scores may be reflective of a shorter period of AM implementation, with one just starting its AM journey at the time of benchmarking. It could also be, in part, that Australian and New Zealand utilities have designed their AM systems with clear links to the WSAA benchmarking framework.

*Figure 6-1. Year 2016 WSAA AM benchmarking results by region*
WSAA data from its 2008 and 2012 Aquamark AM benchmarking indicated that AM practices advanced in relation to all seven measured functions, as shown in the “whisker diagram” in Figure 6-3. The average of scores from all utilities is shown in blue (2008 results) and green (2012 results). The top of each white “whisker” represents the 90th percentile utility score, the bottom of each whisker indicating the 10th percentile score, and the diamond representing the median score.
Interviews with WSAA regarding the 2016 AM benchmarking indicated that scores stabilized, but that WSAA believes that AM practices measurably improved: “We found over time that scores for some areas increased, but for many utilities scores either stabilized or went backwards in some measures. This was because people started to understand their knowledge gaps better, tending to mark themselves harder.” The 2016 versus 2012 results are shown in Figure 6-4.

WSAA benchmarking results are also sorted by utility size based on population served, revenue, and relative asset base, allowing utilities to compare their practices against similarly sized peers. In 2016, there were 12 “large”, 14 “medium”, and 18 “small” participants. Benchmarking indicates that of the utilities that participated in the
benchmarking, larger utilities tend to have higher scores. This does not necessarily suggest that large utilities are “better asset managers,” but rather that more advanced AM practices are necessary at larger, more complex utilities. WSAA cited that AM systems should be “fit for purpose” and smaller utilities may still be striking the appropriate balance of service, costs, and risk for their communities without the need to advance their practices to the same degree. Hence, the reason the WSAA benchmarking uses a comparison of results against peers to develop a profile of the appropriate benchmark level for that utility size and scope.

Higher scores for larger utilities reflect a level of resources at their disposal beyond what smaller organizations can access, as well as their ability to apply economies of scale. Larger, more complex organizations demand more effort to coordinate and streamline AM activities. Only in the area of IT does the trend reverse—here, smaller utilities outperform larger ones, perhaps a reflection of the smaller levels of data and support information required to be managed by the applications, and the simpler environment means that the small utility users are more likely to be satisfied with the capability and functionality they have.

WSAA also noted that while size is a general indicator of AM advancement, it is the combination of size and AM leadership that best correlates with AM advancement. “Some utilities are punching above their weight class” as the result of strong AM leadership.

Interviews with Sydney Water Corporate and Hunter Water Corporation regarding regulatory compliance also revealed evidence of positive results related to AM progress: neither is significantly concerned with including ISO 55000 compliance or attainment requirements in their operating license—they see attainment as a formality as they are already in compliance. The requirement to have an asset management system in place has driven some deeper conversations about AM in those organizations, but they are advanced beyond ISO 55000 compliance.

This research project shows that many utilities in Australia are using benchmarking results, reporting annually on progress related to service levels and other internal metrics, and tracking and trending triple-bottom-line (financial, social, and environmental) risks. They are maintaining a corporate risk register and evaluating trends in their corporate risk exposure on a quarterly basis to ensure the right balance of service, costs, and risk. These are the types of activities that define utility asset management and have become the business model for which other regulatory bodies have sought to promote with their legislative policies in hopes of producing similar results.

6.6 Summary and Conclusions

Asset management development in New South Wales has been influenced by both national and state policy, with IPART playing a central role. The structure of the relationship between IPART, the greater NSW government, regulated utilities, and customers have led to great results.

IPART is motivated to ensure that the pricing structures and operating licensing processes are fair. Should they be too aggressive in driving prices lower than optimal, a lack of proper short-term investment in water utility assets would result, ultimately costing more in the long-term. The expectation of NSW is that the state will receive a significant dividend as part of their majority ownership (one major utility in NSW paid the state a $700 million AUD dividend in 2018), so there is some motivation to maintain higher prices. However, a higher-than-optimal pricing structure would fail to protect
the economic interests of consumers and would hinder the ability of NSW to attract and retain “wet businesses” that use significant amounts of water. IPART and the NSW government is driven to find the optimal pricing and service balance.

Utilities in this context are driven to be as cost-effective and reliable as possible. With both service levels and pricing and dividend structures established for extended periods of time, profitability is based largely on long-term financial efficiency and effectiveness in obtaining and retaining customers to take advantage of the economies of scale. The NSW regulatory context also drives utilities to better understand their business risk exposure. For a utility bidding to operate or considering the acquisition of a water system, the reliability and performance of the physical infrastructure is the driving force in determining future costs. Given rates are established for up to five years in advance at the conclusion of IPART price negotiations, understanding what investments will be necessary to maintain service levels is extremely important in those negotiations. This regulatory context drives utilities to create and maintain a full asset registry, understand the condition and performance of its assets to predict future reliability, and evaluate the consequences if assets fail. Utilizing that information to establish an “asset risk register” forms a significant platform for negotiating rates with IPART. If a utility can show that the cost of a risk-mitigation investment is less than the risk mitigation benefit, it can include cost recovery for that project in its rate proposals.

The importance of customer focus to IPART is demonstrated in many ways:

- Transparency of each pricing review and license review process
- Invitation to the public to comment on pricing and license proposals
- Requirement of customer involvement in choosing the level of service metrics
- Requirement of customer involvement in establishing targets, regardless of their level, provided regulatory compliance is maintained

Establishing levels of service has had a positive impact on customer focus, something that regulators and utilities agree has improved greatly. While IPART is moving towards establishing a set of metrics that will be more consistent from one utility to another, the IPART Secretariat expresses caution to regulators against comparison between utilities in different contexts. From their perspective, the metrics are most useful in trending performance at each utility over time to assess whether the service-cost-risk balance is being managed through AM implementation and that the balance is improving.

Interestingly, when IPART was asked if service levels have improved as a result of AM, the response was that they do not see increasing service levels as a measure of progress, but rather that customers have had their say in making sure that service levels are rightly sized and balanced with the costs they are willing to pay for a specific service level. IPART and the utility case studies all agree that service levels have improved, but the balance of cost, service, and risk are their primary focus and benchmark. In this way, issues of affordability and environmental justice (utilities developing contracts with each customer that are virtually identical from residential customer to customer) are transparently discussed and incorporated into the service level determination.

The IPART Secretariat and utilities also agree that regulators should remain outcome-focused, while the utility and its customers are best positioned to establish the appropriate metrics and targets to achieve the desired outcomes, given their better understanding of their overall needs. Unintended consequences can result when establishing service level targets, based on a potential shift in resources to meet one goal potentially impacting the ability to perform other services and meet other goals.
For this reason, the utility and its customers should own a significant portion of that responsibility.

Both the IPART Secretariat and the utilities researched agree that AMPs and systems should cover all of the infrastructure and become embedded in day-to-day business. While AMPs on subsets of assets may be a good way to introduce AM concepts and the potential benefits to utilities, ultimately the AM model needs to be applied across the utility to have the desired impact of optimizing investments utility-wide. Because AM concepts are no different from industry to industry or asset class to asset class, utilities will find great economies of scale in applying the concepts across their organizations. AM is far less successful, in their experience, when it is implemented as a standalone function.

If AM is required to receive funding, it may be forgotten once funding is received. If AM is only required for assets associated with funding, the benefits will be limited. Based on a commonly held belief that asset management is a continual improvement process that almost universally requires a long time to implement and reach a mature state, periodic and discrete funding programs will not produce lasting change. The IPART Secretariat recognizes the need for long-term support and provides support staff interaction to help regulated utilities in need of advice.

While IPART is now requiring “asset management systems” as part of operating licenses, it is in large part the regulatory context established in Australia well before AM system requirements that gave rise to the structure of the AM business model as it is formally defined today.

6.7 References


Water utilities across the globe have documented significant benefits as a result of incorporating utility asset management practices into business activities (see Section 1.0). The success of those organizations has led many regulatory agencies to encourage and/or regulate asset management practices to varying degrees. Our research found a broad range of policies, including:

- New Hampshire: Resource support, training, and requirements only for agencies requesting SRF funds; requirements apply only for assets associated with SRF funding.
- New Jersey: Similar to NH until the recently enacted Water Quality Accountability Act’s highly prescriptive legislation.
- Michigan: Significant grant funding for AMPs and AM projects; AM requirements apply only to grant recipients and only for assets associated with grant funding.
- Ontario: Municipality-wide encouragement followed by future regulation of municipality-wide AMPs.
- New South Wales: Economic and operating license regulation of private and corporatized utility only by IPART, with recent ISO 55000 (or similar) attainment requirements.

Virtually all the government policies researched are in a state of evolution as agencies continue their efforts to advance water infrastructure management in the regions they govern.

The focus of this research was to not only document those regulatory policies but also to document the data collected by those governing bodies to determine the direct impacts of their policies. Regarding data, the findings were neither as comprehensive nor as conclusive as hoped. In many cases, asset management policies have not been in place long enough to have had a directly measurable impact, given the widely held belief that asset management change takes time.

Even in Australia, the primary incubator of the AM business model dating back to the late 1990s and early 2000s, compliance with asset management-specific regulations is a relatively new development. In his best-selling book “Good to Great,” Jim Collins documents how 11 companies that had 15 years of at- or below-market performance (good) followed by 15 straight years during which they outperformed the market (great) all cited changes in business practices that started a decade or more prior to their transformations from “good to great.” It is not a surprise that with most government asset management policies having been promulgated within the last five to ten years, the direct link between policy and benefits data is not well documented by many of the regulatory bodies interviewed.

Additionally, governing bodies are not requiring the collection of the necessary data, and even if informative data were contained in asset management plans, many agencies do not have the resources to review them to assess their quality or effectiveness. Interview questions with regulators focused on identifying data to support their anecdotal beliefs...
that AM policies have been effective. In all cases except for IPART, that data was not in their possession.

Still, the breadth of anecdotal evidence supporting the encouragement and requirement to implement some level of AM is significant. Regulators almost universally cited enhanced communication between utility managers and governing bodies based on utilities’ better understanding of their portfolio assets, their age and condition, criticality, and risk. More informed decisions can and are being made (e.g., Plymouth Village Water and Sewer District reported that risk-mitigation projects previously rejected have been approved more recently based on the availability of AM data to support them). In New Jersey, utilities cited the improvement in acquiring asset data as part of the commissioning process based on a better understanding of the data needed to make more informed asset decisions. In Ontario, there is increased confidence that the projects being completed are providing the greatest value to communities, as funding is directed at projects prioritized in asset management plans that are developed inclusive of the municipalities’ entire asset base. Representatives at private utilities in both New Jersey and Australia expressed their advocacy for recent changes in government policies that now hold public utilities to the same or similar standards as themselves.

Based on this research and the collection of documentation outlining the benefits of AM that predates it, governing bodies should consider the following.

7.1 Levels of Service and Performance Measurement

The highest performing AM utilities in the world are extremely customer-centric, tracking and reporting on the service levels being provided and, in Australia, promising a baseline service level in individual customer contracts. Consultation with customers is required by IPART in some cases in New South Wales. If a regulatory agency is contemplating AM related requirements, the research team recommends that they consider the benefits (and costs) of requiring utilities to track and report on service-level metrics and require consultation with customers prior to setting service levels. Doing so would have multiple benefits:

- This research indicates that most regulatory bodies do not collect enough data to assess the impacts of their AM policies. Collecting appropriate service level data would help determine if and potentially how policy can evolve in the future to better advance water infrastructure management.
- Formal documentation of service level performance would lead to more informed decisions by utilities. Given that utilities are stewards of extensive infrastructure networks designed to provide service to the customers that fund the infrastructure, understanding, documenting, and having the ability to manage the levels of services provided should be a baseline business practice.
- Utilities that track service levels can engage the public to determine their satisfaction with existing service levels and their willingness to pay for higher (or lower) service levels.
- Investment alternatives can be evaluated more directly in relation to their service level impacts and to determine if appropriate benefit-to-cost ratio goals can be met.

Service level requirements are not unprecedented. In the US water industry, every public community water system has been required for about twenty years to publish an annual Consumer Confidence Report (CCR) documenting water quality in relation to
standards (the 2018 America’s Water Infrastructure Act requires semiannual CCRs for some utilities). IPART requires its regulated utilities to select and report on service level performance in relation to targets established in consultation with customers.

In the power industry, many US state utility commissions require documentation of several standard “distribution reliability” metrics that measure the frequency, duration, and overall impacts of power outages, such as:

- **CAIDI**: Customer average interruption duration index; equal to the number of customers impacted by outages multiplied by the duration of the outages, divided by the number of customers impacted by outages—it is the average interruption duration for customers that experienced outages.
- **SAIDI**: System average interruption duration index; the sum of customer-hours of outages are divided by all customers, not just customers that experience an outage.
- **SAIFI**: System average interruption frequency index; the total number of customers interrupted (in a given timeframe) divided by the number of customers served.

The research team recommends that US regulators consider adapting these three distribution reliability metrics (sometimes referred to as “the reliability triangle”) to the water utility context. Some similar metrics are already used in water utility benchmarking programs (e.g., AWWA Utility Benchmarking Program). Understanding how these metrics work together can lead to better management decisions regarding investments. If a utility tracks SAIFI and identifies an issue with either the current frequency of interruptions or the trend in that value, it can react by adjusting the level of resources directed at mitigating the source of outages and at mitigating the number of customers impacted when outages occur. If a utility tracks a CAIDI-like metric, it will be better informed about resource allocation aimed at impacting the speed of service restoration. These metrics should be tracked in unison, rather than tracking one or two, to avoid unintended consequences (e.g., allocating additional resources to reduce response times may impact a utility’s ability to perform proactive maintenance, increasing the frequency of interruptions).

The IPART metrics required of Australian water utilities offer additional insights into the potential level of service metrics. Aside from regulated utilities in Australia, many utilities in the United States and elsewhere have chosen to report on service level metrics to customers without a requirement:

- The Department of Public Utilities in Columbus, OH, is reporting on service levels (water quality complaints, water main break rate, sewer backups into basements, sewer overflows, power interruption duration, and streetlight outage response times) in its annual budget document. [www.columbus.gov/uploadedFiles/Columbus/Departments/Finance_and_Management/Financial_Management_Group/Budget_Management/2019_Budget/19Complete.pdf](http://www.columbus.gov/uploadedFiles/Columbus/Departments/Finance_and_Management/Financial_Management_Group/Budget_Management/2019_Budget/19Complete.pdf)
- Anchorage Water and Wastewater Utility publishes a “Utility Report Card” which includes metrics on water quality and service disruptions as well as safety, financial, and environmental indicators [www.awwu.biz/home/showdocument?id=1548](http://www.awwu.biz/home/showdocument?id=1548).
While many regulators have struggled with which (if any) metrics should be measured, Ohio EPA is now requiring asset management plans for all public water systems. AM rules passed in late 2018 that involve revisions to the Ohio Administrative Code now require public community systems to report on five predefined metrics and one system-defined customer service metric. The predefined metrics include financial metrics and several related to system reliability (water main break rate, non-revenue water, and planned versus unplanned maintenance tasks) (Ohio Administrative Code, Chapter 3745-87-05; epa.ohio.gov/Portals/28/documents/rules/proposed/3745-87-05.pdf).

The research team also recommends a similar approach as IPART in not requiring reporting on internal performance metrics (metrics that do not directly measure the service customers experience), but rather allowing water systems to determine what, if any, additional metrics are appropriate to measure and what targets are appropriate for the metrics chosen. For example, some communities have chosen to track the reliability of their water system using an AWWA Utility Benchmarking Metric: Water main breaks per 100 miles per year. The metric is normalized for comparison with other utilities, but the appropriate target will vary from system to system and potentially within a utility depending on the criticality of water mains. Higher break rates may be more acceptable in less densely populated residential areas compared to more densely populated urban areas.

In considering whether to require service level reporting, some other considerations include the following:

- Limit the number of service level metrics reported: IPART has made strides in greatly reducing the number of metrics reported in its operating license reviews in recognition of the cost associated with the tracking and reporting of metrics.
- Determine if performance data will be made publicly available: many utilities are concerned that comparison with other utilities operating in vastly different contexts may lead to ill-advised conclusions about the appropriateness of their current service levels.
- Assess the level of community involvement in choosing metrics and establishing targets: While IPART requires it and NHDES encourages it, community involvement in determining the appropriate performance management strategy is not simple. Many of the metrics that may be considered (e.g., water main break rate) required many years of accurate data collection to provide a firm understanding of system performance. While community involvement is encouraged and recommended, it may be best if phased in over time.

### 7.2 Flexibility, Specificity, and Timing of AM Policy

One of the more common themes that emerged from the research was that AM policy needs to have the appropriate balance of specificity and flexibility. Utilities researched in the U.S. and Ontario generally agreed that guidance associated with AM policy has been improving over time but was initially vague. This resulted in AMPs that lacked the specificity and comprehensiveness desired by regulators.

Conversely, The New Jersey Water Quality Accountability Act sets very specific inspection, hydrant flushing, and valve exercising requirements that may not provide the best value to the customers of many utilities. Utilities and their communities lose considerable flexibility in prioritizing investments across the municipality, as highest risk water utility projects require funding.
Regulators need to consider the tradeoffs associated with their policies. IPART recommends defining the specific desired outcomes while allowing utilities to define how to achieve those outcomes. The most advanced AM utilities understand specifically what is required by regulators and have been given the flexibility to determine how to meet regulatory and level of service goals and business objectives.

Just as important as determining the appropriate balance is that the policies be fully formed prior to promulgating legislative requirements. Stakeholder engagement and education should be key components of all parts of the policy process. In the perspectives of utilities and regulators alike, policies requiring AM in Michigan (SAW), New Jersey (WQAA), and Ontario lacked the necessary guidance to produce the full complement of desired results. In the state of Ohio, legislation requiring AM was passed in 2017 requiring all public water systems to produce AMPs by October 1, 2018, but associated rule-making was not finalized until November 2018. Involving stakeholders in all aspects of the policy process and providing utilities adequate time to respond to requirements will increase the level of effectiveness and efficiency in generating the required deliverables. This, in turn, will increase the likelihood that the AM practices developed will have a positive impact on utilities and their customers.

Finally, IPART discussed the need to be cognizant of other regulations impacting utilities. Coordinating with other divisions within the same government or other governing bodies impacting the same community is vital to ensure consistency of policy and not overburden utilities with mandates that are potentially unachievable in combination with others.

### 7.3 Funding Strategies

There have been extremes in terms of the level of funding provided in association with AM requirements. In New South Wales, the regulatory body did not provide funding for the development of asset management systems, but rather expected corporatized utilities under price regulation to return dividends to the state. On the other end of the spectrum, Michigan provided more than $330 million in SAW funding specifically for the development of AMPs and the funding of projects identified in AMPs on a first-come, first-served basis. Ontario’s AM funding programs have, until recently, been comparable to Michigan’s SAW program in terms of incentivizing AM, although AMPs will be required moving forward. IPART believes that the benefits of implementing AM should outweigh the costs, and AM should simply be an evolution of a utility’s business model. Outside of the corporatized water market, public utilities invariably note how they are stretched to the limit with unfunded mandates, and that funding for AM is needed.

The benefits of funding AM programs that lead to infrastructure projects include reduction in risks associated with asset renewal. The AM policy portion of funding (e.g., SRF requirements for AMPs) is intended to ensure maximum value is received from the funded infrastructure over its entire life cycle. However, in the absence of strong AM guidance, AMPs produced in highly funded states have not been produced to the quality of AMPs expected. The research indicated that, in many cases, utilities were anecdotally “checking the AM box” in order to receive funding. One Australian utility representative stated, “Simply throwing money at AM won’t work. You must reach the hearts and minds of utility management and staff, explaining the outcomes desired and why you want them.”

While some AMPs may be completed solely for the purposes of obtaining funding for a project, ancillary benefits may still be achieved, provided regulatory policy and guidance involves exposing utilities to AM concepts. For example, New Jersey’s Water Quality Accountability Act requires chief executives, Mayors, and utility directors to be involved
in certifying AMPs—this will elevate awareness of AM practices to a higher level in many cases. Depending on the requirements, development of AMPs may bring internal utility staff (engineering, operations, maintenance, finance, and IT) together and help align their actions, increasing efficiency and effectiveness. The clearer the policies are, the more likely these positive outcomes will be achieved.

Almost all utilities involved in this project emphasized the importance of funding. US utilities, in particular, cited an increase in regulatory and other pressures (lead and copper rule, phosphorus limits, PFAS, asset management, etc.). That concern is supported in New Jersey by stronger demands for SRF funding to the point that funding is not sustainable at past levels. Also, in New Jersey, the WQAA requirement to dedicate funds to finance its highest AMP priorities may not be practical in some communities that are financially challenged.

Implementing AM may require different skill sets than some utilities currently have. AM involves a data-driven approach to decision making, with advancements in technology enhancing the ability of utilities to capture, store, and analyze data. The skill sets associated with both data-driven analytics and associated IT support systems may involve a transformation of current capabilities. Even if skill sets exist at a utility, learning about AM and preparing AM plans, then working to implement them can require a significant additional workload that precedes the anticipated benefits.

Based on the research findings, funding for asset management should be considered so long as it is coupled with well-defined outcomes. That funding may include both financial funding to utilities as well as setting aside internal funding to provide additional resources from the government agency to better support utilities, just as NHDEP and IPART have done by increasing their staff’s ability to support and enhance the AM capabilities at utilities. The benefits of funding include:

- Enhancing the ability of utilities to begin their AM journey and increasing their capacity and capability to implement AM. Funding for AMP development (as opposed to capital projects identified in AMPs) may be of higher need and value in cases where utilities have limited or no prior experience with AM and require support to gain experience and knowledge.

- Accelerating the implementation of projects identified in AMPs that will deliver the highest value. In some cases, if projects are delayed due to lack of funding, subsequent deterioration of assets could lead to increased risks to financial and public health and safety. Funding for CIP projects identified in AMPs may be best suited for utilities that have more developed AM experience, such that there is more confidence in the AMP and that the project identified are based on solid AM understanding.

One side of the argument for funding is the notion that if there are benefits to practicing better AM, public funding of new requirements should not be necessary other than by the local users of the system which are to benefit from implementing the practices. Better management of the asset portfolio, higher confidence in the decisions being made by the utility, a better sense for the real needs of the infrastructure, and what future costs should really be planned for are all benefits of an AM program that would provide the return on investment necessary to fund AM change. Most economically regulated utilities are assumed to be implementing AM for these reasons and including the cost of AM implementation in rates. On the other end of the argument is the idea that implementing AM requires a significant investment that involves changing the culture of the utility, potentially benefitting from the addition of new skill sets and technologies, training, and other change management activities at the outset; and that many utilities may not be able to finance the up-front investment needed to benefit from
implementation of AM. These considerations must be evaluated by each individual governing body, given their expectations for AM implementation and the context in which their policies will be implemented.

7.4 Audit/Review of AM Programs and Plans

Both Ontario and IPART are reviewing AM plans and programs. A third-party reviewer, the Association of Municipalities of Ontario (AMO), administers the Federal Gas Tax Fund in Ontario and each year reviews ten percent of the 443 municipal AMPs. IPART is involved in reviewing the AMPs of its regulated utilities every four to five years, but this is largely possible because of the relatively high degree of consolidation in the water utility market in New South Wales. IPART has made a concerted effort, however, to staff itself adequately to perform those reviews with a highly qualified team of AM specialists, engineers, and economists that have experience in the private utility sector.

In the U.S., research for this report and the 2017 AWWA report “Clean Water and Drinking Water State Revolving Fund Programs: Survey of Fiscal Sustainability Plans and Asset Management Requirements” indicate that the preponderance of US state regulators are not reviewing the AM plans and programs they require. Interviews with regulators point strongly to significant resource constraints as the primary reason. In Ohio, where AMPs are now required of more than 5,000 public water systems (beginning in late 2018), review of every AMP is not possible due to the inability to acquire enough AM-specialist staff to handle that workload. [Source: Interviews (multiple) with Susan Schell, Environmental Specialist at the Ohio Environmental Protection Agency with multifaceted responsibilities including establishing AM policy for all public water systems in Ohio.]

Regardless of the reasons, it is recommended that regulators consider setting aside resources to review AM programs and plans, even if that involves contracting a third-party reviewer, as is the case in Ontario with AMO administering the Federal Gas Tax Fund AM Plan reviews. If the appropriate review is provided, the quality and content of asset plans will rise closer to desired levels and increase the likelihood of achieving the goal of improving asset management practices. The IPART case study suggests that if AM programs and plans are required, skilled and qualified reviewers capable of providing appropriate feedback to utilities are essential to driving value into them. The benefits documented by advanced AM utilities suggest that this would be an investment well worth evaluating. Beyond the benefits of that feedback to utilities, the involvement of a highly qualified AM specialist in the AM reviews would allow them to better support the water industry, as they would gain an understanding of where the market providing feedback to the utility could benefit from additional training and resources.

Additionally, the research is clear that implementing AM practices is a long process, one that never ends. WSAA AM benchmarking showed that the level of AM implementation and maturity at even the most advanced utilities increases consistently over time. In that regard, just as advanced utilities in Australia are subject to operation reviews and AM system reviews every four to five years, the research team recommends that regulators elsewhere review AM programs and plans at regular intervals. Developing an AMP and reviewing AMPs at the end of a capital project does not ensure the plans are implemented. The purpose of regular reviews would be to ensure that AMPs are being implemented and that AM practices at the utility are maturing, and that the utility is increasing its ability to implement more advanced AM in the future.

7.5 Consolidation of Guidance Manuals

One of the ancillary findings of this project is that almost all governing bodies are preparing their own guidance documents, which appear to be highly redundant in many
cases. While the research team recommends that regulators be supportive of utilities in educating them about the specific AM requirements within their purview, recreating AM documents has the potential to not only expend resources unnecessarily but also cause confusion if any inconsistencies arise between source documents. Inconsistencies in AM terminology alone amongst AM practitioners led to the creation of the “AWWA Asset Management Definitions Guidebook” in 2018 [www.awwa.org/Resources-Tools/Resources/Asset-Management](http://www.awwa.org/Resources-Tools/Resources/Asset-Management).

The research team recommends that regulators first consider directing utilities to a set of existing AM resources before creating additional bodies of work. As an example, IPART requirements for utilities to implement AM systems refers to an Australian AM standard that is identical to ISO 55000. Why should agencies reinvent the wheel?

### 7.6 Breadth of Assets Included in AM Requirements

The case studies in this report illustrate policies that require AM at a project level (e.g., US state revolving fund loan requirements), utility level (New South Wales), and municipal level (Ontario). Anecdotal evidence points to some advantages of municipal-level AM, such as those cited in Fredericton, New Brunswick, where the municipality was able to shift resources to its Water and Sewer Fund when they realized that depreciation of those assets was greatly outpacing reinvestment. Given that AM principles apply for any infrastructure-rich environment, it stands to reason that an entity would take advantage of the economies of scale and apply AM as broadly as possible to maximize the advancement of business practices.

The New South Wales case study pointed to the benefits of AM at the utility level as opposed to at a project level. IPART regulated utilities have little choice at present, as an AM system must now be applied at a corporate level. Prior to that, however, utilities in NSW arrived at utility-wide AM implementation on their own as a way to meet both regulatory pricing and operational requirements and simultaneously support corporate goals. The country recognized that the greatest benefits are realized when utilities within the entire Australian water market are operating in a more competitive (corporatized) market in which AM practices applied across a utility are necessary for a utility to perform at desired levels.

While not developed as a full case study for this report, the research team spoke with representatives from North Carolina that indicated grant funding for utilities to develop asset inventories and conduct condition assessments has been routinely fully tapped. Over the course of three $5 million funding cycles, grants are fully utilized by utilities, and more than $20 million in grant applications were turned away in one cycle (late 2017). This indicates that there is a significant need for the most basic elements of AM in some regions, and funding AM to that extent may produce significant benefits in return; despite not funding a full AM system, the foundation elements are funded (May 2018 Interview with Kim Colson, Director of the North Carolina Division of Water Infrastructure, responsible for managing the state’s major water infrastructure funding programs). The 2015 AWWA “Establishing the Level of Progress in Utility Asset Management Survey Results” report also supports the finding that many utilities are struggling with the most basic AM practices.

In US states that require AM only for assets associated with an SRF loan, requirements have been helpful at introducing concepts. The research points to greater benefit if AM is ultimately implemented at a broader scale—advanced utilities and the economic regulator in NSW echo the notion that AM “should be how a utility does business.”
7.7 Economic Regulation

The inefficiency of monopolistic service providers, as documented in the 1990s in Australia (including the water market), led to the corporatization and consolidation in the water industry there. IPART’s subsequent economic regulation of NSW monopoly utilities, coupled with its operational reviews in which service levels are negotiated and cemented into customer contracts, has led to the very business practices we now term Asset Management. Faced with the prospect of fixed pricing over durations of four to five years, utilities that enter their rate case negotiations without a firm grasp of future costs leave themselves at high financial risk. Economic regulation led to policies and practices that form the foundation of AM—maintaining a comprehensive asset register, understanding the condition of assets, developing a risk register, and anticipating the cost to manage risks based on sound business cases. These utility processes are necessary for the water corporations to be financially sustainable, and those processes are scrutinized by IPART as part of their oversight to ensure utilities are acting efficiently and not overpricing services.

The research team recommends that regulators that do not currently economically regulate utilities consider a means to provide similar oversight. Research in the US indicates that there is substantial room to improve practices used to justify capital expenses and operational budgets. Like utilities in NSW, many large US utilities have adopted a business case evaluation process that involves documenting project needs, ensuring several alternatives are considered and evaluated, and decisions are informed based on an impartial evaluation of the costs and benefits. However, those processes are not the norm, and many decisions are made “on gut feelings,” as described by NHDES.

Australian utilities described the need to conduct thorough evaluations of capital expenses including multiple perspectives. Capital decisions made by governments without proper technical analysis (Flint) and technical decisions without government oversight (potentially leading to underserved populations that are deemed “non-critical”) tend to lead to skewed decisions. Processes that include financial, social, environmental, and strategic community viewpoints have provided the greatest value to communities. Thus, the interaction between regulators and utilities is encouraged with the goal of driving more informed decisions.

There is a recognition that economic regulation adds the most value when decisions are made closest to the local level with consideration given to customer willingness and ability to pay as well as the long-term sustainability of operations.

In the case of public ownership, economic regulation may face legal impediments (i.e., existing governing boards cannot bind future governing boards with a price structure), and such impediments must be recognized. In those cases, an alternate organizational structure could be considered where economic “regulation” is driven from within the utility as a way to improve AM practices and better serve customers at an acceptable cost and level of risk.

7.8 AM Benchmarking and Surveys

**Benchmarking.** Several AM-specific benchmarking tools are available through various organizations (e.g., AWWA's Utility Benchmarking Program). The Water Research Foundation offers a free AM benchmarking tool (with membership), called SAM-GAP®. “Effective Utility Management” is another tool that offers AM-focused benchmarking and applies to a broader set of practices. The Water Services Association of Australia (WSAA) has offered a highly detailed AM-process-oriented benchmarking every four
years since 2000 to Australian utilities, and to worldwide utilities since 2008, though offering the benchmarking outside of Australia may be discontinued in 2020.

**Surveys.** Both the 2015 AWWA “Establishing the Level of Progress in Utility Asset Management Survey” and the “New Jersey Water System Asset Management Assessment Baseline Survey” offered insight into asset management maturity levels in the water sector. The research team received feedback at the national and state AWWA levels that reissuing those surveys could provide additional insights into progress over the last several years. In New Jersey, where the AM survey was originally administered in 2016, a second survey conducted in the near term and then again in the years following WQAA deadlines may prove helpful in determining what AM progress has been made and if AM policy associated with WQAA is having a positive impact.

### 7.9 Additional Research

The research uncovered a variety of AM policies and wealth of anecdotal evidence related to the impacts of various AM policies. Quantitative data was more difficult to find. In addition, most AM policies are in a state of evolution, even in Australia where benchmarking revealed organizations at the highest levels of AM maturity. For these reasons, additional research is recommended to further inform governments considering AM policy.

The research team hopes that some governments already requiring AMPs go beyond their current operating context in which they only review plans for comprehensiveness or they do not review plans at all. In places like Ontario, information from AMPs already being reviewed could be mined further to gage progress as utilities’ AMPs evolve. The state of Ohio has begun requiring the tracking of several metrics beginning on October 1, 2018, including a small set of financial, level of service, and operational metrics. As Ohio’s and other US states’ programs evolve, they may present additional research opportunities.

In the meantime, Australian utilities that continue to outpace others in terms of AM maturity could be studied further to determine how their successes in a corporatized environment can be applied to other regions with different contexts. While there is quantifiable data collected by utilities and other agencies, progress would be fleshed out further. For example, while IPART and the Australian utilities studied all report increased reliability of services, it has been their priority to ensure service levels meet the needs of customers, not necessarily improve. Additional research with both IPART and utilities that have documented service levels could show those anecdotal statements.

Additionally, the role of economic regulation in Australia could be studied further. Some water utilities in the US (e.g., in Alaska and Wisconsin) are economically regulated. AM performance of utilities in those areas and Australia could be compared to those in regions without economic regulation to determine how much of an impact that regulation has had.