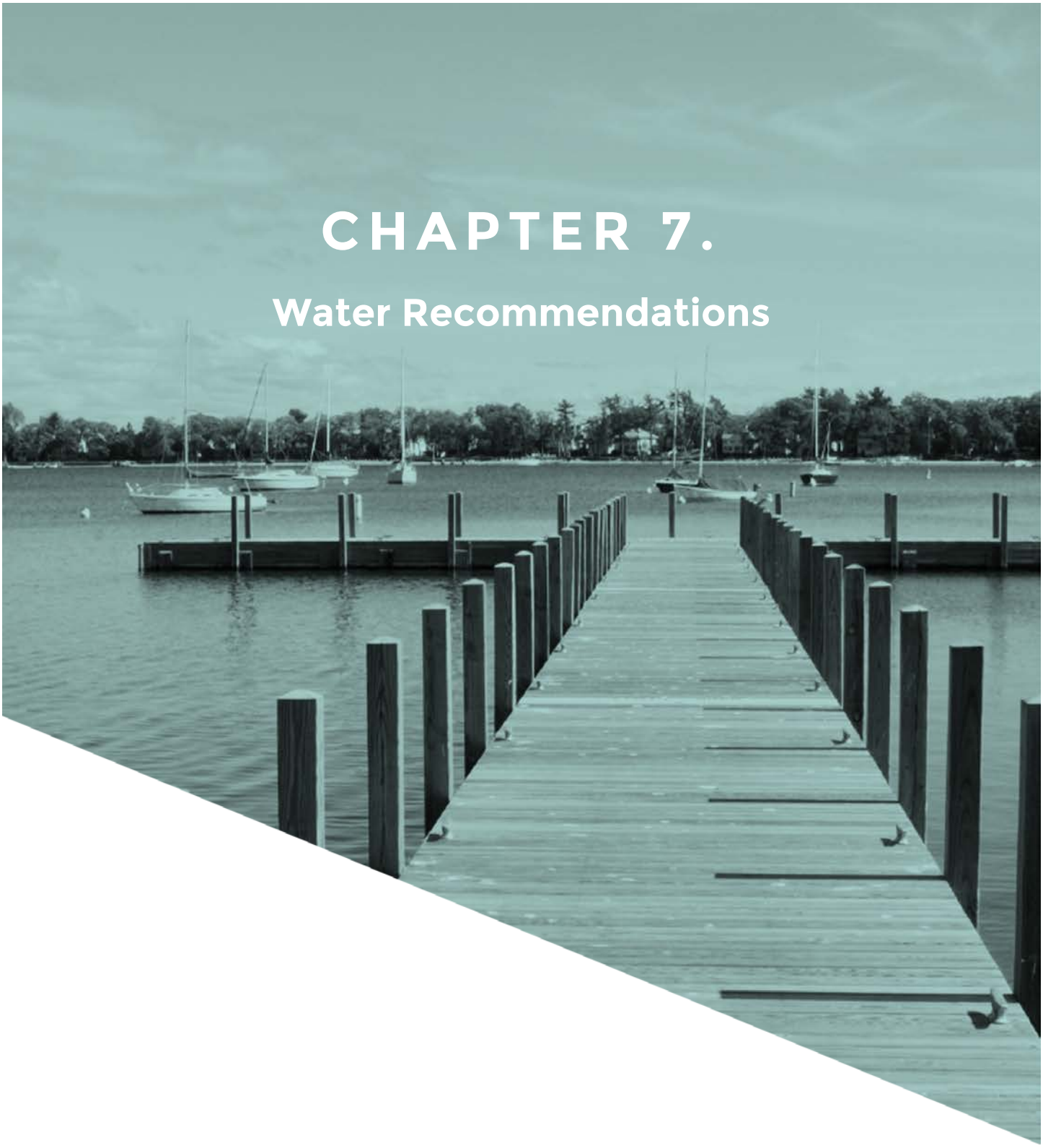


CHAPTER 7.

Water Recommendations

CURRENT STATE OF MICHIGAN'S WATER INFRASTRUCTURE

Infrastructure systems in Michigan should enhance residents' quality of life, enable economic growth, and create a strong foundation for vibrant communities. In order to obtain safe, reliable, and resilient water systems in the 21st century, we must first understand the current reality of water infrastructure in Michigan:

DAMS

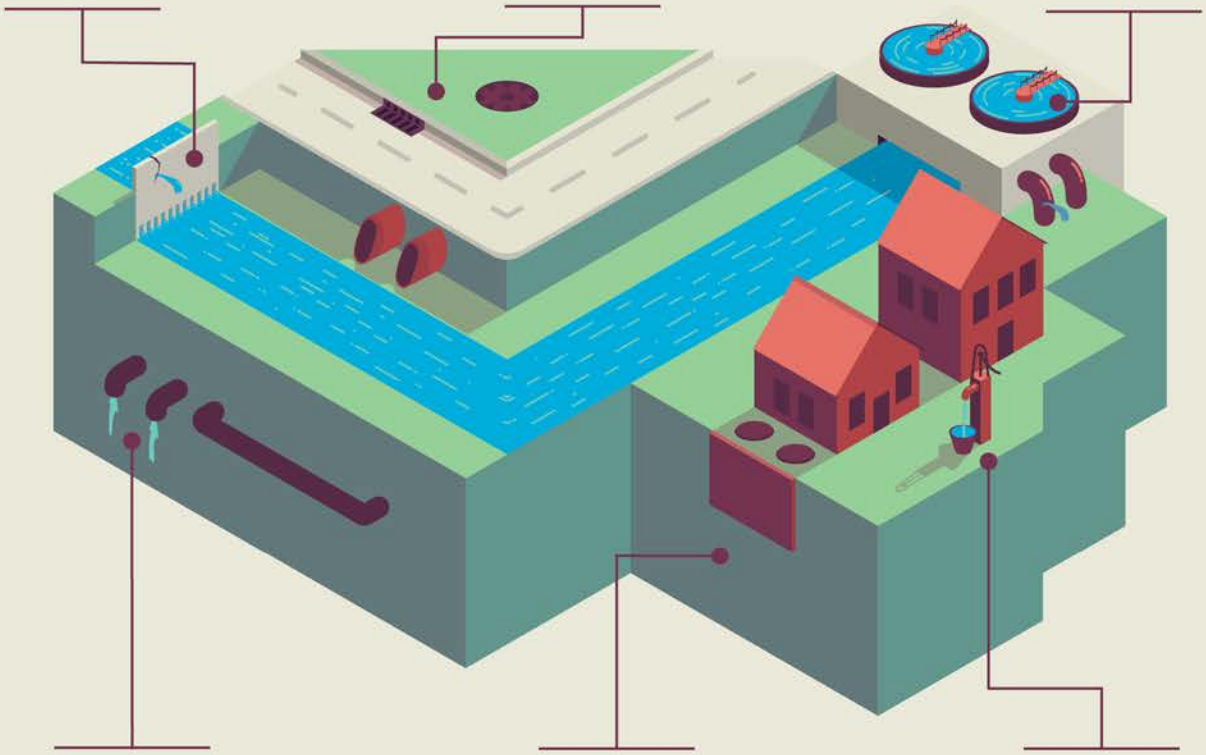
- Michigan has an estimated **2,600 dams,** many of which were built decades ago.
- More than **10 percent** of rated dams are in poor or unsatisfactory condition.

DRAINAGE SYSTEMS

- Drainage systems capture stormwater through open ditches, underground pipes, retention, and treatment systems to prevent flooding.
- **35,000 miles** of county drains serve more than **17 million acres.**
- Many communities lack sustainable funding mechanisms to support drainage systems.

MUNICIPAL WASTEWATER

- **1,080 community municipal wastewater treatment systems** serve **70 percent** of Michigan residents.
- Since 2008, an average of **5.7 billion gallons** of untreated sewage flowed into Michigan waterways.



MUNICIPAL DRINKING WATER

- **1,390 community water systems** supply **75 percent** of the state's residents and businesses.
- Most water systems were built at least **50-100 years** ago and need repair and replacement.
- Many water systems are continually underinvested.
- Drinking water systems commonly lose between **10 and 50 percent** of the drinking water they produce due to leakage.

SEPTIC SYSTEMS

- Septic systems serve **30 percent** of Michigan residents.
- Of the **1.3 million systems** in the state, at least **10 percent** are estimated to be failing. Some estimates suggest the rate may be as high as **25 percent.**
- Michigan is the only state in the country without a sanitary code, which would provide a unified standard for septic system performance, inspections, and maintenance.

PRIVATE WELLS

- Of Michigan's residents and businesses, **25 percent** obtain their water from more than **1 million private wells,** the most of any state in the nation.
- Groundwater and private wells are critical to the success of agriculture.
- Groundwater resources must be protected to ensure access to safe drinking water.

Michigan has unparalleled fresh water resources, including 11,000 inland lakes, groundwater resources, and 36,000 miles of streams, wetlands, and beaches. This vast water network—combined with our unique position within the Great Lakes, the world's largest freshwater system—provides exceptional opportunities. However, it also means we have a great responsibility to ensure Michiganders have the healthiest water system in the world.

Michigan's water system provides drinking water to millions of people, sustains unique and pristine habitats, and offers world-class recreation opportunities. Residents rely on this system for public health and environmental, recreational, and economic benefits.

> *To sustain Michigan's future, we must manage the state's water resources wisely to protect and enhance their value, including maintaining and enhancing the viability of our water, sewer, and stormwater infrastructure systems.*

Currently, Michigan has an $800 million annual gap in water and sewer infrastructure needs, compiled from decades of deferred maintenance and a lack of knowledge on the condition of our water-related assets.[31]

The Flint water crisis has placed a national spotlight on the impacts of deteriorating infrastructure, declining population and system usage, fragmented decision making, and severe underinvestment in critical water infrastructure. Flint is not alone. Other Michigan communities need water infrastructure investment to address water quality concerns, including Oscoda Township and Ann Arbor. These two communities face the complex problem of chemicals that contaminate local groundwater supplies, causing hundreds of homeowners to abandon their wells and seek alternative drinking water sources. Michigan's municipal systems need to be evaluated for defective and inadequate infrastructure to ensure long-term safety and public health.

Beyond drinking water, there are other challenges to Michigan's water infrastructure. An average of 5.7 billion gallons of raw sewage flowed into Michigan's waters between 2013 and 2014 (MDEQ October 2016 a.). Sixty-four rivers that drain 84 percent of the land area in the Lower Peninsula tested positive for human sewage (Verhougstraete et al. 2014). Nearly 25 percent of beaches experienced closures in 2015 (MDEQ May 2016). 20 percent of our beaches do not meet public health protection standards. Maintaining and updating our wastewater and stormwater infrastructure is critical to solve this problem so all Michigan residents can access these resources without risk to their health.

The Commission has recognized that a 21st century water infrastructure system begins with being able to identify the location and condition of Michigan's water, sewer, and stormwater infrastructure. This knowledge and data will identify infrastructure shortcomings to develop a long-range plan for a safe, reliable, cost-effective and efficient system. In addition, this information will assist revisions to water and sewer rate structures, to reflect the full cost of providing service to maximize infrastructure investments and stop deferring needed maintenance activities.

[31] The annual funding gap for water and sewer infrastructure needs is considered a conservative estimate using the best available information. As condition assessments and asset management plans are developed, this estimate may increase.

This chapter outlines a series of water-related recommendations to provide clean, safe water that enables a high quality of life, stimulates economic development, and protects public health and the environment.

Recommendations Key

- EP — Economic Prosperity
- HE — A Healthy Environment
- QS — Reliable, High-quality Service
- VI — Value for Investment
- 0-2 — Implementation Start (in years)
- 0-2 — Implementation Complete (in years)

7.1 ENSURING PUBLIC AND ENVIRONMENTAL HEALTH

Where is Michigan today?

Drinking water and wastewater investments, as well as regulatory programs, focus on sector and individual source compliance rather than systematic methods for supporting comprehensive environmental and public health outcomes. As evidenced by aging infrastructure—and the city of Flint, Oscoda Township, and other communities that are experiencing public health impacts associated with contaminants in drinking water—without adequate information, planning, and investment, the level of public and environmental health will continue to worsen.

What does a 21st century Michigan look like?

Michigan's water-related infrastructure investments and regulatory programs lead the nation in providing integrated approaches that successfully protect public safety and environmental health. The results are a safe, reliable, cost-effective and efficient water-related infrastructure system.

How do we get there?

7.1.1 The MDEQ should provide financial assistance to communities in need to invest in replacing aging infrastructure where there are immediate risks to public health or the environment due to lagging water infrastructure investments. Public health and environmental emergencies will be immediately mitigated by accessing emergency funds for failing infrastructure

Estimated investment needed: $25 million of state funds annually, dependent on the number of immediate public health or environmental risks identified

7.1.2 The MDEQ should develop an outcome-based regulatory framework that ensures compliance is achieved, while enabling flexibility of means and methods through a permitting system that supports innovation to achieve public and environmental health goals. State and local programs should be revised to achieve these outcomes. Following these revisions, the State of Michigan should evaluate regulatory staffing levels and requirements for MDEQ and MDHHS as well as local training and certification to ensure that environmental and public health outcomes are achieved.

Estimated investment needed: Will utilize existing staff resources; the estimated investment needed should be reevaluated as regulations are revised

7.1.3 The MDEQ should use resources such as the recommendations of the National Drinking Water Advisory Council, municipal utilities, current U.S. Environmental Protection Agency (U.S. EPA) standards, and evolving research to inform legislative updates to the regulation of drinking water. As regulations are updated, communities may face additional costs to meet revised standards that may not be anticipated in local capital improvement plans or rate structures (i.e., the need to replace lead service lines). The MDEQ should partner with the Michigan Infrastructure Council, Michigan Department of Treasury, and drinking water utilities to determine the extent of potential financial impacts and provide funding to offset some of these costs to help communities meet revised standards.

Estimated investment needed: $50 million in funding each year for ten years; administered through the Drinking Water Revolving Fund

7.1.4 The MDEQ should provide grants and technical assistance to schools to develop and implement a science-based drinking water quality testing and remediation program for lead and other contaminants. The program should use established guidelines to develop an appropriate level of testing for schools based on age, plumbing vintage and materials, and water quality.

Estimated investment needed: A one-time state investment of $4.5 million

7.1.5 The MDEQ and MDHHS should incorporate science-based research in establishing drinking water standards and evaluate sources of drinking water contamination as technology advances, enabling better detection of pollutants to determine whether further controls are warranted in drinking water and wastewater systems.

Estimated investment needed: Will utilize existing staff resources

7.1.6 The MDEQ should continue to provide funding through the Clean Michigan Initiative (CMI) to assist with cleanup efforts of contaminated properties that threaten public health and drinking water supplies. This will require a new, successful ballot initiative to fund the CMI into the future.

Estimated investment needed: $35 million of state funds each year for ten years

7.1.7 The MDEQ and MDHHS, local municipalities, and utilities should expand public outreach, engagement, and communication efforts regarding regulatory standards to manage risk and ensure public and environmental health are maintained, and the necessity of water supply, sewer, and stormwater investments.

Estimated investment needed: Will utilize existing staff resources, asset management plans, and rate structures

7.1.8 The MDEQ and MDHHS, in partnership with drinking water system operators, regional partners, and federal agencies, should expand comprehensive real-time surface and groundwater monitoring to detect potential threats to water supplies, develop early responses, and provide regular public reporting.

Estimated investment needed: $1 million of state funds annually

7.2 WATER ASSET MANAGEMENT

Where is Michigan today?

Unlike Michigan's transportation system, there is no comprehensive state requirement for the collection of data on water and sewer infrastructure conditions. The lack of information about existing water infrastructure conditions and long-term investment needs jeopardizes service quality, safety, public health and reliability. This adds to the legacy costs for communities and utilities.

> *The lack of information about existing water infrastructure conditions and long-term investment needs compromises both service quality and reliability.*

In addition, the technical and financial resources needed to adequately invest in infrastructure is beyond the reach of many service providers that operate in older communities. The problem is threefold: 1) the infrastructure is older and in need of a larger investment; 2) shrinking population has resulted in stranded capacity; and 3) the economic wherewithal of typical residential customers is far below what it was when systems were first put in place, with many at or below poverty indices.

What does a 21st century Michigan look like?

Michigan's drinking water, sewer, stormwater, and dam infrastructure systems all are regularly assessed and maintained to ensure the health and safety of Michigan's residents. The location and condition of public water infrastructure is identified, enabling strategic management and investment

in these systems. Michigan's investments are transparent and cost effective, facilitating a high level of public trust. This public trust is a foundation for sustained investment and quality service.

Local governments and water utilities have the necessary tools to regularly inventory, assess, and strategically invest in their water assets.

How do we get there?

7.2.1 The MDEQ should compile and evaluate asset management plans submitted under the first phase of the Stormwater, Asset Management, and Wastewater program. If necessary, the program should be updated to ensure that completed asset management plans are comprehensive and provide sufficient detail for planning purposes and meet MDEQ criteria. Following a program review and update, the MDEQ should provide additional funding to incent and assist municipalities and public utilities that have not established asset management plans for their stormwater and wastewater systems. Any updates to the program should also ensure that condition assessments and asset management plans are developed in a manner that enables consistent reporting in a statewide asset management database system supported by the State of Michigan (see Chapter 3).

Estimated investment needed: $400 million of state funds, distributed at a rate of approximately $80 million per year for five years[32]

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[32] The SAW program was previously allocated $450 million, which has supported the development of asset management plans for approximately 50 percent of the state's wastewater and stormwater systems.

7.2.2 The MDEQ should expand the current SAW program, to provide a portion of the funding necessary to complete condition assessments and the development of asset management plans for drinking water supply systems. Asset management plans for drinking water infrastructure should identify and prioritize infrastructure elements with risks to public health, such as lead service line replacement, which would decrease the risk of drinking water serving as a pathway of contamination. Asset management plans should develop local strategies to conduct coordinated lead service line replacement. Additionally, asset management plans should assess, maintain, and restore source watersheds and their ability to reliably and sustainably provide high-quality water for drinking water systems. Funding provided to these municipal agencies should be proportional to the size of the system (e.g., number of users, miles of infrastructure, and nature and extent of source watershed[s]). These revisions should ensure that condition assessments and asset management plans are developed in a manner that enables consistent reporting in the previously mentioned database.

Estimated investment needed: $350 million distributed at a rate of $70 million per year for five years[33]

7.3 21ST CENTURY WATER INFRASTRUCTURE

Where is Michigan today?

Water-related infrastructure is aging and insufficient across urban, suburban, and rural areas of the state, particularly in our legacy cities.[34]

The high cost of replacement and maintenance, combined with declining water usage creates a daunting challenge. Excess distribution capacity impedes effective operations, and antiquated infrastructure prevents dependable, cost-effective service delivery. These challenges can cause undesirable public health, environmental, and economic impacts. In some rural areas of the state, keeping and attracting land-based industries depends upon access to wastewater treatment systems, potable water, and drain infrastructure.

[33] $350 million represents an average of $250,000 per asset management plan for the state's approximately 1,400 community drinking water supplies.

[34] Legacy cities are considered "older, industrial urban areas that have experienced significant population and job loss, resulting in high residential vacancy and diminished service capacity and resources." For more information, see www.legacycities.org.

What does a 21st century Michigan look like?

Michigan's water-related infrastructure, including water supply, sewer, and stormwater systems, in conjunction with other infrastructure types, serves as the platform for economically and socially prosperous communities and supports a healthy environment. Our water systems are designed and built using the best available technologies to equitably provide services to residents and businesses.

How do we get there?

7.3.1 The Michigan Infrastructure Council and other asset management entities should partner with economic development entities to identify and prioritize areas for targeted infrastructure water, sewer, and stormwater replacements or upgrades. These targeted investments should be consistent with local land use master plans and seek to leverage the availability of investments in other infrastructure (such as roads and communications networks) and other business development assets (such as a labor force or production facilities); as well as maximize economic development, investment, and employment opportunities. The capital improvements in these areas should be reflected in the approved local program.

Estimated investment needed: Will augment existing programs

7.3.2 The Michigan Department of Agriculture and Rural Development (MDARD) should help support access to wastewater treatment capacity, potable water, and drain infrastructure in rural communities to promote land-based industries such as food, fiber crops, tourism, and mining, in order to keep rural communities competitive in a global economy.

Estimated investment needed: $10 million of state funds annually

7.4 FISCALLY SUSTAINABLE WATER, SEWER, AND STORMWATER PRICING MODELS

Where is Michigan today?

Inadequate and inconsistent information on the condition of water infrastructure and resources prevent system managers from developing sustainable funding models.

Water and sewer rates do not always reflect the full cost of providing water and sewer service. This unintentionally undermines economic efficiency and the financial sustainability of those systems. In some cases, communities bill utilities to pay for services rendered that would otherwise have to be paid out of the General Fund. While these charges are legitimate if properly allocated, it can lead to mistrust—jeopardizing the ability of water utilities to sustain rates and revenues at adequate levels. In other cases, local general funds (usually financed largely by property taxes rather than user fees) are used to subsidize water rates, meaning that rate revenues are not sufficient to support capital and operating costs. This General Fund subsidization is unsustainable due to Michigan's tax structure, making underinvestment and risk of failure of water infrastructure more likely.

What does a 21st century Michigan look like?

Michigan's water and wastewater systems are adequately and sustainably funded in both the short and long term. Certainty and transparency exists for all parties and entities paying water utility rates. Using an enterprise concept for rate structures, revenues generated by rates cover all capital, operation, maintenance, and replacement expenditures based on asset management plans. Any subsidies or General Fund transfers to water infrastructure systems would be limited and transparent. Pricing models ensure Michigan gets the most value for investments in our water, wastewater, and stormwater systems, as well as provide an ideal level of service to customers. These systems ensure continuous improvement models to maximize value to all people and entities that benefit from these systems, and protects and sustains natural resources. Water infrastructure system operators employ asset and information management systems that provide customers the transparency and confidence that infrastructure is being well managed on a sustainable basis. Management systems are in place that ensure that water infrastructure maintenance and improvement is done in coordination with other infrastructure systems to provide customers with the most cost-effective deployment and operation.

How do we get there?

7.4.1 Through new policy, state auditing, regulatory processes, and technical support, Treasury and MDEQ should require self-sufficient transparent operation of enterprise organizations for water, sewer, and stormwater utilities that are supported by rate structures that cover all capital, operation, maintenance and replacement expenditures based on up-to-date asset management plans. This should include the development of mechanisms to provide financial assistance to ratepayers with a demonstrated financial need. The MDEQ should convene a stakeholder workgroup to develop these mechanisms in a context that fits Michigan's structure for fees and taxes.

Estimated investment needed: Establishment of requirements and development of financial assistance mechanisms funded through existing staff resources; $1 million needed annually to seed the financial assistance program[35]

[35] Funding amount should be reevaluated after rate structures are adjusted.

7.4.2 Utilities should engage in customer outreach when developing financing and ratemaking processes for all water, sewer, and stormwater utilities to achieve greater degrees of transparency.

Estimated investment needed: Will utilize existing staff resources

7.4.3 The MDEQ and Treasury should evaluate and modify Michigan's Water Pollution Control Revolving Fund, better known as the State Revolving Fund (SRF), to increase opportunities for participation in the program. At a minimum, the following components should be evaluated:

- Enhancing education and outreach to help market the program to communities and assist them through the SRF process
- Streamlining the SRF application process to make participation more attractive in a competitive interest rate environment
- Providing direct financial support through the project planning phase or allowing reimbursement for these costs once a loan is approved (the S2 grant program may serve as a model)
- Providing for a longer loan time horizon to parallel the life of infrastructure assets
- Providing for the option to discount the interest rate based on outcomes achieved (e.g., asset management, regional partnerships, public and environmental health benefits)
- Analyzing various interest and loan scenarios in relation to assuring the fund is sustainable in the long term

Estimated investment needed: Will utilize existing staff resources

7.4.4 The Michigan Legislature should adopt legislation authorizing stormwater utilities that is consistent with the *Bolt v. City of Lansing*[36] decision, establishes the requirements for structuring and charging a fee, and provides a streamlined process for local adoption. This legislation should establish the requirement for all users of stormwater services to pay for sustainable service delivery on a proportionate basis and provide incentives for alternate approaches to stormwater management.

[36] The *Bolt v. City of Lansing* decision has precluded most municipalities in Michigan from establishing stormwater utilities. The decision requires stormwater assessment to be based on the unique contributions of individual properties.

7.4.5 Water utility rate structures should incorporate incentives to promote water-use efficiencies to reduce operating costs and delay or eliminate the need for capital investment.

Estimated investment needed: Will utilize existing staff resources and rate structures

7.5 GREEN INFRASTRUCTURE

Where is Michigan today?

Michigan's water management systems were originally designed to remove water from property as swiftly as possible, which significantly altered streams and rivers, increased water quality problems, and degraded habitat. Variability of weather and climate could further strain existing drainage infrastructure and require new approaches to protect public health and prevent flooding and water pollution. Currently, there are few funding and financing mechanisms to support green infrastructure.

What does a 21st century Michigan look like?

Michigan leads the country by developing integrated and sustainable approaches to manage the quantity and quality of stormwater and surface water. A variety of optimization and simulation modelling approaches are used to assist water planners with developing and implementing plans. The impact of stormwater runoff on the total water cycle is significantly reduced and the state embraces low-impact design standards on land development projects. Michigan's water supply, wastewater, stormwater, and surface water management systems are integrated to provide the best outcomes for public and environmental health.

How do we get there?

7.5.1 The Michigan Department of Licensing and Regulatory Affairs (LARA), MDEQ, MDNR, and MDOT should encourage the integration of low-impact development/design standards and green infrastructure for stormwater management. Local jurisdictions should update their local ordinances to incorporate policies that incent the use of green infrastructure approaches that seek to optimize the joint benefits of stormwater management and green infrastructure—unless there are clear engineering, economic, environmental, or social reasons to select traditional engineering approaches. Model ordinance language from the Low Impact Design Manual for Michigan should be the basis for revisions. These ordinances should include stormwater quality and quantity planning for all projects.

Estimated investment needed: Will utilize existing staff resources

7.5.2 To enhance community resiliency and optimize costs, the MDEQ and MDNR should facilitate the development of tools that enable stormwater and wastewater system owners, managers, and operators to fiscally and operationally manage green infrastructure through asset management plans.

Estimated investment needed: Will utilize existing staff resources

7.5.3 Treasury and the MDEQ should update and revise funding and financing mechanisms that support infrastructure investments to incent evaluation and implementation of both efficiency-oriented approaches and green infrastructure.

Estimated investment needed: Will utilize existing staff resources

7.5.4 The MDEQ should periodically review and revise its programs and permitting requirements to ensure that engineering and design practices for sanitary sewer overflow (SSO) and combined sewer overflow (CSO) correction and stormwater management are based on assumptions that anticipate increased storm intensity and/or frequency.

Estimated investment needed: Will utilize existing staff resources

7.5.5 Drinking water, wastewater, and stormwater agencies should evaluate the resiliency of systems and facilities that enhance a community's readiness for increased storm intensity and/or frequency as well as their timely recovery as part of their asset management planning.

Estimated investment needed: See recommendation 7.2.1, SAW asset management funding

7.5.6 The MDEQ, MDARD, and county drain commissioners should develop draft revisions and then work with other stakeholders to provide recommendations to the Michigan Legislature to update the Michigan Drain Code (if appropriate) and municipal separate storm sewer system (MS4) program to better facilitate joint action and collaboration among jurisdictions to manage stormwater on a watershed basis. Chapter 22 of the drain code should be updated to allow petitions to request development of collaborative watershed management plans as well as watershed-based engineering and design studies. The code should also be updated to allow performance-based (rather than prescriptive) mechanisms to incent property owner behavior to achieve water quality and quantity outcomes.

Estimated investment needed: Will utilize existing staff resources

7.5.7 The MDEQ, MDARD, and county drain commissioners should develop draft revisions then work with other stakeholders to provide recommendations to the Michigan Legislature to address inconsistencies between the drain code and MS4 programs, with a goal of more explicitly authorizing projects focused primarily on management of water quality, especially in urbanized areas. MDEQ would still retain all authority over MS4 programs while allowing the drain commissioners to assist petitioning municipalities with implementation, particularly for permit requirements that are not grant eligible.

Estimated investment needed: Will utilize existing staff resources

7.5.8 Relevant state agencies, including the DTMB, and the MDEQ should assess properties to identify and implement opportunities to use green infrastructure to manage stormwater. The MDNR and MDOT should be the first agencies to conduct this evaluation.

Estimated investment needed: Will utilize existing staff resources

7.6 ONSITE WELL AND WASTEWATER TREATMENT SYSTEMS

Where is Michigan today?

Approximately 25 percent of Michigan residents and businesses obtain their water from private wells, of which there are more than one million—the most of any state in the nation (Creagh 2016). Michigan's farms also predominately use private wells for their agricultural operations. Moreover, about 30 percent of Michigan residents are served by onsite wastewater treatment systems, commonly called septic systems. It is estimated that 10 percent or more of Michigan's 1.3 million septic systems are failing (MDEQ 2016). While the majority of residents are connected to sanitary sewers, more than half of new home construction occurs in areas without sewer systems and requires onsite treatment system installation.

> *Michigan is the only state in the country without a sanitary code to protect its waters and public health.*

Michigan does not have a uniform standard for septic system performance, inspections, or periodic maintenance.

Well and septic systems, when properly installed and maintained, can provide an environmentally sound and cost-effective method to supply and treat water on individual properties. Subdivisions and condominium developments not contiguous to municipal systems frequently use small community systems, which may not be as environmentally sound over the long term and are often not adaptable to new users. This suggests that, over time, these systems may be undercutting municipal rate bases and the opportunity of improving economies of scale. Once installed, the performance of individual onsite water and wastewater systems are not well tracked, and the apparent high failure rates for these systems threaten both environmental and public health.

What does a 21st century Michigan look like?

Onsite water wells and wastewater treatment systems provide safe, affordable drinking water as well as wastewater disposal in rural areas of Michigan where investments in community systems do not make economic sense. Michigan has programs that ensure that individual systems are safe, properly maintained, and do not cause individual or cumulative environmental consequences. Information that helps make data-driven decisions is collected, compiled, and made publicly available.

How do we get there?

7.6.1 The MDEQ, MDHHS, and LARA should revise regulations to require county and municipal governments, as well as water and sewer utilities, to use planning and permitting processes, taxes, fees, and other policies to promote connection to public water supply and wastewater treatment systems when they are available or when a new or expanded municipal system would be cost effective. This should include the development of utility service districts as part of asset management planning. New decentralized community systems should be required to demonstrate full life-cycle economic benefits, with consideration of other sustainability principles. For example, this may include the development of utility service districts as part of asset management planning.

Estimated investment needed: Will utilize existing staff resources

7.6.2 The MDEQ, MDHHS, and LARA, in partnership with local health departments, should encourage local governments to adopt ordinances requiring new homes and businesses with failed onsite wastewater treatment systems to connect to established community systems if they are available within 200 feet, consistent with Michigan Public Health Code (Act 368).

Estimated investment needed: Will utilize existing staff resources

7.6.3 The Michigan Legislature should pass new legislation that would enable local governments to adopt ordinances requiring homes and businesses to connect to community drinking water systems when onsite water wells fail if they are within 200 feet of an existing system.

Estimated investment needed: Will utilize existing staff resources

7.6.4 Communities should use Section 208 of the federal Clean Water Act to plan wastewater treatment facilities under an area-wide wastewater treatment management plan. In such cases, the MDEQ should use the permissive authority granted under Act 451, Part 21, Rule 39 to ensure that state or national permits (e.g., National Pollutant Discharge Elimination System) are addressed consistently with the approved Section 208 plan.

Estimated investment needed: Will utilize existing staff resources

7.6.5 The MDEQ and local health departments should strengthen permitting requirements to allow community systems only where a municipal system connection is not available, cost effective, or environmentally necessary. Community systems should be adaptable to future increases in the number of users, demonstrate a financially supported asset management plan, and provide for eventual connection to a municipal system.

Estimated investment needed: Will utilize existing staff resources

7.6.6 The MDEQ and MDHHS should work with the Michigan Legislature and local public health departments to update Michigan's Statewide Sanitary Code. The revised code should include 1) inspections of septic and community systems on a routine basis (e.g., every five years); 2) an approval route for alternative systems where public health or environmental quality is at risk; 3) minimum requirements for permitting; 4) a local health department–based, statewide registry of septic systems, including location, installation, and inspection dates; and 5) requirements for maintenance, pumping, repair, or replacement based on inspection results. This information should be included in the statewide asset management database system.

Estimated investment needed: Will utilize existing staff resources

7.6.7 The MDEQ and MDHHS should develop a financing mechanism such as a low-interest revolving loan fund or loan loss reserve program to support maintenance and replacement of existing onsite and community systems for system owners with a demonstrated need for financial assistance.

Estimated investment needed: $20 million of state funds annually[37]

[37] Michigan has an estimated 1.3 million septic systems, which have an average lifespan of about 25 years. This suggests that approximately 52,000—4 percent—of all septic systems should be replaced on an average annual basis. This may require annual investment of approximately $780 million. Septic systems are private infrastructure that can affect public health and environmental quality. Similar to other investments property owners make, septic systems should be primarily funded privately. State support should be provided to owners of failed systems with demonstrated financial need. Michigan counties that have enacted inspection programs have estimated failure rates of approximately 25 percent; $20 million annually assumes that approximately 10 percent of owners of failed systems would need financial assistance to replace their systems.

7.7 EMBRACING NEW TECHNOLOGY TO DEVELOP 21ST CENTURY UTILITIES

Where is Michigan today?

Most of Michigan's drinking water and wastewater management systems were built between 50 and 100 years ago and utilize outdated technology and approaches for treatment, distribution, and collection.

Many government procurement specifications and policies do not include mechanisms to evaluate and utilize new technologies or alternative materials that can provide cost savings and enhance environmental outcomes. Regulatory policies can discourage innovation because permitting entities are unfamiliar or uncomfortable with new technologies, materials, or use of old technologies and materials in new and novel ways.

What does a 21st century Michigan look like?

Michigan's water supply, wastewater, and stormwater utilities embrace ideas, partnerships, and cost-effective emerging technologies and materials. This holds substantial promise for more efficient water and energy use, recovery of resources (such as nutrients), and improvement of environmental and public health outcomes.

How do we get there?

7.7.1 The MDEQ, municipalities, and local utilities should put in place a process to periodically review and update new technologies, procurement manuals, or standard operating practices to allow for open competition for technology and materials meeting relevant professional standards (e.g., American Water Works Association, Michigan Water Environment Association). Regulatory programs should be updated to further enable innovative approaches to achieve environmental and public health outcomes.

Estimated investment needed: Will utilize existing staff resources

7.7.2 The MDEQ, municipalities, and local utilities should put in place a process to periodically review and update regulatory programs, implement methods of continuous improvement, and create standard work to further enable innovative approaches to achieve environmental protection and public health outcomes, as well as to control costs.

Estimated investment needed: Will utilize existing staff resources

7.7.3 The MDEQ should work with municipal utilities to amend the current wastewater regulatory framework to advance the State of Michigan's Water Resource Recovery Facility framework and educate municipalities about the benefits of these approaches.

Estimated investment needed: Will utilize existing staff resources

7.7.4 The MDEQ should work with municipal utilities to amend the current drinking water regulatory framework to advance the development of 21st century water utilities and inform municipalities about the benefits of these approaches.

Estimated investment needed: Will utilize existing staff resources

7.7.5 The MDEQ should encourage and incent strategies like resource recovery, as well as energy conservation and management options at wastewater and drinking water facilities, to help conserve resources and drive down costs. Revisions to Michigan's revolving loan fund could help incent those changes.

Estimated investment needed: Will utilize existing staff resources

7.7.6 The MDEQ should support innovation through partnerships and or funding with Michigan universities to expand research programs in the drinking water and wastewater fields.

Estimated investment needed: $1 million of state funds annually

7.7.7 The MDEQ and water utilities should support new and emerging cost-effective technologies (such as smart metering and loss management technology) through permitting requirements that integrate water utilities with innovative communication and energy networks.

Estimated investment needed: Varying; the cost of new technologies should be integrated locally into cost of service

7.8 DAMS

Where is Michigan today?

Michigan is home to an estimated 2,600 dams—many of which were built decades ago to supply power and run mill operations (Lane 2016). While many of these structures continue to serve a valuable purpose, others are in disrepair, risking failure that can cause significant ecological and economic damage, and threaten public safety (MDEQ 2016).

These decades-old dams have deteriorated due to age, erosion, poor maintenance, flood damage, or antiquated design, and they are particularly vulnerable during high water flow events.

> *Since the early 20th century, more than 300 dam failures have been documented in Michigan.*

In addition, significant adverse environmental effects of dams interrupting the natural flow of water, material, and organisms have been documented. The risk of failure, in conjunction with adverse effects on tributaries, suggests that dams that no longer serve a valuable purpose should be candidates for removal.

Dams are not routinely assessed for social and economic value and operational risks, which hinders reaching informed decisions on reinvestment, repair, removal, or replacement. Adequate, consistent, and long-term funding sources are limited for dam removal. Removal costs are highly variable and dependent on factors such as sediment contaminant levels, sediment volumes, surrounding infrastructure, wetland-related issues, and more. Furthermore, information is lacking regarding the number, condition, and ownership of low-head barriers that are not regulated under Parts 307 and 315 of the Natural Resources and Environmental Protection Act.

What does a 21st century Michigan look like?

Michigan has far fewer dams than it did at the turn of the 21st century. Given the original purposes for dam construction dating back to the 1800s, many of these relics have met their useful lifespan and have been removed or modified to help restore the natural functions of river ecosystems, such as upstream and downstream passage of biological organisms, nutrient transfer, and recreation. Dams that continue to provide benefits to society, such as reservoirs that provide water supply, recreational opportunities, and wildlife habitat and refuge, will have investment mechanisms to ensure their maintenance and structural integrity over their remaining useful life.

How do we get there?

7.8.1 The MDEQ's Dam Safety Program should maintain a publicly accessible geospatial data layer within the statewide asset management system that includes the number, condition, risk, and ownership of public, and private, regulated and nonregulated dams in the state. Working with partner organizations, the MDEQ should develop publicly available decision-support tools and training programs to assess risk, reinvestment and removal options for dams and low-head barriers. The tools should help communities and owners of dams evaluate potential safety, social-cultural, biological, ecological, and economic tradeoffs associated with the removal or maintenance of a dam. Utilizing the inventory of dams and the decision-support tool, the State should continue to support removal and maintenance of dams depending on the individual risks and benefits of each dam.

Estimated investment needed: $227 million of state funding over 20 years[38]

[38] The figure represents $10 million to develop and update the dam inventory database and develop decision-support tools to help assess removal or maintenance options. The MDEQ's Dam Safety Program currently estimates that an additional $225 million is needed for dam management, which may be refined with additional data.