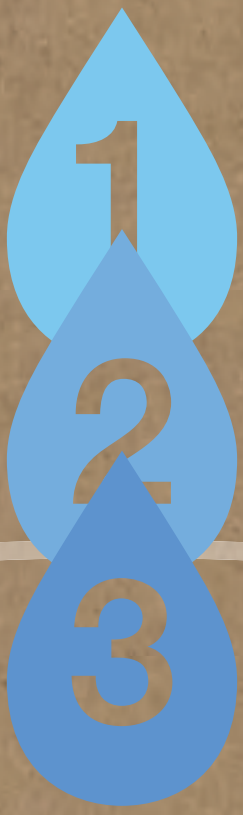
Drinking Water



A Guide for Local Officials
and Community Leaders

Drinking Water 1-2-3 is the fourth in a series of how-to guides developed by the Metropolitan Planning Council (MPC) and partners to assist elected and appointed officials and others in making important policy decisions. With assistance from national, regional and local experts from the public, private and non-profit sectors, this series creates a valuable toolkit that provides key questions, useful resources and case studies for communities grappling with economic development, housing, water resource management and public safety improvement.

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Acknowledgements

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Since 1934, the Metropolitan Planning Council (MPC) has worked to make the Chicago region a better place to live and work by partnering with businesses, communities and governments to address the area's toughest planning and development challenges. MPC is dedicated to achieving a resilient, thriving, equitable and healthy region. Join us in implementing our 10-point action agenda to ensure our region's drinking water systems and supplies remain sustainable.

The **Chicago Metropolitan Agency for Planning (CMAP)** is our region's comprehensive planning organization. The agency and its partners are developing OnTo 2050, a new long-range plan to help the seven counties and 284 communities of Northeastern Illinois implement strategies that address transportation, housing, economic development, open space, the environment, and other quality-of-life issues.

The **Illinois Section of the American Water Works Association (ISAWWA)** is part of the national American Water Works Association. Its mission is to provide resources for the management and advocacy of safe and sustainable drinking water for Illinois.

The **Metropolitan Mayors Caucus** provides a forum through which elected officials of the region cooperatively develop consensus on common public policy issues and multi-jurisdictional challenges. With a foundation of collaboration and consensus-based decision making, it serves a number of functions for its partner organizations and local governments.

The **Northwest Water Planning Alliance (NWPA)**, formed by intergovernmental agreement, seeks to collaboratively plan for and steward its region's shared river and groundwater resources to ensure a sustainable water supply for the people, economy, environment, and future generations.

Welcome/About This Guide

Water. H2O. Most of us in Northeastern Illinois don't pay much attention to our drinking water. We turn on faucets dozens of times a day without pausing to consider the questions that millions of people around the world worry about on a regular basis: Do we have enough? Is it clean? Will it endure?

We are lucky: In Northeastern Illinois, our proximity to a Great Lake means we generally enjoy ample water. But that good fortune has lulled us into complacency, and our drinking water systems have been neglected. Our proverbial glass is half empty.

What's at stake? Public health and safety, including contamination and service disruptions due to crumbling infrastructure and aging water treatment systems. Our ability to attract jobs and drive regional economic growth—since every company needs water. Vital, yet fragile, ecosystems. Municipalities and their residents, who find themselves hard-pressed to pay the escalating costs of collecting, treating and delivering drinking water. And, yes, some groundwater sources may be unusable in less than 15-20 years.

While our water supply issues are significant, they are fixable.

Photo Credit Biswarp Ganguly

You can help

As a local leader, you set the tone for the rest of your community. What decisions will you make and actions will you take to ensure your community has safe and reliable drinking water now and into the future? What best practices will provide sustainable drinking water service for the communities you serve? Informing yourself about the systems and processes that convey safe drinking water to your municipality's residents, businesses and institutions is vital.

Elected officials often enter office without prior experience in water resource management or running a water utility. **This guide is designed to support you—our leaders—in understanding the key aspects of water management and critical questions to discuss with your water system managers and engineers, municipal planners, public works officials, finance directors, developers, residents and businesses.** What practices are important today? What do other communities often forget? How can you best serve your community and support sustainable water service? Find answers to these questions—and more—here.

Water Systems Are Connected
There are three components to water service infrastructure drinking water, wastewater and stormwater. While this guide is focused on drinking water, it is important to understand that these systems are ultimately interconnected.

Drinking Water 1-2-3 is a call to action and an educational tool for local officials and community leaders to better understand and proactively address their area's drinking water needs.

This guide is a manual that provides information about water resource management, service, infrastructure and planning. It helps you identify important strategies and actions for you and your community to take today.

It takes strong leadership from community officials to marshal political will, head off calamities and create a sustainable water future for our region.

1 2 3 GO

1

Meet Your Water: An Introduction

Understanding Drinking Water in Northeastern Illinois

Where does our water come from?

Northeastern Illinois' drinking water comes from surface water sources—like Lake Michigan and the Fox and Kankakee Rivers—as well as groundwater from aquifers. About **20 percent** of Northeastern Illinois' population relies on a water source other than Lake Michigan, and about **78 percent of that population** relies solely on groundwater.

Surface Water Sources

Lake Michigan

The Great Lakes system is the largest source (approximately 22%) of available fresh surface water in the world, and Lake Michigan is the second largest of the Great Lakes by volume. Northeastern Illinois borders the shores of this Great Lake, which is the largest public drinking water supply in the state, serving approximately 6.6 million residents.[1] However, Illinois' use of Lake Michigan water is limited. Since the reversal of the Calumet and Chicago Rivers away from Lake Michigan, most of Illinois is no longer in the Great Lakes watershed. The water we pump out of the lake now flows west and south and ultimately to the Gulf of Mexico.

Surface Water
Surface water includes lakes, ponds, rivers and reservoirs.

Due to this diversion of water out of the Great Lakes, the State of Illinois is under a U.S. Supreme Court Decree that limits the amount of water it can use. Communities in Illinois that seek to use Lake Michigan as a drinking water source must apply to the Illinois Department of Natural Resources (IDNR), which is the state agency that governs permits for Lake Michigan water and oversees the state's compliance with the decree. Recent Illinois usage of its water allocation from Lake Michigan has reached about 76 percent of the allowed total.[2] While we may think our region enjoys an unlimited amount of freshwater, that is not true.

Lake Michigan Water Diversion
Illinois' Lake Michigan diversion amount can change significantly based on the amount of rainfall our region has each year. If the amount of rain increases substantially in any given year, less drinking water is available since it is counted as part of our diversion.

One of Chicago's water cribs, where water is pumped from Lake Michigan to supply parts of our region with drinking water.
Photo Credit Eric Allix Rogers

Fox and Kankakee Rivers

In addition to Lake Michigan, Northeastern Illinois also has two rivers that communities use for drinking water: the Fox and the Kankakee Rivers.

The Fox River flows 70 miles, beginning near Menominee Falls, Wisconsin, and continues on until it reaches Illinois and flows for 115 miles through the Chicago metropolitan area, before it finally converges with the Illinois River in Ottawa, Illinois. In our region, the Fox River is a partial drinking water source for Aurora and Elgin, Illinois, which represent over 300,000 people in our region.

The Kankakee River is approximately 90 miles long, flowing westward from the rural outskirts of South Bend, Indiana to western Will County, where it joins the Des Plaines River and eventually flows into the Illinois River. In our region, the Kankakee River is a drinking water source for Wilmington and Kankakee, Illinois, which represents a population of more than 32,000.

Additional communities in our region are exploring the use of these two rivers as drinking water sources for the future.

The Fox River is another surface water source that provides drinking water for communities in Northeastern Illinois.

Groundwater Sources

Groundwater is underground, held in soil or in the pores and crevices of rock. Most communities around the world get their drinking water from beneath the earth's surface. Here in Illinois, there are two main types of aquifer: shallow and deep. Shallow aquifers lie within 500 feet of land surface, while deep aquifers are located at depths of at least 500 feet below the surface. Deep bedrock aquifers supply the majority of drinking water for groundwater-dependent communities in Northeastern Illinois.

Groundwater is the water beneath the surface of the earth, consisting largely of water that has seeped down into the ground over time. Groundwater feeds springs and wells.

Both shallow and deep aquifers have different challenges that need to be addressed. The more minerals—such as saline water, barium, radium or other elements—that need to be removed from a groundwater source, the higher the treatment costs.

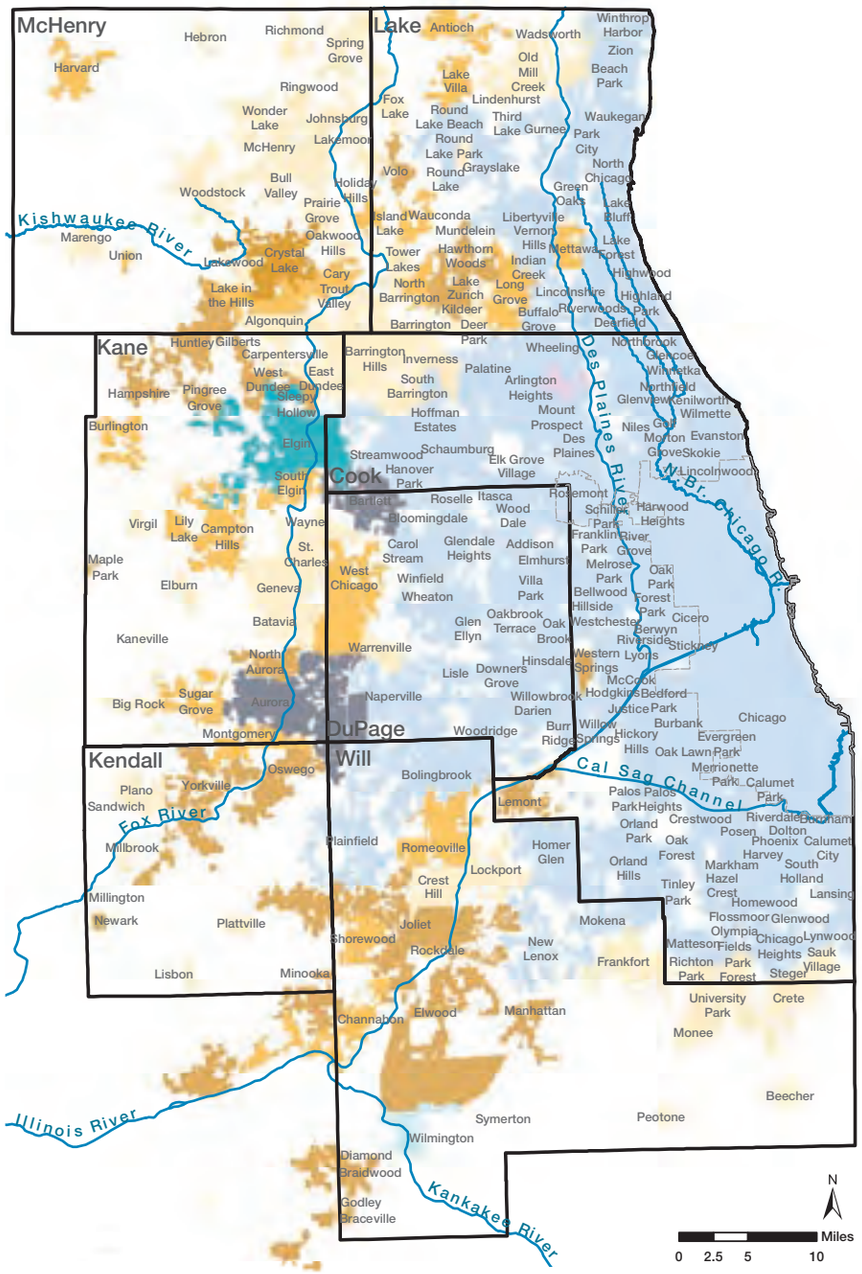
Groundwater recharge is an important part of the hydrologic cycle. When there's precipitation, water moves through the surface of the earth to natural storage areas below the ground, which "recharge," or refill, these water sources. The more impervious the land cover—such as buildings, pavement and concrete—the less water reaches these water sources to recharge. A deep bedrock aquifer can take many decades to recharge through rain and snowmelt. While shallow limestone, or sand and gravel aquifers in Northeastern Illinois recharge faster than deep bedrock aquifers, they are more susceptible to contamination and can be depleted faster when used for drinking water. And shallow aquifers can impact surface water and wetlands since they are interconnected and often exist directly above or near these resources.

What is a watershed? A watershed is the specific land area that drains to a lake, river or stream. Watershed boundaries often overlap with multiple municipal, county and state lines, which means strong coordination between these governance boundaries is needed.

The depletion of aquifers reduces both water supply availability and quality. The consequences of over-pumping water include potential contamination and increased energy usage, both of which lead to increased treatment costs, before, eventually, wells become unusable.

The Hydrologic Cycle
Water is in constant flux and change. The hydrologic cycle is the continuous movement of water above, below and along the earth's surface. This cycle affects the availability of water supply, which is why planning for the impact of climate variations on drinking water is critical for local communities.

Northeastern Illinois drinking water sources

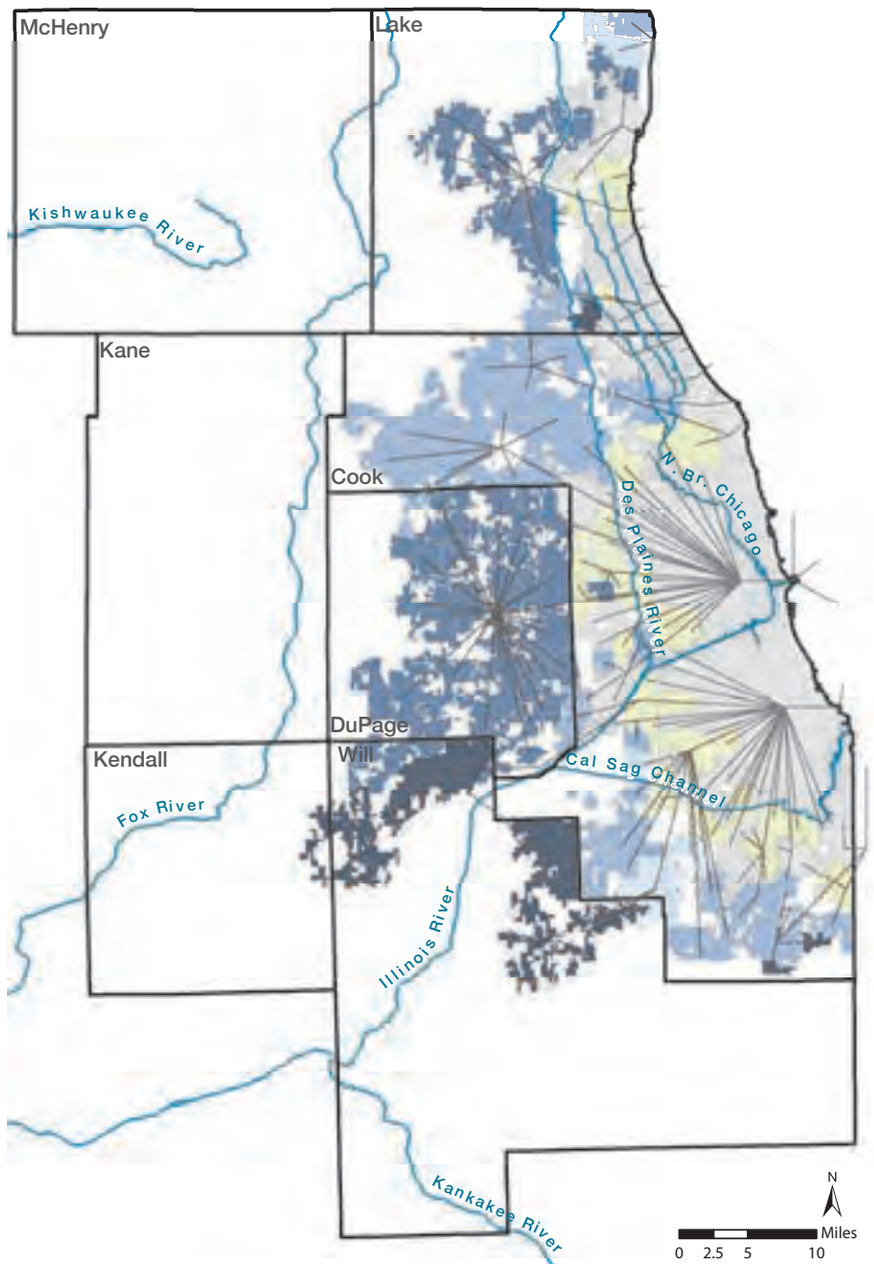


Sources of drinking water for Northeastern Illinois communities

- Groundwater, Shallow Bedrock/Glacial
- Mixed Groundwater Sources, Shallow/Sandstone
- Groundwater, Sandstone
- Surface Water, Lake Michigan
- Surface Water, Kankakee River
- Surface Water, Fox River
- Mixed Sources, Fox River/Groundwater
- Mixed Sources, Lake Michigan/Groundwater

Source Illinois State Water Survey and Chicago Metropolitan Agency for Planning

Illinois' Lake Michigan drinking water permittees and suppliers



Year Switched to Lake Michigan

- Before 1970s
- 1970s
- 1980s
- 1990s
- 2000s
- Lake Michigan (no switch)
- Water Distribution Direction*

*Water distribution direction is illustrative. Source Illinois State Water Survey, 2014.

Source Illinois State Water Survey and Chicago Metropolitan Agency for Planning

It's complicated
This image demonstrates how complex the system of Lake Michigan water use is. Most communities purchase their Lake Michigan drinking water from other communities, resulting in a complicated system of governance and infrastructure.

There is a lot of effort and resources that go into providing safe, clean drinking water.

Making Water Drinkable

Potable water (or drinking water) is water that is safe to drink or to use for food preparation without risk of health problems. It is the product of taking raw water—from surface or groundwater sources—and treating it to regulatory standards.

Every time we turn on the faucet, we expect clean, safe water. Making water potable isn't easy: Technically trained operators and engineers carefully track and monitor the treatment process to ensure our communities enjoy safe drinking water.

One of the most important actions a community can take to protect its water supply is to keep its water source clean. At a municipal level, this means putting restrictions on industrial waste disposal, implementing pharmaceutical drop-off programs and reducing overuse of fertilizers, road salt, sanitary sewer overflows and septic tank malfunctions, which can pollute drinking water sources.

Once source water reaches a treatment plant, several processes make it potable. The primary reasons for treating water are:[3]

- Complying with state and federal regulations to ensure it is safe for consumption
- Removing taste and odor to reduce consumer dissatisfaction and complaints

The quality, characteristics and challenges of a water source define the best treatment option. Challenges can include noxious gases, dangerous chemicals, minerals, bacteria, microorganisms, viruses, suspended solids and sediments.

Did you know?
The largest water treatment plant in the world is right here in Illinois. It's the James W. Jardine Water Purification Plant in Chicago. Between this plant and the Eugene Sawyer Plant, Chicago can process almost one billion gallons of water a day for our region.[4]

Photo Credit Jaysin Trevino

Infrastructure: Delivering water to the tap

It is important to understand the extensive infrastructure that delivers drinking water to our homes, businesses and schools. Wells or intake pipes collect water, treatment plants acquire and purify water, water mains, pumps and pipes transport water and towers and reservoirs store and pressurize water.

Collect the water

First, water is collected from the source, either groundwater or surface water. Water from groundwater aquifers is pumped using wells. Surface water is obtained through an intake pipe. This source water is then piped into a water treatment facility.

Water utilities require high-capacity wells or intakes, powerful pumps, large pipes, as well as a power source (electricity) to drive the pumps and obtain source water. Groundwater sources generally require more electricity due to the increased need for pumping the water up from the wells to the treatment plant.

Filter and treat the water

Once source water is collected, treatment processes produce potable water. Treatment plant infrastructure—such as the facility itself, which includes a lab for testing—requires chemicals, screens, tanks and settling ponds, which are designed to meet the specific needs of the water source conditions and quality.

Store the water

After water leaves the treatment plant, it must be safely stored until it is needed. The water distribution system should have enough storage capacity to meet all expected needs. Storing treated water serves multiple purposes:

- Provides a reserve of treated water that will minimize interruptions in supply due to failures of mains, pumps or other plant equipment
- Helps maintain uniform pressure
- Ensures a reserve of water for firefighting and other emergencies
- Allows pumping at an average rate

We have all seen the municipal water towers throughout our communities. A water tower is an elevated structure supporting a water tank constructed at a height sufficient to pressurize a drinking water system in order to distribute drinking water, meet peak demands and provide emergency storage for fire protection.

Deliver the water

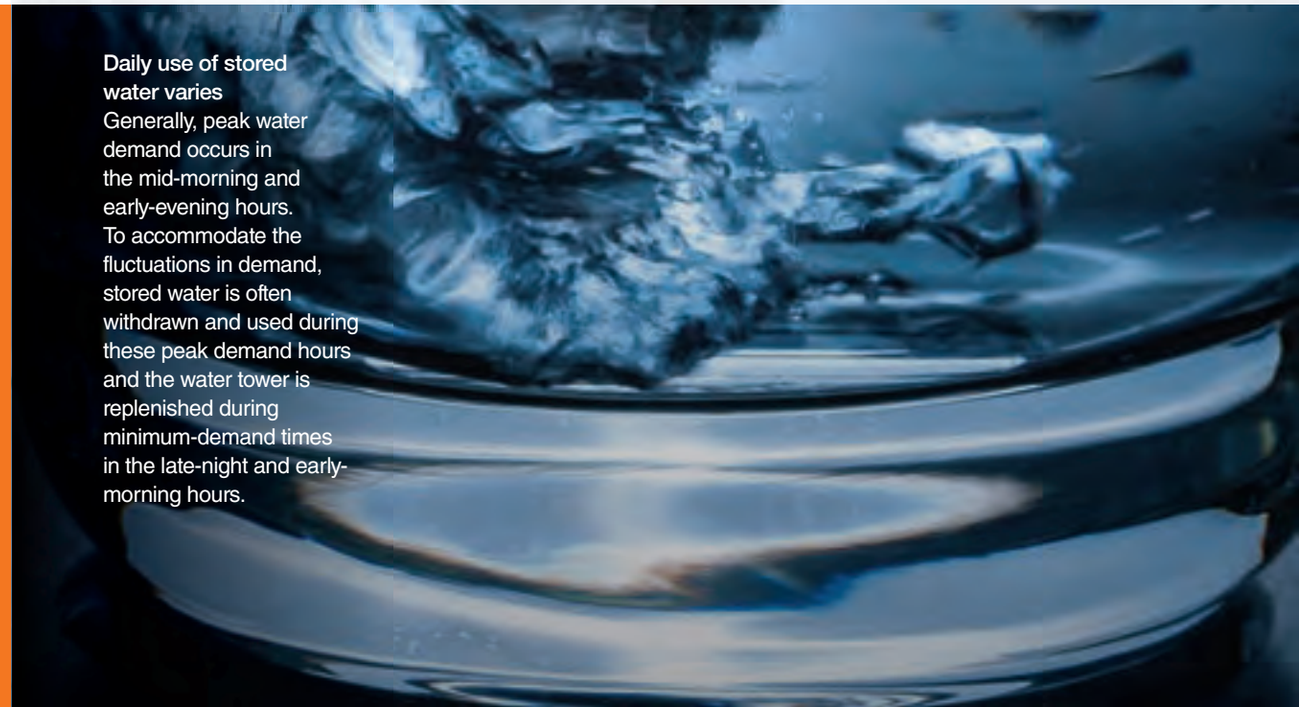
Once needed, potable water is pumped to users via a complex network of underground pipes. Pressurized pipes deliver water to schools, homes, commercial buildings and industry. The pipe networks also contain many valves throughout the system to control location, pressure and water flow. These materials deteriorate over time. Old pipes require replacement to avoid unnecessary leakage (waste of drinking water) or corrosion, which can release harmful or unwanted chemicals into the water.

Consume the water

Water is delivered to our homes, businesses, schools and organizations for us to use and enjoy through a complex web of pipes. The main line pipes are owned and maintained by our water utilities. However, often times the water pipes that run from under the street to individual buildings are the responsibility of the property owner. Maintaining this infrastructure is important for public health, so that we can continue to consume safe water, which is then sent down another set of pipes to be treated by our wastewater utilities.

Questions for your staff: Drinking water service

- What is our municipality's drinking water source(s)—where does our drinking water come from?
- Do we produce (treat) our drinking water, or do we purchase drinking water from another community?
  - If you produce: What treatment processes do we employ at our plant to ensure our water meets regulated potable (drinking water) standards?
  - If you purchase: Who do we purchase our drinking water from?
- How are we storing or otherwise ensuring we have enough drinking water supply for peak demand in our community?



Daily use of stored water varies
Generally, peak water demand occurs in the mid-morning and early-evening hours. To accommodate the fluctuations in demand, stored water is often withdrawn and used during these peak demand hours and the water tower is replenished during minimum-demand times in the late-night and early-morning hours.

2

Your Water's Keeper: Utilities and Regulators

Understanding Drinking Water Management and Laws

How does operation and regulation work?

Water is an ordinary and everyday part of our lives, yet it requires much effort to deliver it to us. Understanding the systems, operations and regulations required to provide community's with safe, drinkable water is part of your responsibility as a community official.

Utilities: The managers behind your water[5]

In the United States, there are over 151,000 public water systems in operation.[6] The U.S. Environmental Protection Agency (EPA) classifies these systems according to the number of people they serve, the source of their water and whether they serve the same customers year-round or on an occasional basis.

Most public water systems are owned by the municipality they serve or a regional consortium of communities such as a Water Commission or Joint Action Water Authority (JAWA), but they can also be owned by private companies, nonprofit corporations or individuals.

Public water systems deliver a public service and charge a fee for this service in much the same way as energy or telecommunication utilities. They are responsible for operating the necessary treatment and distribution systems to reliably deliver safe drinking water.

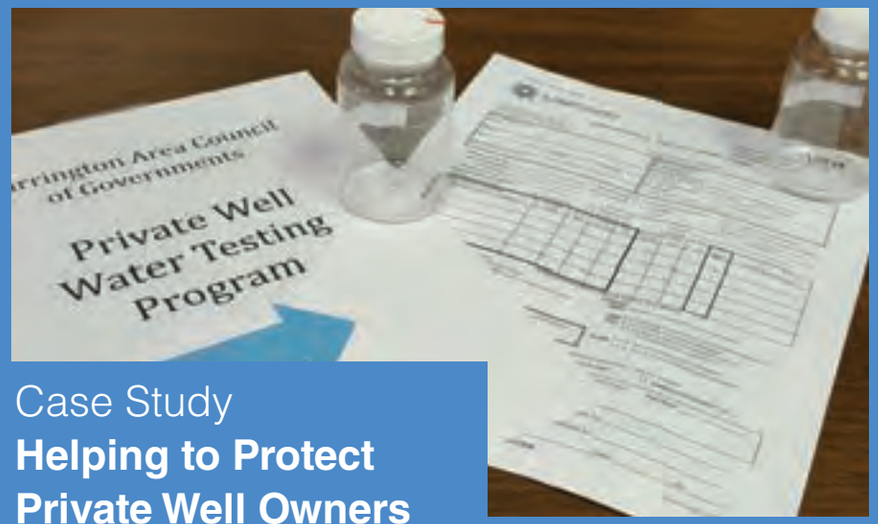
A public water system is so named because water is delivered to the public, however, this utility may be publicly or privately owned. There are two forms of private sector participation in public water systems: If a water system is fully privatized, assets are owned and operated by a private company. The company charges fees to water consumers to recoup capital and operational expenses. If there is a public-private partnership, ownership of assets remains public and certain functions (e.g., operation of the drinking water treatment plant) are assigned to a private company for a specific period. In Illinois the majority of public water systems are publicly owned.

Public water systems consist of three elements:

1. The source water (surface water or groundwater)
2. The drinking water treatment plant (treatment facilities and labs)
3. The distribution system (mains, pumps and storage)

Public Water Systems
Local officials must account for everything from ensuring enough supply, to water-quality monitoring and treatment, to service operations and infrastructure maintenance, to ensuring regulatory compliance.

Photo Credit Goatling



Case Study

Helping to Protect Private Well Owners

The Barrington Area Council of Governments (BACOG) has approximately 7,800 private wells in an 80-square-mile area. In order to help its residents better manage their private wells, BACOG provides educational materials and facilitates regular testing. In partnership with Lake County Health Department, BACOG offers local purchase of bacteria/nitrate test kits at village and township offices plus central local collection and delivery of water samples—all at reduced rates for residents. Lake County's laboratory conducts the tests, and residents benefit from the education provided by this program. By proactively providing education and testing, BACOG is helping to ensure its residents have safe drinking water when using private wells.

Photo Credit BACOG

Private Wells

There are also many people in rural and unincorporated areas of Northeastern Illinois who supply their own drinking water via private wells on their property instead of being connected to a public water system. The sole party responsible for providing the drinking water, maintaining the infrastructure and testing for water quality is the private property owner. The U.S. Environmental Protection Agency and other federal and state agencies recommend annual testing of private well water for bacteria and nitrates. Bacteria can enter a well or household plumbing system through contaminated stormwater flowing over a weak well cap, seepage through a cracked well column or the opening of the indoor plumbing system for repair or replacement of equipment. Bacteria are mostly invisible and odorless but they can make people sick. Unfortunately, not every well owner knows that he/she is solely responsible, or how to keep water clean and safe for their family or business.

Drinking Water Regulation

Federal Regulation: The Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was enacted by Congress in 1974 to ensure water supply systems in the U.S. are providing good quality water to consumers.[7] The Act authorizes the U.S. Environmental Protection Agency (EPA) to establish minimum standards for drinking water and requires all owners or operators of public water systems to comply with these health-related standards.

Maximum Contaminant Levels (MCLs) are standards set by the United States Environmental Protection Agency (EPA) for drinking water quality. An MCL is the legal threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act.

The SDWA's program to regulate drinking water quality is called the Public Water System Supervision program. Utilities are responsible for regularly testing the quality of drinking water and comparing the test results to the health-based standards, known as Maximum Contaminant Levels or MCLs. There are MCLs for bacteria, metals such as chromium and lead, inorganic chemicals such as arsenic and nitrate, and organic chemicals including pesticides. All these contaminants can cause serious health concerns if they are present in excessive levels in drinking water. For example, high levels of bacteria in drinking water can cause gastrointestinal problems.

If a utility violates an MCL requirement, it can be fined up to $25,000 per day until the violation is resolved. In addition, the water system must provide public notification which explains the nature of the violation, the health implications and steps consumers should take. All violations by a utility are listed online at the EPA's Drinking Water Watch website where communities, consumers and interested parties can view them.

Reporting Back: Keeping Consumers Informed
The EPA requires every community water system to deliver a Consumer Confidence Report (CCR), also known as an annual drinking water quality report, to their customers each year. These reports provide information about local drinking water quality. CCRs dictate what a utility must report to its customers, including:

- their source of drinking water
- a brief summary of any contamination risks to local drinking water sources
- any regulated contaminant found in local drinking water
- the potential health effects of any contaminant detected in violation of an EPA health standard
- an accounting of the system's actions to restore safe drinking water
- educational information on nitrate, arsenic or lead in areas where these contaminants may be a concern
- phone numbers of additional sources of information, including the water system and the EPA's Safe Drinking Water Hotline

Providing an annual, comprehensive consumer confidence report is not only required, but it can greatly assist your community in keeping customers informed and confident that their utility is providing them with quality service. CCRs also provide a useful opportunity for utilities to communicate with their customers about water rates, billing information and infrastructure conditions. For more information on CCRs, please see the EPA's website: https://www.epa.gov/ccr.

State Regulation: Drinking Water Quality Requirements

The Safe Drinking Water Act provides State governments primary authority for implementation, as is the case in Illinois. While the EPA establishes health-based standards at a national level, the Illinois EPA is responsible for the day-to-day implementation of the drinking water program, among other things.

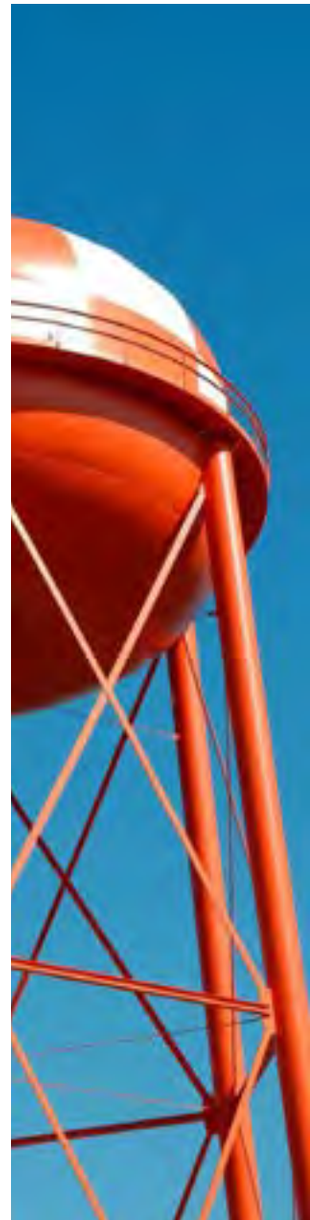
In addition to the federal requirements of the SDWA, there are State of Illinois requirements that apply to community public water systems. State requirements can be found in Subtitle F of **Title 35 of the Illinois Administrative Code** and are implemented by the Illinois EPA. The Maximum Contaminant Levels and monitoring requirements generally mirror the Federal requirements. However, Illinois established additional programs and requirements to strengthen public health protection.

Our state's drinking water program also includes requirements for permitting, including construction and operating permits for community water supply systems. Construction permits are issued for new or modified water supply systems—for example, when a community is planning to change its drinking water treatment facilities. Operating permits are issued after construction projects are completed and the new or modified system will be going into operation. The permits program ensures that system components are properly sized, designed and operated so that the system will reliably provide safe water. The State of Illinois can issue emergency permits whenever emergency conditions require immediate action.

Illinois also has requirements to ensure groundwater is of good quality when it's being used as a source of drinking water. The fundamental requirement is "No person shall cause, threaten or allow the release of any contaminant to groundwater so as to cause a groundwater quality standard set forth in this Subpart to be exceeded." (Section 620.405 of the Administrative Code)

There are Illinois-specific requirements for regulated recharge areas which protect water sources in areas where the groundwater is susceptible to contamination. For example, facilities or operations that could pose a risk to the groundwater (e.g., a municipal solid waste landfill) cannot be located within a delineated, regulated recharge area. Additionally, counties and municipalities utilizing a community water supply are authorized to establish maximum setback zones, up to 1,000 feet, around their well(s). Setback zones—as the name implies—are areas where certain operations are restricted, facilities and activities that could pose a risk to the groundwater being used as a source of drinking water.

Illinois EPA also operates the State Revolving Fund low-interest loan program. More information on this program is provided in section GO of this guide.



Other State Regulators

As mentioned above, the US EPA is the ultimate regulator on safe drinking water for communities. And Illinois EPA is the state enforcement agency for these safe drinking water standards. However, there are a number of other governmental units that have roles related to safe drinking water. The following highlights these various agencies and their regulatory jurisdictions.

Illinois Department of Public Health (IDPH)

The IDPH creates and regulates standards for and provides oversight of non-community water systems. A community water system provides daily water to residents and businesses through a distribution system. A non-community system is a stand-alone business or institution that has its own well and provides drinking water to people at that location.

Schools, day care centers, factories and restaurants that have their own wells and supply water to people are examples of non-community water systems. IDPH also provides information to private well owners.

There are also requirements for entities that wish to drill their own drinking water wells. To ensure the safety of these water supplies, the IDPH and local health departments review well installation plans, issue permits for new construction and inspect wells. IDPH is also responsible for reviewing and approving plumbing code related standards that impact drinking water utilities.

Illinois Commerce Commission

As mentioned previously, a small percentage of communities are provided drinking water from a privately owned utility. These utilities have an additional layer of regulatory oversight, administered by the Illinois Commerce Commission (ICC), which oversees rate setting and utility organization, such as a merger of two or more utilities, both of which must go through due process and be approved by the ICC.

Illinois Department of Natural Resources

Illinois has a limit on how much water it can withdraw from Lake Michigan, a quantity which was set by a U.S. Supreme Court Decree. The State of Illinois' Lake Michigan Water Allocation is overseen by the Illinois Department of Natural Resources (IDNR). Illinois' Lake Michigan Diversion is made up of three components: domestic water supply, direct diversion and stormwater runoff. Domestic water supply is used to serve communities and industries within our region.

Any use of water from Lake Michigan within the State of Illinois is authorized by, and requires a permit from, the IDNR. All domestic water allocation permittees (drinking water utilities) are required to submit an annual water audit form. IDNR uses these forms to track individual users' compliance with the conditions of their allocation permits. Additionally, all utilities that produce drinking water from Lake Michigan must submit a monthly form which shows daily water usage numbers and the amount of water sold to other permitted drinking water utilities.

IDNR also regulates water withdrawals from other surface water such as the Fox and Kankakee River. These regulations enable IDNR to permit and limit water withdrawals based on required flow rates in order to protect these water sources from overuse and environment damage.

Illinois State Water Survey

Another state agency that plays a role related to drinking water systems is the Illinois State Water Survey (ISWS). ISWS is responsible for the Illinois Water Inventory Program. This program compiles and maintains records on annual water withdrawals and water use information, which helps the region and your community understand current water demand compared to available supply. Reporting to ISWS on water withdrawals and water use is mandatory for public water suppliers, industries that withdraw and use water as well as irrigation water users.

Questions for your staff: Regulation and operations

- Is our drinking water utility publically or privately owned?
- Do we have any private well owners in our municipal boundary? If so, do we know who they are and how much they are pumping? Do we provide any educational assistance to ensure they have safe drinking water?
- Do we have any current or recent drinking water violations or compliance issues we need to attend to?
- Is an annual Consumer Confidence Report (CCR) going out to our customers?
- Are we keeping up with the requirement to annually submit our water withdrawals and usage information to the Illinois State Water Survey?
- What is the process for quality control on the accuracy and recording of all our water reporting requirements?
- If your water comes from Lake Michigan: Are we submitting our LMO-2 Forms on time every year?

3

Murky Waters: The Challenges We Face

Understanding Drinking Water Issues in Our Region

What are the issues we face?

While our region generally enjoys an ample amount of freshwater, we are not without critical challenges–issues that need to be addressed today. These challenges include increasing pollution, old infrastructure, fragmented service and, yes, some communities face wells running dry.

Do we have enough?

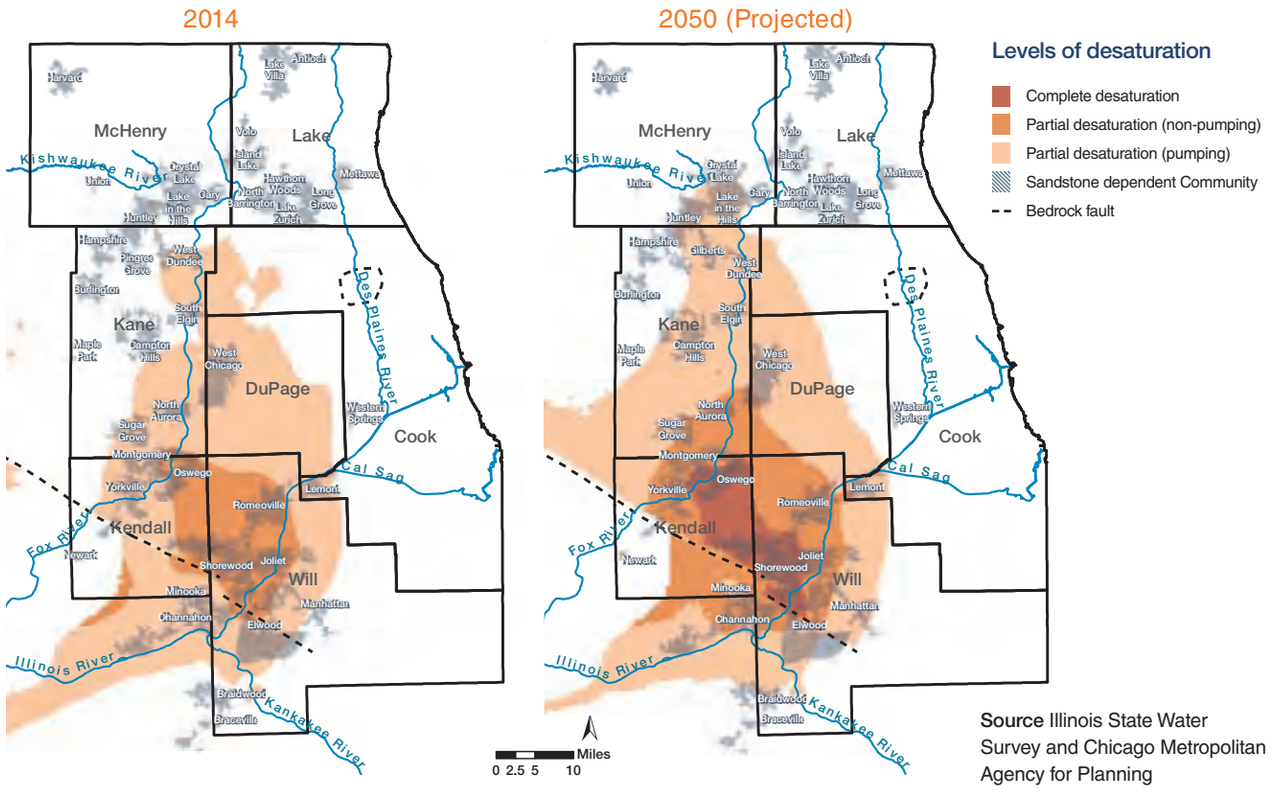
In 2015, the Illinois State Water Survey, which has been monitoring and modeling our water resources for more than a century, released a seminal report about the groundwater levels in wells. **The report sounded an alarm about how much groundwater we really have:**

- Our deep sandstone aquifers are being depleted unsustainably.
- High-capacity wells could be unusable in as little as 15 years.
- Many more wells could be dry by 2050.[8]

If current practices continue, some groundwater-dependent community and industrial wells could be unusable within 15 years, and even more will be at risk by 2050.

Why does this matter? About 20 percent of Northeastern Illinois' population—including people in the outer-ring suburbs of Chicago—rely on water sources other than Lake Michigan, and about 78 percent of that population relies solely on groundwater. To serve those communites, some 90 million gallons per day are being withdrawn from the deep sandstone aquifers—a withdrawal rate at least twice as high as what experts say is sustainable. Some areas are already experiencing significant depletion and some shallower, private wells are already going dry.

Progression of groundwater depletion over time with continued well pumping



Source Illinois State Water Survey and Chicago Metropolitan Agency for Planning

Some might think the easy answer to this issue is for more communities to tap into Lake Michigan as a source for drinking water. However, Illinois' allotted diversion of Lake Michigan water is limited by a U.S. Supreme Court decree. So while we may think our region enjoys an unlimited amount of fresh water, that's simply not the case. Lake Michigan is not a solution for all communities.

A dwindling water supply has the potential to harm our regional economy, costing local jobs if businesses relocate due to water-shortage concerns. The good news is that this is preventable if groundwater users—including municipalities, self-supplied commercial and industrial facilities and irrigators—plan and work together. Best practices in water reporting and demand management must be widely adopted by all communities to protect current and future populations.

Is it clean?

Northeastern Illinois' water supply faces increasing pollution from a variety of sources, including:

- Chlorides from salting our roads and sidewalks, as well as water softeners.
- Fertilizers from lawns and agriculture.
- Organic matter (such as human waste) and inorganic matter (such as pharmaceuticals) from sanitary sewer overflows and leaking septic systems.
- Toxins from industrial processes.

Clean water should be top of mind for community officials like you because it's critical to our health and well-being. Increases in water pollution in our local water sources—lakes, rivers and underground aquifers—ultimately raise the cost of drinking water. The more pollution we have in our drinking water sources, the more we'll spend in additional filtration and treatment processes, the more we'll ultimately have to charge the consumer to cover these costs.

Increasingly, water pollution is a costly issue in Northeastern Illinois.

In March 2016, the Illinois State Water Survey released a report on the shallow groundwater quality in Kane County.[9] The greatest concern identified is chloride: Two-thirds of water samples taken from eastern Kane County between 2003 and 2015 had chloride concentrations above safe levels. Road salt is one of the most likely sources of this contamination, and the unfortunate result can be increased water treatment costs.

A Note on Lead Pipes and Fixtures
Another known toxin is lead. Lead poisoning is a serious health condition, and eliminating exposure to lead in drinking water is important. Lead can enter drinking water when service pipes or fixtures that contain lead corrode. These pipes can be owned by a utility or a private property owner and should be updated to reduce public health risks.

Road salt (chloride) is polluting our drinking water sources. **Photo Credit** Stolborsky

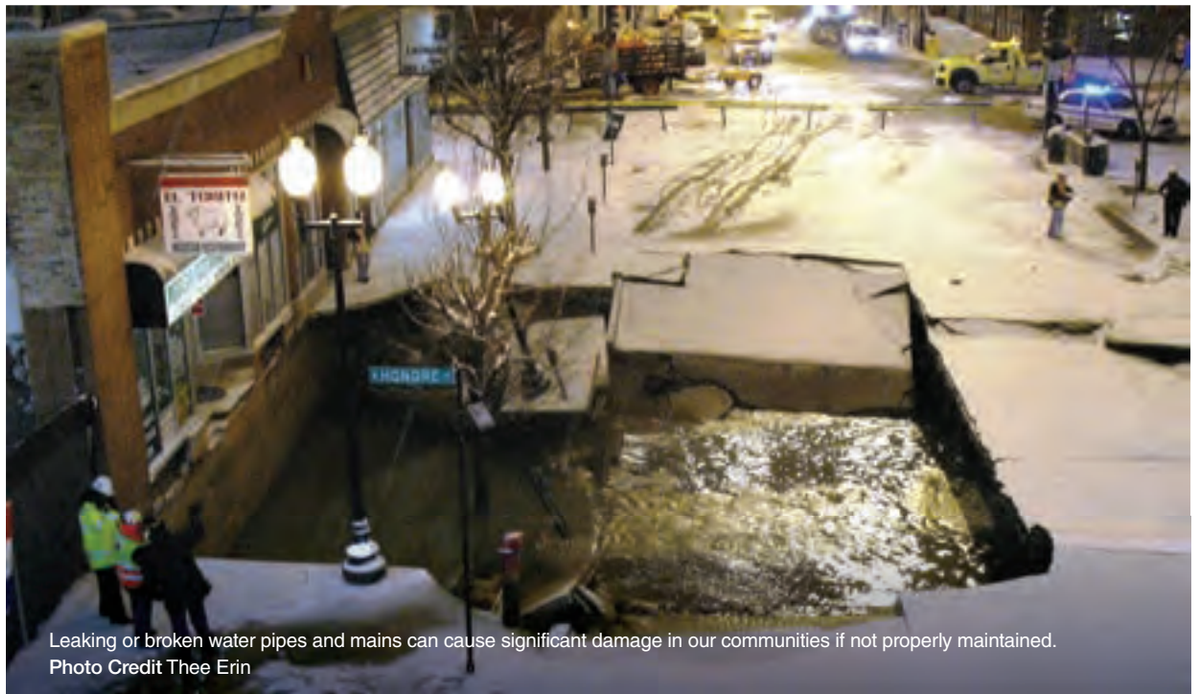
Algae blooms are the result of an excess of nutrients, such as fertilizers, that enter water sources through stormwater runoff. **Photo Credit** NOAA Great Lakes Environmental Research Laboratory

Another type of pollutant that is negatively impacting our water quality are nutrients. This group of pollutants includes phosphorus and nitrogen, two ingredients typically included in fertilizers. When nutrient levels in surface waters are excessive, one result is algae blooms. Nutrients get into the water from a variety of sources including fertilizings crops and lawns.

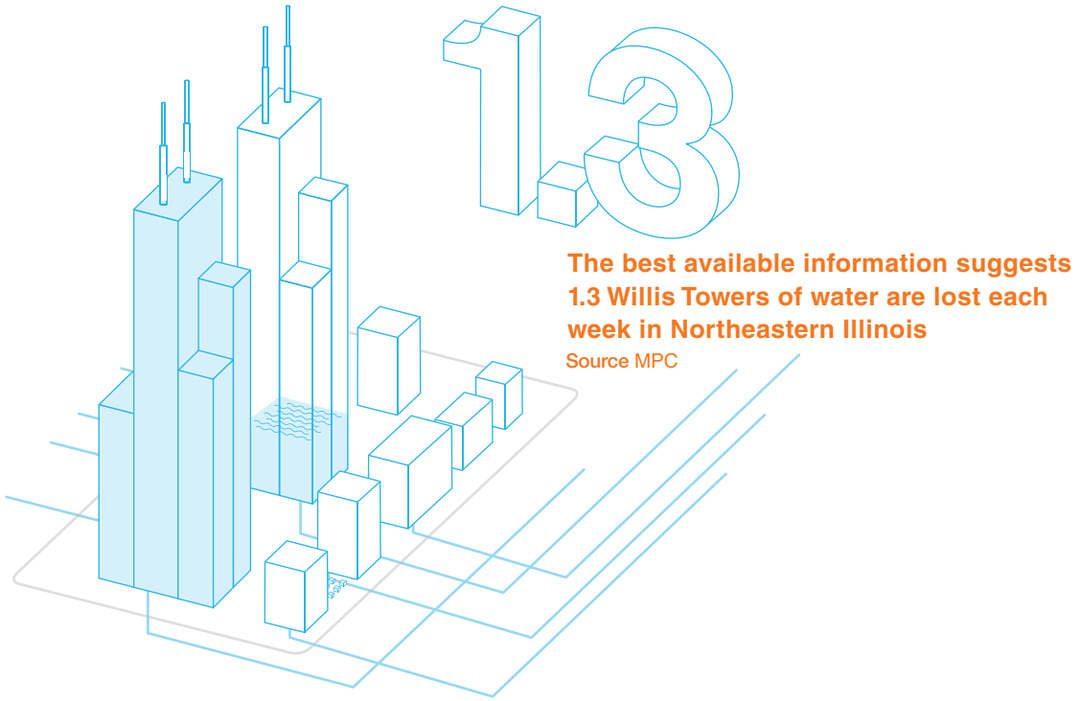
Past and current land uses can also pose contamination threats to drinking water supplies. For example, toxins leached from landfills and industrial complexes that discharge into local waterways can pollute our water sources as well. Implementing source water protection practices, such as reducing nutrients and practicing sensible salting, are necessary to ensure your community's water source remains clean.

Will the system endure?

Much of Northeastern Illinois' water infrastructure—treatment plants, pumps and pipes—built to collect, treat and deliver round-the-clock drinking water to our homes and businesses is coming to the end of its useful life. Plainly put, the infrastructure is old—anywhere from 50 to 100 years old—and in dire need of repair and replacement. It is fact, not hyperbole, to say that if we fail to act, we face catastrophes such as water main breaks, collapsing infrastructure and drinking water contamination. If we don't act, the question isn't whether disaster will strike, but when.



Leaking or broken water pipes and mains can cause significant damage in our communities if not properly maintained.
Photo Credit Thee Erin



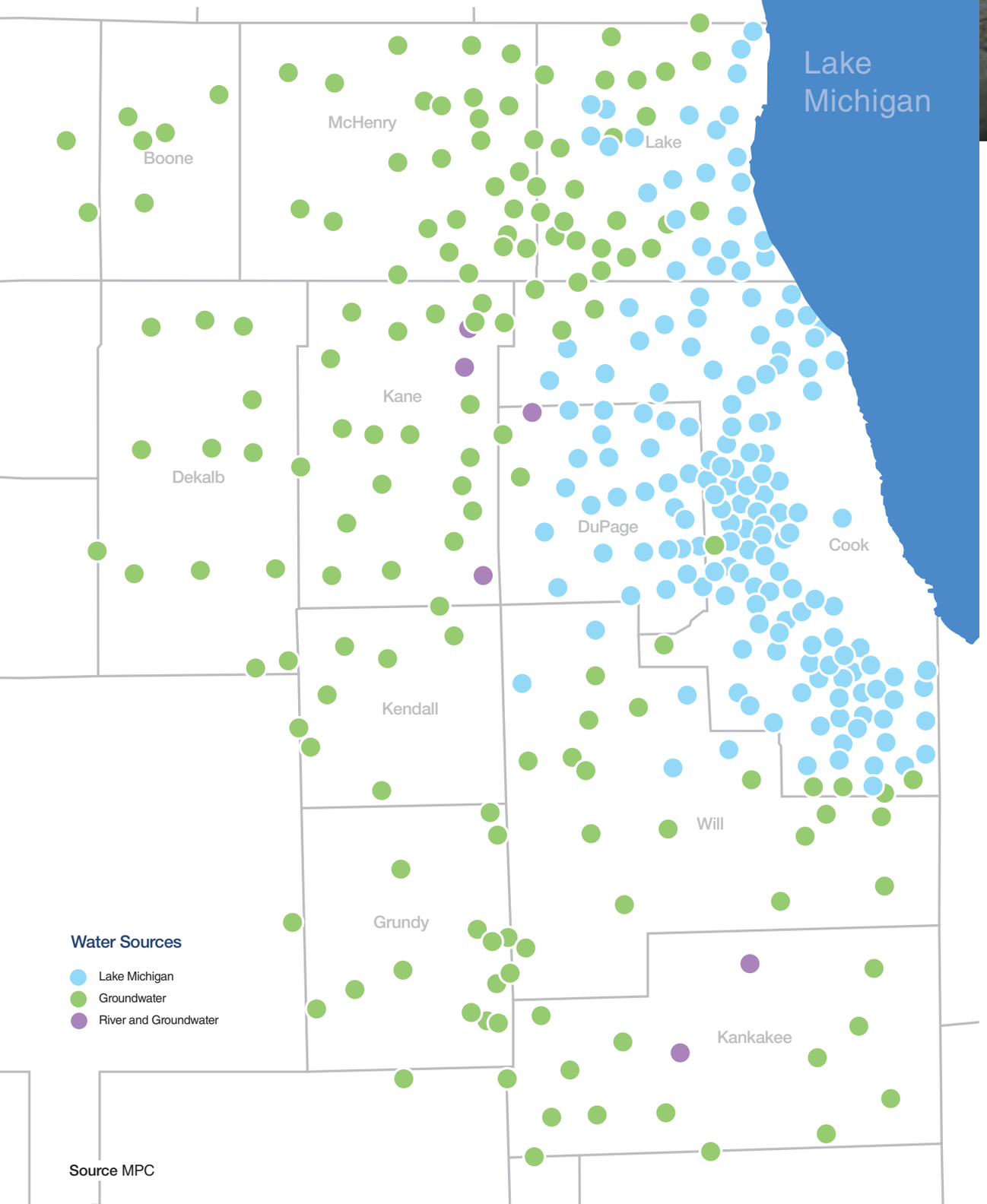
The best available information suggests 1.3 Willis Towers of water are lost each week in Northeastern Illinois
Source MPC

What's more, our pipe network is buried out-of-sight, so it is also out-of-mind. Practically speaking, it's challenging to know the condition of buried pipes—but we know there are areas of grave concern: Estimates suggest that we lose 26 billion gallons each year due to deteriorating infrastructure—enough water to fill more than one Willis Tower every week.[10] Without a clear understanding of our water infrastructure conditions, we'll continue to see utilities across Northeastern Illinois waste money on drinking water that never gets to consumers.

Addressing our aging water infrastructure in Illinois is estimated to cost around $21.5 billion through 2030.[11] Our local water utilities need viable funding and financing streams in order to make this huge investment. At the same time, equitable water rate practices need to be employed to ensure everyone in our communities has access to clean drinking water. Now more than ever, industry standards in auditing and reporting the condition of our systems, establishing asset management programs and identifying investment needs are imperative.

The Water Energy Nexus
Ensuring our systems are in good condition also reduces energy consumption. Water and energy are interdependent—water is required to generate energy—and energy is required to generate and deliver drinking water. In fact, as much as 40 percent of operating costs for drinking water systems can be for energy.[12] A survey done by the Illinois Section of the American Water Works Association found that energy costs on average ranged between 8-15 percent of a drinking water utility's operating budget, with the maximum reported at 38 percent.[13] Crumbling infrastructure not only wastes water, it wastes energy.

Our region shares water sources.
Collaboration across communities is important.



Source MPC

Overwatering our lawns depletes water supply. **Photo Credit** Cary Bass-Deschenes

Fragmented system, disconnected users

Northeastern Illinois has more than 400 community water supply systems in operation. Most of these utilities are owned and managed by a municipality, which means decisions about water utility operations, infrastructure investment, future planning and service rates are made at the local level by elected officials, like you, who may or may not have prior expertise in managing a water utility.

Inefficiencies in water service delivery add unnecessary costs to our community members. Given the increasing challenges of supply constraints, water pollution and infrastructure reinvestment needs, our region needs to explore economies of scale and service sharing between utilities.

Northeastern Illinois also lacks a well-adopted system for tracking water usage from each utility. As a result, we don't have a clear understanding of current demand for drinking water. While communities that use Lake Michigan water must report usage and infrastructure conditions, the rest of the region—particularly those communities who are facing water shortages—are not held to the same standard. Because of these factors, **our region is extremely fragmented in our approach to managing a shared, vital resource**. The action of one community can impact another, which is why we need more coordinated, regional water supply planning.

Another fundamental challenge is that **we, as consumers, are very disconnected from the complex system that provides us with water** to drink, bathe and survive. Our region's collective lack of awareness about our drinking water may stem from historically ample supplies, the buried nature of water infrastructure and the subsidized costs we have enjoyed for water service. We haven't needed to give a second thought to the infrastructure and operations it takes to deliver water to our homes and businesses. However, as outlined above, conditions related to our drinking water have changed and communities need to be engaged and coordinate across municipal boundaries in order to address the above water resource challenges.

Drastic weather change patterns greatly impact water resources. Too little or too much water puts stress on our drinking water systems.

Climate change stresses our water systems

The latest climate models predict that Illinois' temperatures will increase an average of 2.1-3.0 degrees Fahrenheit by 2035 and precipitation will increase between 1-5% with much of that rainfall happening in spring months.[14] This will lead to drier, hotter summers and wetter, springs. This change will significantly impact our water supplies. If precipitation is more intense, increased flooding can overwhelm wastewater treatment facilities, sending large amounts of pollution—during a combined sewer overflow—into drinking water sources. On the other hand, having longer periods of drought will reduce the amount and availability of drinking water. So both weather patterns greatly impact the availability of clean and plentiful drinking water supplies.

Surface water impacts from drought

Decreased water levels and higher water temperatures produce algae blooms that reduce water quality and make it more expensive to treat drinking water. These conditions also affect local ecosystems including aquatic life, which impacts the health of a water source and the ability for recreation including fishing and swimming.

Groundwater impacts from drought

Given the current over-pumping of our groundwater, drought will further threaten supply. Likewise, during drought conditions, groundwater pumping can reduce the natural flow of water that would otherwise recharge lakes, streams and rivers.

Developing and continuously revising an adaptive and collaborative approach to water supply planning and management is imperative to dealing with the effects of a changing climate. Addressing and planning for these impacts is important to help mitigate future supply constraints and increasing costs for treatment.

Questions for your staff: Drinking water challenges

- If your community uses groundwater: Are we facing drinking water shortages?
- What current or emerging water pollution issues do we have in our drinking water source(s)?
- How are we keeping track of our drinking water infrastructure conditions to ensure our system remains safe and sustainable?
- Do we partner with our neighboring communities on drinking water issues? What opportunities do you suggest we look into for improved coordination between our municipalities?
- How are we adapting our drinking water system and infrastructure to remain viable with increasingly severe weather patterns?

GO

Taking Action: Your Guide to Important Practices

Understanding the Actions You Need to Take

Water practices for every community

Making decisions about your community's drinking water system is part of your job. You, along with other leaders, need to understand and oversee our drinking water systems from an overall operational and managerial perspective. This section outlines the specific practices you should take to ensure your community has safe and reliable drinking water.

Protect Your Source

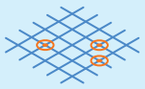
1

Protecting and preventing your community's water source from pollution reduces risks to public health, utility treatment costs and service disruptions. So what can you do to reduce pollution?

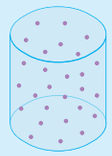
GO Conduct source water assessments

Regardless of where your drinking water comes from, and whether it is produced or purchased, source water assessments provide communities with information needed to protect drinking water sources. A source water assessment is extremely valuable to determine risks and possible protective measures. Following are some typical steps, as outlined by the Environmental Protection Agency,[15] in producing a source water assessment:

Step 1 Delineate the source water protection area. Create a boundary line based on where your water utility draws its drinking water supplies. For example, the delineated area may be a certain radius surrounding the location of your drinking water wells or intake pipes.



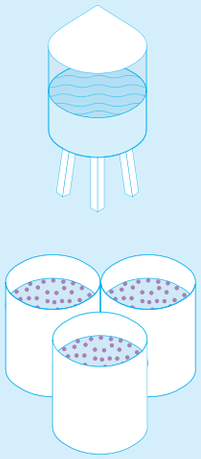
Step 2 Inventory sources of contamination. The contaminant source inventory identifies documented and potential contaminant sources or activities of concern.



Step 3 Determine the susceptibility of your water supply to contaminants within the source water protection area. Assess the nature, severity and likelihood of risks. For example, tanks storing harmful materials within your source water protection area would likely be considered a susceptibility.

Step 4 Inform businesses and residents about the inventory and the susceptibility of your system. Notifying businesses and households they are in a source water protection area and identifying local support for voluntary source water protection is a great way to build trust and partnership with your community. You want an informed public to prevent contamination.

Step 5 Implement management or policy measures to prevent, reduce or eliminate risks to your drinking water supply. Management options might involve ordinance provisions prohibiting or restricting land uses that could release contaminants to critical source water areas—including sensitive groundwater recharge areas. Examples include, prohibiting gas stations in source water protection areas or restricting the application of pesticides.



Step 6 Develop contingency strategies that address water supply contamination or service interruption emergencies. This may involve an assessment of available water storage and/or an identification of alternative sources of water.

Step 7 Implement an industrial pretreatment program. Pollutants in industrial wastewater may compromise municipal treatment plant processes or contaminate drinking water. To protect municipal treatment plants and the environment, a pretreatment program—as part of the U.S. Clean Water Act's National Pollutant Discharge Elimination System (NPDES)—requires industrial dischargers to use treatment techniques and management practices to reduce or eliminate the discharge of harmful pollutants to sanitary sewers.

GO Support regulatory compliance + utility staff

You and your water system have a responsibility to the public to provide clean and safe drinking water to homes and businesses. Customers may take their water for granted… until they don't have it. If service is interrupted or if the water becomes unsafe, you can be assured you will hear about it from your constituents.

Water utility systems are subject to Federal and State regulations. These regulations require that water delivered to customers meets established safety standards and that water quality test results are reported to the State. Violations can result in fines of up to $25,000 per day. Another regulatory requirement is Consumer Confidence Reports about local water quality and any violations or identified contamination. These annual reports must be distributed annually to homes and businesses in your utility service area. As an elected official, you must ensure that budgets include sufficient funding for operating and maintaining the system, as well as for regularly testing water quality and meeting regulatory requirements.

Photo Credit Emily Cikanek

Water Utility Staff
Water utility staff are on the frontlines of ensuring we all have safe, clean drinking water at our tap 24/7. Just like police and fire service workers, water utility staff provide a service critical for the life and health of people every day. Supporting utility workers' participation in trainings that bring the best practices in water resource management to your community should be a priority. Is your utility a member of the American Water Works Association? Encourage cross-industry learning and expertise building—your community will directly benefit.

Water utility staff are trained managers, technicians and operators certified to operate water utility services. Ensuring your water utility has trained and qualified operators for the water system is paramount. Illinois maintains Operator Certification requirements for different classifications of water systems. For example, if you have a Class B system, it is required that you have a Class B certified operator. Operators must pass an exam, have the requisite operational experience and certifications must be renewed every three years, which requires continuing education training. You will want to ensure you have certified operators for your water utility system, as well as back-up operators.

Like many industries today, the water industry is seeing a significant number of water utility operators retire. It is recommended that water utilities consider an operator-in-training program, such an apprentice operator, to ensure a smooth transition of leadership as staff retire.

GO Practice sensible salting

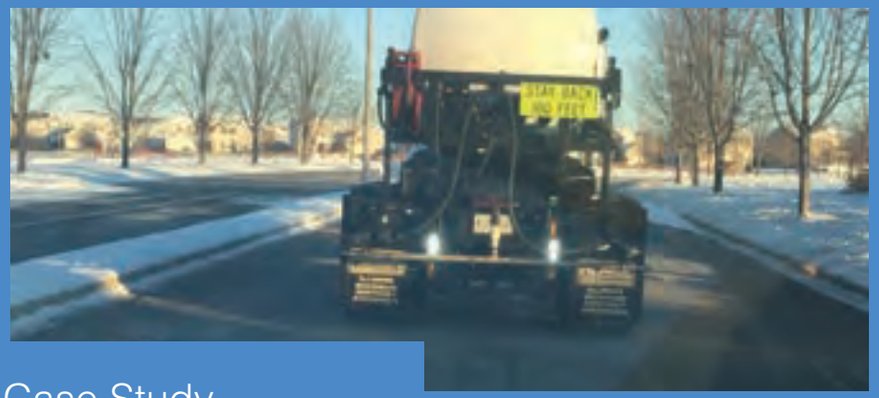
Removal of snow and ice from pavement is essential for public safety. During winter storms, the use of deicing chemicals is a widely accepted and generally essential means of keeping pavements safe and passable. Sodium chloride—common salt—is by far the most popular roadway deicing chemical. However, salt is corrosive to vehicles, roadway surfaces, parking lots, driveways and bridges and has been found to have adverse effects on the environment including flora, fauna and water quality. Salt pollutes—when snow and ice melt, the salt goes with it—washing into our lakes, rivers, streams, wetlands and groundwater. It takes only one teaspoon of road salt to permanently pollute 5 gallons of water. If too high a concentration of chloride gets into a water source, that source can harm fish and plant life, and become unusable as drinking water.

So what can you do to reduce the negative impacts of chlorides in our water? Practice sensible salting. The following actions reduce the negative effects of salt in our water sources:[16–19]

- Plow, shovel and blow the snow. Use mechanical means to remove snow, not salt or other deicing chemicals to "burn-off" snow and ice.
- Calibrate your equipment. Knowing that your equipment is calibrated and the application rate is accurate will save chemical costs and reduce environmental impacts. Make these calibrations annually, and keep a record in the vehicle for appropriate spreader settings.

Photo Credit SDOT Photos

Increasing Chlorine Levels In Water
In Northeastern Illinois, 2016 monitoring by the Illinois State Water Survey has shown chloride levels in surface water and groundwater are increasing, and that use of salt for pavement deicing is the primary source of these increases. Staying ahead of this issue is important to maintaining healthy water sources for drinking water.



Case Study
Benefits of Sensible Salting

The Villages of Montgomery and Oswego in Chicago's southwest suburbs have partnered together to implement a sensible salting program. In 2014, the Village of Oswego began investing in a sophisticated brine-making system capable of mixing different anti-icing agents that could be applied to the roadways both before and during a snow storm to reduce the department's dependency on calcium chloride (rock salt). In 2015, the Village of Montgomery built its own homemade brine maker and truck-mounted sprayer skid for applying product to roadways. The application's success propelled Montgomery's village board to invest in a new truck capable of applying product at a more efficient rate.

The two communities then began working together to maximize the strongest parts of both programs—Oswego's brine making system and Montgomery's application ability. During 2016-2017, Oswego produced product for both communities, which Montgomery picked up with its new truck, and applied to major roads in both communities. The communities have discovered that applying the liquids to the rock salt prior to salting the roads activates the rock salt for quicker results, and that pre-treatment of roadways can be accomplished up to 48 hours in advance of a storm, which has reduced overtime costs for staff.

These efforts combined with other changes in Montgomery's policies—such as only salting the center of the road on streets with lower traffic volumes and speeds and only salting cul-de-sacs after the storm is over—have earned the village savings of 30-50% of its historical annual salt consumption. This alone can save the village's road budget $75,000-$150,000 annually, depending on the current cost-per-ton for salt. Additionally, this new shared services program has reduced staff needs from 5-6 down to 2-3, which allows village leaders to reassign employees to other priority areas. The staff deploy the new tools in their arsenal, and many of them enjoy more rest and time with loved ones as well as fewer laps around the block.

Photo Credit Todd Hoppenstedt, Village of Montgomery

- Choose the right material and apply the correct amount. Know the limits of deicing chemicals. For example, rock salt is not effective at temperatures below 15°F no matter how much is applied. Align application rates with current weather conditions.
- Use ground speed controls on your spreader. Application rates should correspond with the vehicle's speed.
- Pre-wet the salt. Adding brine to salt before it is applied will jump start the melting process and help keep the salt in place by reducing bounce and scatter. Pre-wetting salt can reduce application rates by 20 percent.
- Use anti-icing. Be proactive by applying deicing chemicals prior to snow and ice accumulation. This practice can reduce the amount of chemical needed by 30 percent.
- Don't mix salt and sand. Salt is for melting and sand is for traction on top of the ice, they work against each other.
- Consider possible alternatives to salt. For example, beet juice is a deicer.
- Be familiar with sensitive areas, such as your source water protection areas. Consider designating reduced-salt areas or identifying safe alternatives to road salt in these areas.
- Have your Department of Public Works staff attend training workshops and stay up to date with new technologies and practices.

GO Encourage sensible fertilizing + landscaping

Another pollutant that affects water sources is nutrients—often phosphorus and nitrogen—two ingredients typically included in fertilizers. When nutrient levels in surface waters are excessive, one result is algae blooms. Nutrients enter the water from a variety of sources including fertilizing agriculture and turf grass. As a community leader, you are in a position to ensure that staff incorporate best practices in fertilizing at parks and other public spaces. Your community can also encourage or require homeowners and businesses to practice sensible fertilizing through educational efforts, or by ordinance. Some cities and even states have banned the use of fertilizers which contain phosphorus: Winnetka, Illinois now has a working ban on phosphorus-containing fertilizer, which its village council approved through a reworked ordinance in 2017.

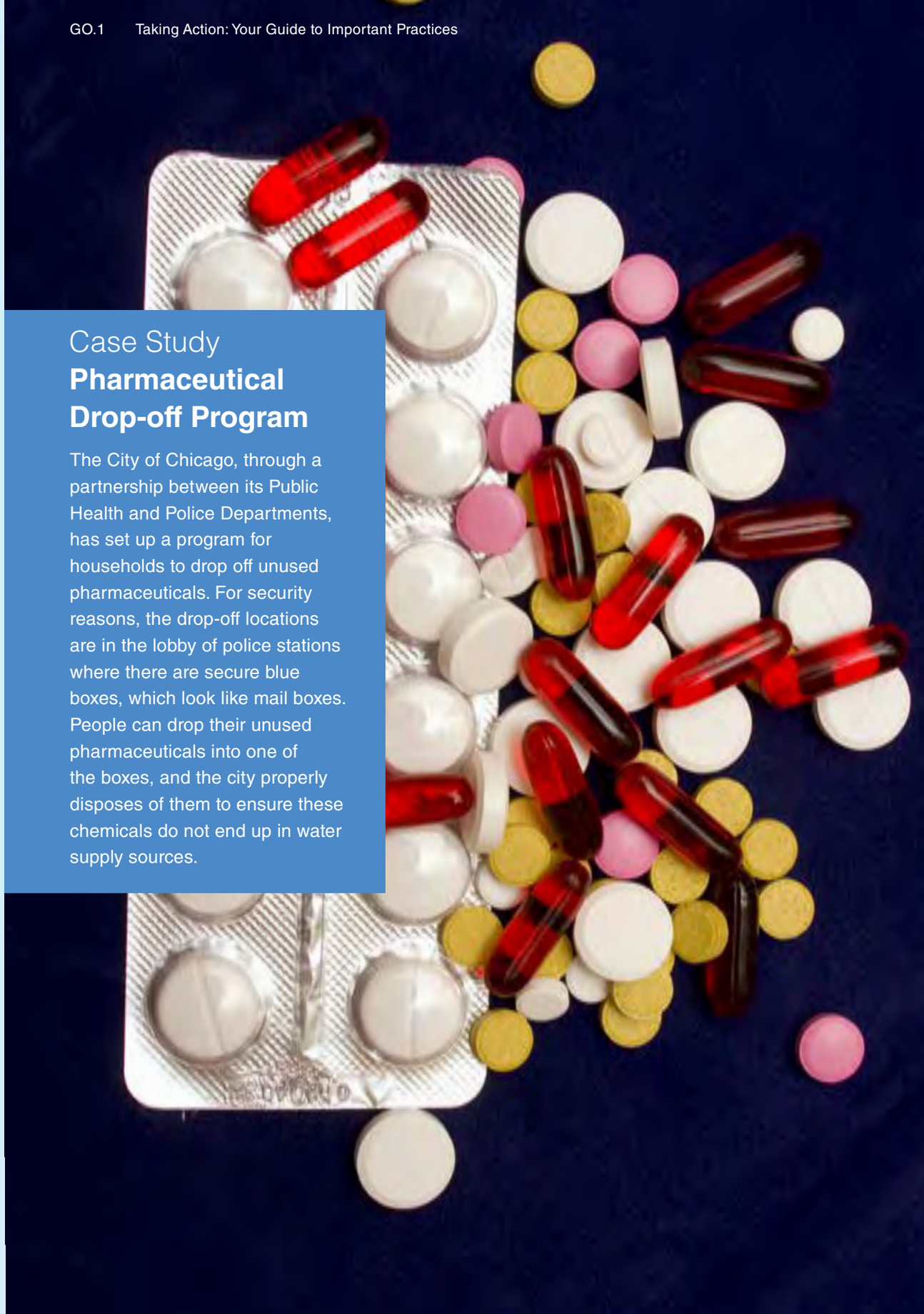
Algae Blooms Can Disrupt Water Service
Toledo, Ohio gets its water supply from Lake Erie. In 2014 the city's water service was disrupted after chemical tests confirmed the presence of unsafe levels of the algae toxin Microcystin in the drinking water plant's finished water. The ban on drinking and cooking using tap water for more than 400,000 residents (as well as 30,000 residents of southeast Michigan) lasted two days and caused emergency measures at the state level.

What actions can your community take to reduce the threat of algae blooms in drinking water? Reduce the amount of nutrients applied for lawn care. This can include enacting an ordinance to limit the use of phosphorus-containing fertilizers like Winnetka, Illinois did. Communities can also provide educational outreach and training programs such as those offered through the Illinois-Indiana Sea Grant, which promote switching to landscape practices that reduce pollution. Called Lawn to Lake, this collaborative program promotes healthy lawn and landscape practices such as building healthy soil, being water smart and taking an integrated approach to pest management. Host workshops and provide educational materials about these best practices in your community to reduce the negative impacts of nutrients in local water sources.

GO Improve hazardous waste + pharmaceutical disposal

Hazardous wastes such as paint, motor oil, gasoline, antifreeze, cleaning products, lawn care chemicals, solvents, mercury, batteries, medicines and pharmaceuticals are harmful to local water sources. Medicine should not be flushed down the toilet, as most municipal treatment systems are not designed to remove pharmaceuticals, so these waste products pass through a treatment plant and are released to a nearby lake or river—most likely a drinking water source. Monitoring of rivers and lakes near metropolitan areas has revealed trace amounts of pharmaceuticals in the water and in fish. Like pharmaceuticals, it is problematic for other hazardous wastes to be put into toilets or sewers, and they should not be poured out onto the ground. Proper disposal of these products is important to ensuring safe drinking water for our communities.

Fortunately, many state and local law enforcement agencies, communities and organizations have established different options for hazardous waste collection. In Illinois, the Environmental Protection Agency (IEPA) coordinates one-day household hazardous waste collections each year in the spring and fall. The IEPA encourages communities or organizations to co-sponsor household hazardous collection events, which you can do by filling out an application and contacting its Waste Reduction Unit. There are also take-back events, mail-back and other collection programs that communities can organize to collect old, expired or unwanted prescription and over-the-counter pharmaceuticals from households.



Case Study
Pharmaceutical Drop-off Program

The City of Chicago, through a partnership between its Public Health and Police Departments, has set up a program for households to drop off unused pharmaceuticals. For security reasons, the drop-off locations are in the lobby of police stations where there are secure blue boxes, which look like mail boxes. People can drop their unused pharmaceuticals into one of the boxes, and the city properly disposes of them to ensure these chemicals do not end up in water supply sources.

Questions for your staff: Protecting your water

- What are our community's risks for source water contamination?
- Have we developed a source water assessment and plan?
- Do we have any current or recent drinking water violations we need to attend to?
- If on deep aquifer water: What treatment practices do we use to eliminate any naturally occurring barium or radium? How are we communicating these practices to our customers to build public trust?
- What is the classification of our drinking water treatment facility?
- Are our operators appropriately certified?
- Are we involved in the American Water Works Association?
- What is our policy and practice regarding sensible salting?
- How are we making sure to not over-salt in order to protect our water supplies?
- Do we have any programs, policies or educational materials available for our community members on best practices in lawn care to reduce nutrients in water sources?
- Do we have a pharmaceutical drop-off program?
- Have we ever sponsored a household hazardous waste collection event in partnership with the IEPA?

Ensure You Have Enough

2

It is important to ensure your community not only has enough drinking water, but that it is also conserving precious resources like water, energy and municipal funds. So what can you do to be a steward in your community? There are a number of practices communities can implement to balance supply with demand and avoid water waste.

GO Track water usage

Measuring community water use and collecting data on a regular basis is critical to making informed decisions about managing your utility, infrastructure and general drinking water service. The State of Illinois requires water suppliers to report annual water withdrawals and water use information. The Illinois State Water Survey (ISWS) is the agency responsible for managing the Illinois Water Inventory Program. The purpose of this program is to compile and maintain records on these withdrawals and usage data in order to glean an accurate understanding of water demand. Reporting to ISWS on water withdrawals and water use is mandatory for public water suppliers, industries that withdraw and use water as well as irrigation water users. This data is useful for you and for your water supply system operations to gauge per-capita water consumption and determine how much water is needed to supply your community. This is the first step in ensuring your utility can meet the needs of its customers.

Lake Michigan Water Users

The amount of water Illinois can withdraw from Lake Michigan every year is limited by a U.S. Supreme Court decree. Any use of water from Lake Michigan within the State of Illinois is authorized by, and requires a permit from, the Illinois Department of Natural Resources (IDNR). Drinking water utilities are required to submit an annual water audit form called LMO-2 to IDNR and must also submit a monthly form which shows daily water usage numbers and the amount of water sold to other permitted drinking water utilities. These practices are important for every water utility that uses Lake Michigan as its drinking water source to ensure Illinois is complying with federal regulations.

GO Conduct annual water loss audits

Wasting water wastes money, which is why controlling water loss in your drinking water distribution system is important. Water loss reduces your utility's revenues, distorts data on customer usage, inflates production costs and stresses resources.

Case Study
Reducing Leaks Saves Money

The City of Evanston invested in leak-detection equipment to proactively address water loss in its distribution system. Between 2013-2015 the City surveyed 314 miles of pipe and located five main breaks and eight service leaks. The savings from eliminating these leaks was estimated at 143 million gallons of water per year. All of these leaks were found to be discharging directly into sewer laterals or mains, or into the ground. Without a leak-detection program, these leaks may never have been found. Additional benefits of reducing non-revenue water for the City of Evanston include cost savings from more accurate leak locating, avoidance of emergency repairs, the ability of city staff to survey all 160 miles of water mains annually without any increase to operating costs and a proactive approach to coming into compliance with the Illinois Department of Natural Resources (IDNR) rules on allowable water loss for communities that use Lake Michigan water.

Annual water loss audits are an invaluable practice in controlling water waste and reducing lost revenue. In basic terms: Knowing the amount of water produced and sent out into your distribution system, minus the amount of water used by your customers (known through metering), equals the amount of water not billed for. This water was somehow used or leaked within the distribution system—non-revenue water. The American Water Works Association (AWWA) has established a standard method as well as free software for utilities to use in conducting robust, annual water loss audits.

Conducting annual water loss audits, validating the findings, implementing plans to ensure accurate meter readings and locating and repairing leaks are important to maintaining a viable, responsible and healthy water system. To keep track of infrastructure conditions and ensure your community is not paying for wasted water due to a leaky system, make sure your utility is using the latest practices and free resources to conduct annual water loss audits and reduce your system's non-revenue water waste today.

GO Analyze supply + demand

Knowing how much water your community uses, and understanding where improvements in your system should be made to reduce water waste, are both important steps. It is also necessary to analyze and understand how much water is available for future demand.

Understanding demands of water will help ensure thoughtful planning for future availability.

Case Study

Monitoring Groundwater Levels

The Barrington Area Council of Governments (BACOG) operates a groundwater monitoring program that measures, maps and analyzes water levels and conditions in the region's shallow aquifer system on a long-term basis. With regular data collection and analysis every five years, the program identifies trends in groundwater levels and describes where and how much water levels are changing.

To achieve ongoing monitoring, BACOG collaborates with the Illinois State Geological Survey (ISGS), U.S. Geological Survey (USGS), the Flint Creek Watershed Partnership and 13 municipalities to obtain data from their respective wells and gauges on an ongoing basis. The BACOG office also relies on both the Illinois State Water Survey (ISWS) and ISGS for guidance and technical support.

While dire conditions are not predicted, water levels in the BACOG area are expected to decline over the next few decades. This monitoring program will determine changes and produce data and reports to inform local government officials, providing the rationale and facts to enable action. The monitoring program and other groundwater efforts at BACOG are also expected to generate community awareness and support for groundwater protection. This proactive initiative for a small region of highly cooperative governments recognizes the critical value of data for addressing any future water supply challenges.

Photo Credit BACOG

While communities in Northeastern Illinois that have permits to use Lake Michigan water already have a set amount of supply, it is still important to analyze future demand to ensure your water allotment is sufficient for future population projections. If your community's water source is not Lake Michigan, understanding how much groundwater or river water is available for your usage (and for the use of communities that share the same source) is imperative to ensuring ample supply now and into the future. As a leader, making sure your utility is conducting regular analysis on the supply and demand for drinking water in your community is important. Bringing new or alternative water sources online takes many years to design, permit and build. Don't wait until it is too late to safeguard the community you serve.

GO Designate groundwater recharge areas

The primary reason for groundwater aquifer depletion is unsustainable withdrawal by communities, private well users and agriculture. Depending on the type of aquifer your community uses for drinking water, you may be able to identify and designate groundwater recharge areas. These are land areas where rainfall is able to seep into the ground and help refill the aquifer. The Illinois State Water Survey or the U.S. Geological Survey are two agencies that can help communities identify groundwater recharge areas. If a particularly useful recharge area is identified, your municipality should take steps via a policy or ordinance to protect that area—for example, by not paving over it or approving uses that pollute the land—in order for clean rainwater to infiltrate those aquifers for future drinking water use.

Groundwater Communities Need to Be on Alert
The Illinois State Water Survey has been monitoring and modeling Illinois' water resources for more than a century. Its current projections for certain groundwater supplies in Northeastern Illinois is quite worrisome, stating that some high-capacity wells could be unusable in as little as 15 years.

GO Reduce Drinking Water Demand

The least expensive guarantee of future drinking water is conservation and efficiency today. Managing demand helps ensure enough drinking water for your community. Following are strategies that help preserve precious water supplies for the future.

Capture and reuse water Rainwater is a great source of water for outdoor irrigation and other purposes. Rainwater catchment systems, which can include cisterns and rain barrels, can be designed and installed on both small- and large-scales. On average, outdoor water use accounts for more than 30 percent of total household water use[20] —that is a lot of drinking water! By promoting the capture and use of rainwater for outdoor irrigation, your community can reduce unnecessary demand on drinking water supplies. Reusing rainwater has the added benefit of reducing the amount of water entering your sewer system, which can help prevent sewer overflows and urban flooding in your region.

Include information about cisterns and rain barrels in your community outreach and education programs, and collaborate with local organizations—such as the Metropolitan Water Reclamation District of Greater Chicago or the Conservation Foundation—to help homeowners purchase and use rain barrels. Consider how the municipality can reduce demand on drinking water for irrigation, perhaps by installing cisterns at public buildings and locations. Or you might install underground cisterns at schools or parks to provide flood relief and water for irrigating turf and other plants in the summer.

Adopt WaterSense and other ways to conserve water Implementing water-conservation programs not only preserves water, but helps your community members save money.

The Environmental Protection Agency's WaterSense program provides tools and products for municipalities, businesses and consumers so they can be smarter about water use and saving money. One component of the EPA's WaterSense program is the certification of WaterSense-labeled products, such as showerheads, toilets and bathroom faucets. These products use at least 20 percent less water than conventionals. By implementing WaterSense products in all municipal buildings, you can save water and money, and set an example to residents in your community.

The Alliance for Water Efficiency (AWE) is a national stakeholder-based nonprofit organization dedicated to the efficient and sustainable use of water. Headquartered in Chicago, AWE advocates for water-efficient products and programs, and provides information and assistance on water conservation efforts. AWE offers resources including a Water Conservation Tracking Tool. This tool uses your community's usage data and system costs to evaluate the potential water savings, expenses and benefits of various conservation programs for your water system.

In addition to the steps outlined above, there are useful guides and handbooks that outline the basics and best practices for tracking water usage, conducting water-loss audits, analyzing available supply and utilizing demand management to help ensure your community has sustainable water service. References and links to these helpful resources can be found in the resource section of this guide at **metroplanning.org/DrinkingWater123**.

Case Study

Protecting Drinking Water While Reducing Urban Flooding

The Village of Northbrook, Illinois recently constructed a new storm sewer and stormwater chamber underneath the northern half of the Village's Wescott Park, a project undertaken in cooperation with the Metropolitan Water Reclamation District of Greater Chicago (MWRD), Northbrook Park District and Northbrook/Glenview School District 30. This 7.5-million-gallon chamber includes a rainwater harvesting system, which enables the Village and the Park District to reuse water captured during rainstorms, thus reducing the amount of drinking water used for irrigation purposes—a win-win.

Photo Credit Metropolitan Water Reclamation District of Greater Chicago

Questions for your staff: Ensuring quantity and reducing waste

- How are we keeping track of water usage? How are we recording that data on a regular basis for our community in order to ensure ample supply?
- Are we keeping up with the requirement to annually submit our water withdrawals and usage information to the Illinois State Water Survey?
- If your water comes from Lake Michigan: Are we submitting our LMO-2 Forms on time every year?
- Do we conduct annual water loss audits? Are we using the approved methodology and free software from the American Water Works Association (AWWA) to conduct those audits? What steps are we taking after an audit to validate the findings?
- How are results from the audit being considered within our water utility budget in order to fix and repair leaks, or invest in updated metering technology?
- Are we coordinating with our neighboring water supply utilities that use the same water sources we do? How?
- What kinds of demand-management programs is our community engaged in? Do we have a program that supports rainwater reuse in our community?
- Where can we implement rainwater reuse on our municipal properties to reduce demand for drinking water for outdoor irrigation purposes?
- Are we a member of the EPA WaterSense Program?
- Are we a member of the Alliance for Water Efficiency (AWE)? How can we utilize the tools provided by AWE to reduce drinking water demand?

Maintain Your Infrastructure

3

Maintaining your drinking water system ensures public health and quality of life for your community members. So what can you do to protect your community? There are a number of practices utilities can implement to responsibly plan and maintain our drinking water systems.

GO Practice asset management

Your water utility is responsible for making sure its infrastructure system stays in good working order to ensure public health and cost efficiency. Asset management is a planning process water utilities use to ensure that infrastructure assets (plants, pumps, pipes, etc.) are being repaired, replaced or upgraded with adequate funding at the right time. **Following are some of the benefits asset management provides a utility**:[21]

- Extended life of infrastructure
- Rate setting based on sound operational and financial planning
- Appropriate budgeting for sustained performance
- Satisfied customers and regulatory compliance
- Improved emergency response, security and safety of assets
- Reduced overall costs for both operations and capital expenditure

Photo Credit Doran

Making sure your utility is implementing best practices for operating an asset management program is key to ensuring your drinking water system remains in good working order. **Following are fundamental steps for operating an asset management program:**

Step 1 Prepare an asset inventory and system map

Step 2 Develop a condition assessment and rating system

Step 3 Assess the remaining useful life of existing infrastructure

GO Be smart about planning for capital improvement projects

Part of a robust asset management program is regular capital improvement planning; these two practices should be interlinked. A Capital Improvement Plan (CIP) provides a mechanism for decision making, a link to long-range plans, a financial management tool and a reporting document.

Case Study
Managing Assets Responsibly

Incorporated in 1921, the Village of Westmont, Illinois' original water mains were constructed of sand cast iron. By the 1970s Westmont, located in DuPage County, Illinois was seeing a large increase in water main breaks, averaging 150 per year by 1990. In 1991, knowing it was going to switch to Lake Michigan for water supply, the Village decided to start an aggressive water main replacement program. This was a good idea: Within the first five minutes of receiving its new water source, the Village had eight water main breaks throughout town, 40 within the first week and 120 after the first month. By the end of the year Westmont had 246 water main breaks—which further confirmed its new water main replacement program was necessary.

From 1991 to 2016, the Village replaced over 18 miles of water main, 300 fire hydrants and 250 valves. This $15 million program was funded through the Water Enterprise Fund, federal grant money during the American Recovery and Reinvestment Act (ARRA) in 2009 and a low-interest loan from the State Revolving Fund (SRF). Westmont has seen a drop in annual water main breaks from a high of 246 in 1992 to just 18 in 2016. The savings to the community since starting the program is just over $11 million, based on avoided overtime, materials, equipment and lost revenue. When this program is completed in 2021, Westmont will have no sand cast iron water mains in its system, and no fire hydrants or valves older than 1975. Through this long-term water main replacement program, Westmont learned that an expensive investment will pay for itself over time and reduce unnecessary drinking water waste in the process.

Photo Credit Mike Ramsey, Village of Westmont

A CIP is not a static document. It should be reviewed every year to reflect the changing priorities, unexpected events and opportunities your community identifies for its drinking water system. **There are multiple benefits to maintaining an up-to-date CIP including**:[22]

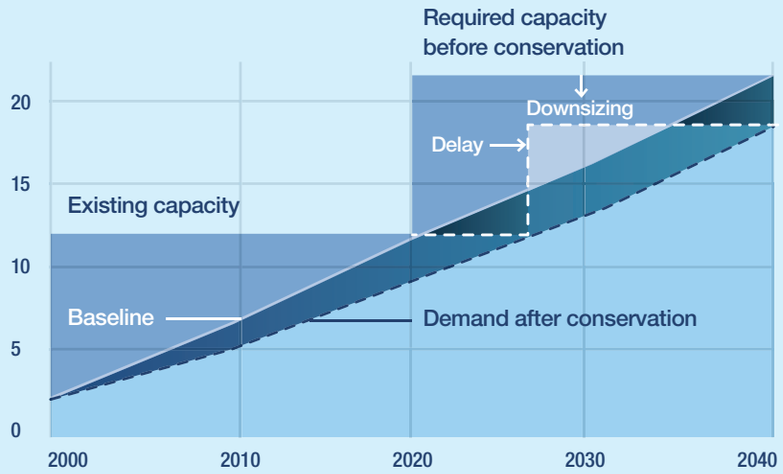
- Focuses attention on community goals, needs and financial capabilities
- Helps build public consensus for, and awareness of, projects
- Allows for improved intergovernmental/departmental cooperation and communication
- Helps ensure efficient use of resources
- Promotes financial stability through infrastructure maintenance, long-term planning of resources and needs, and detailed impacts of capital funding on operating budgets and debt servicing

Capital Improvement Plans
A capital improvement plan (CIP) is a multi-year plan identifying capital projects to be funded during that time. These plans identify each proposed project, its start year, expected expenditures and the means of funding those expenditures.

Important Note: Nearly everything about drinking water production and infrastructure sizing is based upon "Peak Day Demand," which is the capacity required for producing and distributing water during the highest collective demand—often during the hottest, driest days of the year.

When considering what capital improvement projects are necessary for your community, it is also important to evaluate how managing demand can delay or even avoid the expensive buildout of new infrastructure for supplying drinking water to your community.

Managing Demand = Saving Money
Peak demand/capacity in million gallons per day



Source American Water Works Association, 2006. AWWA Manual M52, First Edition, page 75 and Chicago Metropolitan Agency for Planning

Case Study

Managing Demand to Avoid Expensive Capital Projects

In order to save on long-term infrastructure costs for drinking water, the City of Aurora, Illinois approved a water conservation ordinance in 2006. This has resulted in a water demand reduction of 20 gallons per person, per day, and has allowed the City to maintain a much lower than anticipated "Peak Day Demand", even as its population has continued to grow.

This reduced demand has reaped huge overall savings for the municipality's taxpayers by eliminating expensive capital improvement needs. These previously planned infrastructure projects included drilling new deep sandstone wells, the building of required well houses and the construction of collector pipelines to the treatment plant. These capital improvement projects—deferred as a direct result of the City's water conservation ordinance—saved Aurora taxpayers an estimated $7,500,000 over the past 10 years. As Aurora has demonstrated, saving finite water resources for our grandchildren and saving precious dollars for current taxpayers can both be accomplished through a strong water conservation ordinance.

GO Support replacement of old, crumbling infrastructure

Much of our drinking water pipes in the United States were laid in the early to mid-20th Century with a lifespan of 75-100 years. Some of our older urban areas have water infrastructure that's been in the ground for a century or longer. While much of this infrastructure is beneath the ground—out of sight, out of mind—we can't ignore it, not when public health is at stake. Water infrastructure does not exist by itself. It involves people: the people who build it, operate it, maintain it, finance it and ultimately use it. The extensive nature of this infrastructure is important, and supporting the reinvestment in this critical utility service is paramount to ensuring your community is safe, and our infrastructure systems are sound.

A Note on Lead Pipes and Fixtures: As community officials, public health and safety is a number one priority. Lead is a known toxin and lead poisoning is a serious health condition. Communities have taken action to eliminate lead paint in homes and businesses—the same should be done for lead pipes and fixtures.

Water itself does not naturally contain lead. Lead can enter drinking water when old service pipes or fixtures (either owned by the utility or the private property owner) corrode[23]—particularly where the water has high acidity or low mineral content. Conducting an assessment of old lead pipes and fixtures within your community's water system is a first step—and is required by Illinois state law. Likewise, all municipalities should support private property owners in understanding whether they have lead pipes or fixtures and how to test for lead in water. The American Water Works Association (AWWA) has a guide for communicating about lead service lines with your community. Taking a proactive approach in assisting your community's residents, schools and businesses in testing and taking a proactive approach to replacing lead pipes and fixtures is of utmost importance today.

In addition to the steps above, there are a number of useful guides and handbooks available that outline the basics and best practices for implementing asset management programs, creating capital improvement plans and reinvesting in our drinking water infrastructure to ensure community health and well-being. References and links to these helpful resources can be found in the resource section of this guide at metroplanning.org/DrinkingWater123.

Did you know
North America has more than **1 million miles of pipes** beneath our streets designed to bring drinking water to our homes and businesses. What does 1 million miles even look like? Well, the circumference of Earth at the equator is about 24,902 miles, so one million miles of pipe would wrap around our planet 40 times. Chicago alone has over 4,400 miles of water mains. That's a lot of pipe to maintain!

Case Study

Investing in Your Infrastructure Saves Money

The Village of Lansing is located in southeast Cook County, Illinois. The Village purchases its Lake Michigan drinking water from the City of Hammond, Indiana, and has almost 9,400 billed customers—the majority of which are residential, with approximately 650 commercial customers as well. Annual auditing demonstrated increasing water loss in its distribution system, which was due to water meters that were anywhere between 20-23 years old—long past their typical life span. The meters were no longer accurately measuring water usage, which was resulting in non-revenue water for Lansing.

In 2014, the Village identified the need for a community wide water meter replacement initiative to reduce its non-revenue water issue. The upfront capital for this infrastructure improvement project is funded through a State Revolving Fund (SRF) loan, and is estimated to cost about 4.9 million dollars, which includes engineering and construction. Lansing is also installing a fixed network radio frequency automatic meter reading system that will allow them to more efficiently collect meter readings and automatically print water bills—both of which will lead to cost savings. The return on investment is calculated to be less than nine years, with annual savings from more accurate meter readings and reduced operational costs covering the current debt. Construction began in 2017, with the new meter system scheduled to be fully operational in 2018. By investing in necessary capital improvement projects, the Village of Lansing is demonstrating that being a good steward of water can go hand-in-hand with saving money on your utility operations.

Questions for your staff: Maintaining your infrastructure

- What is our asset management program, and what kind of tools do we use?
- How often are our system conditions and future needs updated?
- How are we practicing operational and cost efficiency in our drinking water system?
- What can we implement or do better to ensure our systems assets remain in good working order?
- Do we have a capital improvement plan (CIP) for our drinking water system?
- How often is this CIP updated?
- How are projects outlined in the CIP incorporated into annual budgets and financing plans?
- As required by Illinois state law, have we completed a system-wide assessment of the lead pipes or fixtures within our system?
- What are we doing to replace any identified lead service lines or fixtures owned by our municipality?
- How are we assisting our community members in testing for and replacing lead pipes and fixtures on private property?

4

Finance Your System

Local governments are the primary investors in water infrastructure. Operating water utilities as financially independent enterprises ensures this extensive and critical system has the appropriate resources available to repair and replace infrastructure in a timely and cost-effective manner. The following section outlines best practices in setting fair and viable water rates, and options for utilities to finance capital improvement projects to ensure your community's drinking water system remains safe and sustainable.

GO Set appropriate water rates based on cost of service

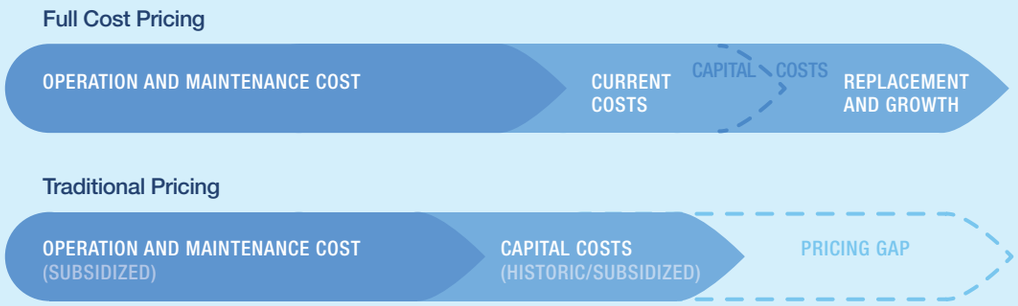
Unlike water pulled right from a lake or river, treated drinking water provided on demand is a utility service—just like energy and telecommunication. Utilities add value to drinking water through treatment, storage and daily distribution directly to customers in their homes, schools and businesses. Treating and delivering water requires both capital and operating expenditures. As such, pricing this service to ensure the long-term viability of the system and sustainability of the water resource is critically important.

Revenues generated by water rates are, and will continue to be, the primary source of funding for drinking water utilities. Water rates must recover the full cost of operations as well as maintenance and capital costs. Rates should also consider resource depletion (scarcity) and environmental costs. Setting water rates at an appropriate price, and creating an enterprise fund so that water utility revenues are used only for utility operation and maintenance, helps ensure sustainable water service and availability for your community now and into the future.

The Illinois-Indiana Sea Grant Program in partnership with the Chicago Metropolitan Agency for Planning and the University of Illinois Extension, developed a Full-Cost Water Pricing Guidebook specifically for community water systems in Northeastern Illinois. The guide is intended to assist local decision makers in setting appropriate water rates to ensure sustainable water service now and into the future.

The Need for Full Cost Pricing

Adjusting water rates to match costs



Source Illinois Indiana Sea Grant and Chicago Metropolitan Agency for Planning

Rate setting is the process through which a water system ensures revenue adequacy. Water suppliers face several decisions about what rate to charge for drinking water service. **Rate setting involves conducting a cost-of-service rate study, and should include the following steps:**

Step 1 Determine cost of service
(including operation, maintenance and capital investment)

Step 2 Project revenue based on future demand

Step 3 Design rate structure

But how do I know what to charge?

Following are key considerations each utility/community should consider throughout the rate-setting process:[24]

- Rates must be set at a level that covers all of the costs to finance, produce, treat, store and distribute water to customers as well as provide capital for investment in the water utility system
- Rates must be fair and equitable
- A water system's revenues should not be used to pay for other municipal services or needs
- Customers should easily understand their water rate
- The rate structure should be easy to administer and be reviewed once a year
- Good rate structures are based on accurate financial information and customer records
- Affordability programs for economically disadvantaged customers need to be established

No elected official wants to raise rates. However, the long-term viability of a community's drinking water system is essential to its sustainability. If rates are reviewed annually as part of the budgeting process, they can be adjusted in small, annual increments instead of infrequent, but large, increases. This is much more palatable for customers over time. A hallmark of sound ratemaking includes basic principles of transparency[25]—customers should easily understand the intent and purpose of a good rate. Given the extent of infrastructure requiring repair and replacement today and in the near future, putting off setting appropriate water rates puts a community in jeopardy.

The Alliance for Water Efficiency (AWE) is a stakeholder-based nonprofit organization dedicated to the efficient and sustainable use of water. AWE operates Financing Sustainable Water, a website which includes guidance, tools and other resources to assist water utilities in ensuring responsible, viable and sustainable water rates and services, now and into the future.

Case Study
Water Rates that Work

The Village of Algonquin, Illinois has been a leader in water conservation. However, reduced consumption has also reduced revenue. The decrease in revenue, plus the fact the Village had not raised rates in a few years, led the Village to conduct a water/sewer rate study. In January 2016, Algonquin approved an increase in water and sewer utility rates, effective November 2016.

A comprehensive water and sewer rate study evaluated capital infrastructure needs (supply, treatment, storage, distribution and control), decreases in usage and funding and increased regulations. The new rate includes a fixed fee of $10 per billing cycle and an increase in consumption charges each year. The new fee structure also retained a water conservation measure, which triples the rate if consumption is over 20,000 gallons. The decision was to charge a flat fee to ensure enough revenue to help cover general maintenance and operations costs of the system while also maintaining water conservation efforts to ensure that water is available for many years to come.

Photo Credit Village of Algonquin

A Note on Water Rates and Affordability: Water rates are on the rise; many customers are seeing increases in their water rates. The reasons are many—water system infrastructure reinvestment needs, the increased costs of treatment and pumping, demand outstripping supply, regulation, etc. What we pay for drinking water is significantly less than what the average consumer pays monthly for cable television, cell phones or even coffee. However, it is important to address emerging affordability issues for vulnerable populations in your community.

Low-income households may face affordability problems if prices continue to rise. In order to avoid and alleviate these hardships, communities can offer equitable pricing structures that mitigate impacts on low-income households such as tiered rates and affordability programs for those demonstrating need. Your utility should be implementing best practices to ensure everyone in your community is appropriately provided for.

GO Finance your capital improvement needs

Without reliable drinking water infrastructure, communities cannot maintain quality of life, economic vitality or a healthy ecosystem. Feasible funding streams to replace and upgrade outdated public water systems are critically needed. Good asset management, regularly updated capital improvement plans and appropriate water rates are critical to understanding what investments your drinking water infrastructure may require in any given year.

But where will the money come from to finance the upfront costs of infrastructure investments? To be sure, there is no one-stop shop for financing our water infrastructure needs. However, there are a variety of options for municipalities to finance drinking water infrastructure upgrades or replacement. The following options are viable ways to finance drinking water infrastructure investments; it is important to note that revenue will still need to be generated from local water rates in order to leverage and eventually pay off these financing options.

Municipal Bonds A municipal bond is a bond issued by a local unit of government to pay for public projects such as roads, schools, and water, wastewater and stormwater infrastructure. Bonds are not a revenue source; they are a means of borrowing money. Bonds allow expenditures—such as capital improvement projects for drinking water systems—that exceed a local government's annual resources.

If a community is considering issuing bonds to pay for drinking water infrastructure projects, it must evaluate how much money is needed over what time period, and identify how the bond holders will be paid. Municipal bonds may be set up as general obligations of the issuer or secured by specified revenues. Either way, the community must have a reliable stream of future incoming funds to demonstrate its ability to pay back its investors.

In Illinois, additional state tax advantages may be available by issuing municipal bonds through the Illinois Finance Authority's "Local Government Revenue Bond Program." The Illinois Finance Authority also offers a municipal program for non-home rule units seeking to borrow up to $1.5 million for essential purpose public projects through its "Local Government Direct Bond Purchase Program."

State Revolving Fund The State Revolving Fund (SRF) is a federal, low-interest loan program designed to support water service infrastructure repair and replacement. Each year, Congress appropriates funds to the SRF, and the U.S. Environmental Protection Agency (USEPA) proportionally distributes these funds to each state based on a regular Needs Assessment. Illinois combines these federal dollars with required state matching funds, program repayments, bond proceeds (generated via the Clean Water Initiative bond sales administered by the Illinois Finance Authority and the Illinois Environmental Protection Agency) and interest on loans to generate a perpetual source of loan money for water infrastructure, which the Illinois Environmental Protection Agency (IEPA) administers.

With these SRF funds, the IEPA provides loans for drinking water mains, water meters, pump stations, storage facilities, treatment plants and just about any infrastructure related to a public water supply system through its Public Water Supply Loan Program (PWSLP). During fiscal year 2016-2017, the PWSLP provided just under $500 million in loans to municipal drinking water systems.

Photo Credit Abby Crisostomo

Reduce Costs by Partnering with Your Neighbors
Given the rising costs of infrastructure and drinking water service, communities can benefit from partnering through service sharing, joint procurement of goods or services and even consolidation of services. While not a new concept, exploring ways to save your community dollars on drinking water service costs by partnering with your municipal neighbors demonstrates effective governance in a time of scarce resources.

If a community in Illinois wishes to apply for a SRF loan, the Illinois Environmental Protection Agency requires the submission and approval of a complete financial package, including a dedicated revenue stream that is adequate to assure loan repayment. Thus, similar to municipal bonds, having a dedicated, established revenue stream is necessary for a community considering an SRF loan to raise capital for crucial infrastructure projects. For more information on how to apply for a State Revolving Fund loan, please see the program webpage on the IEPA's website.

Public-private partnerships In addition to bonds and loans, communities can also establish public-private partnerships (P3s) to finance needed drinking water infrastructure improvements. This approach engages the private sector in funding infrastructure projects to meet public service needs. P3s involve the private sector in financing, planning, design, construction, operation, maintenance and/or rehabilitation and replacement of publicly owned infrastructure.

With P3s, a community typically maintains ownership and ultimate responsibility of any infrastructure. The private sector helps finance projects and/or improve cost efficiencies for construction and/or operation and maintenance. P3s may allow for increasing the ability to leverage public funds while minimizing impacts to a municipality's debt capacity. Like the other financing tools described, P3s require a dedicated revenue stream for repayment.

While there are a number of different ways a municipality can finance its drinking water system, the best approach will vary from community to community. Sound asset management, water rate setting and regularly updated capital improvement plans will allow your community to identify what investments are needed when, and what financing options are the most appropriate.

A number of guides and handbooks outline the basics and best practices for implementing good and equitable water rates as well as guidance on appropriate and advantageous financing for drinking water investment needs. References and links to these helpful resources can be found in the resource section of this guide at **metroplanning.org/DrinkingWater123**.

Questions for your staff: Appropriately financing your water system

- When was our last rate study conducted? Was the community involved in the process?
- Are we considering the full costs of service (operations, maintenance, infrastructure renewal, etc.) in our water rates today?
- Are the revenues from our water services put into a separate enterprise fund reserved for water services and maintenance only?
- Do we have an affordability program for low-income households?
- How are we ensuring sustainable use and equity for customers within our water rate structure?
- What is our current municipal debt load/capacity?
- Do we have any outstanding bonds for drinking water infrastructure repairs?
- Have we ever utilized the State Revolving Fund to finance our drinking water investment needs?
- What drinking water investment needs might a P3 financing option be possible?
- Have we ever tried coordinating joint procurement or purchasing with our neighboring communities? What drinking water investment needs might lend themselves to that type of coordinated approach that could save us money?

5 Plan and Coordinate With Your Neighbors

Drinking water is an integral aspect of planning for municipalities. Without ample water, communities are unable to thrive, let alone exist. Integrating water resources and utility service considerations into your community's current and future plans, policies and ordinances is essential. Following are actions your municipality can take to integrate water more holistically into community planning.

GO Include water in your community comprehensive plans

Land use decisions and future planned development directly impact local water quality, quantity and future usage. They also influence long-term infrastructure maintenance costs. Which is why incorporating water resource and service considerations within community comprehensive plans or land use plans is important. For example, large parking lots next to surface water will impact water quality as stormwater runoff that contains salt, oil, gas and litter can flow directly into drinking water sources. Likewise, different types of housing and landscaping have different impacts on drinking water usage in a community.

The scale at which community planning evaluates the approval of a development proposal must be larger than the development itself. Development generates development—once a new housing development is approved, it attracts other developments such as retail, gas stations, schools, etc. All of these will require more drinking water and more water infrastructure that needs to be maintained over time by the municipality. Incorporating these considerations and calculating the water demand impact is important to ensuring sustainable service and supplies today and in the future.

Many communities now include details about drinking water service and source water protection within comprehensive plans. Whole chapters that address water are showing up in these plans. **Following are beneficial topics to address within your community's comprehensive plans:**

- Overview of the water supply system
  - History of water service in the community
  - Water source
  - Water infrastructure
- Information on water consumption and future forecasting
  - Data on current drinking water usage (total and per capita)
  - Future projected water usage needs
- Water supply challenges and plans to address those challenges (current or future)
  - Supply constraints based on data usage
  - Water pollution challenges
  - Infrastructure condition issues
- Water-wise programs and initiatives
  - Public education initiatives, and customer rebate or incentive programs
  - Outdoor watering restrictions
  - Landscape ordinances
- Drinking water goals for the community
  - Demand management goals
  - Land use and density goals based on average water consumption
  - Emergency management and back-up plans

Is Your Community Water-Wise?
The International Water Association has developed Principles for Water-Wise Cities in order to assist leaders in developing and implementing resilient urban water planning and design. These principles encourage collaboration between local government and the communities they represent. Cities around the world are embracing a new way of incorporating water into future planning—will your community join in being a water-wise city too?

Holistic Water Management—the One Water Approach:
Many leading water management agencies, communities and organizations nationwide are embracing a holistic approach to managing water resources. As defined by the U.S. Water Alliance, One Water is the concept by which all water resources are managed in a sustainable, inclusive and integrated way. One Water encourages coordination across previously siloed industries—drinking water, wastewater, stormwater, planning, architecture, transportation, energy, etc. All of these fields must work together to address how we improve our approach to managing water resources more sustainably.

Photo Credit MPC

Ensure your community planners and water utility managers are coordinating and incorporating important drinking water considerations within the larger planning picture for your community. Here in Northeastern Illinois the Chicago Metropolitan Agency for Planning (CMAP) produced a regional water supply/demand plan in 2010 called Water 2050. The plan includes population forecasting, water demand scenario modeling, impacts on available supply as well as demand management strategies for addressing potential shortages.

GO Plan for droughts

What is a drought?
Drought occurs when there is a prolonged period of little to no rainfall, which can occur at different durations, timing and intensity. The National Drought Mitigation Center (NDMC) has defined drought as "a period of excessive dryness long or intense enough to affect agriculture, habitats or people… (and) are difficult to define because it often develops slowly over months or years…"[26]

Variability in climate can cause drought, which can lead to water shortages. Drought diminishes precipitation, which reduces water levels in surface and groundwater sources. Drought also causes water-quality concerns as contaminants and algae blooms make it harder to treat this water to drinking standards. Given drought's implications for public health, communities and utilities must prepare for these conditions through contingency plans that mitigate water quantity and quality concerns.

Drought doesn't only affect arid regions of the U.S. In the summer of 2012, Illinois experienced a significant drought (as did the rest of the country), which raised concerns of having enough water supply to meet demand. The Illinois State Water Survey (ISWS) monitors drought conditions for groundwater and surface water, and there were noticeable impacts on water levels, mainly in shallow groundwater wells, which caused several water supply systems to be "at risk."

Preparing for drought requires both planning and action. Make sure your community is protected by establishing a drought plan based on sound scientific analysis. In Illinois, the State Water Plan Task Force published "State of Illinois: Drought Preparedness and Response Plan." **This plan includes recommendations on how communities can prepare for drought and guidance for government officials on how to protect their community water systems from drought:**[27]

- Quantify existing water supply resources
- Assess drought vulnerability
- Identify expected changes in future water needs
- Adopt drought preparation plans to address vulnerabilities and potential damages
- Act on those plans when needed

Additional drought risks
include damages or threats to agriculture, the environment, navigation, energy production and recreation. Drought also has economic impacts:

- Increased food prices
- Increased water costs
- Reduced income and spending
- Potential loss of manufacturing and jobs
- Delayed transit of goods (barges that cannot operate due to reduced flow in waterways

Make sure your community is continuously monitoring its drought conditions by tracking Illinois' precipitation levels and drought alerts by the U.S. Drought Monitor, updated weekly by the National Drought Mitigation Center.

The most effective drought plans involve coordination and communication between municipalities, water suppliers and land use planners. Combining the skills, knowledge and responsibilities of these sectors helps ensure drought preparedness and successful mitigation of impacts. Additionally, transparent communication with the public about the effects drought can have on their water supply helps catalyze needed water conservation at the right time. Providing information on local municipal websites, flyers defining outdoor watering restrictions and legal notices can help get the word out and change behavior patterns when it matters most.

GO Be prepared for emergencies

Emergencies are, by definition, unpredictable. Source water contamination and service disruption are the most common emergencies that impact drinking water service in addition to drought. Unplanned drinking water service disruptions can include main or service line breaks, contamination and security breaches. Being prepared is the best approach for dealing with these unplanned emergencies.

An Emergency-Response Plan (ERP) is a written document that details a drinking water system's plan of action for responding to emergencies, disasters and other unforeseen events. The ERP may include detailed steps the public water system will take to respond to potential or actual emergencies including, but not limited to, the following: loss of water supply from a source, loss of water supply due to a major infrastructure failure, damage to power supply equipment or loss of power, or contamination of water in the distribution system from backflow or other causes.

Bioterrorism

Although water utilities might be the last place one would think of as a target for terrorism, contamination of drinking water through intentional means could have catastrophic consequences. The Bioterrorism Act of 2002 requires that drinking water utilities serving more than 3,300 people conduct vulnerability assessments and develop emergency response plans.

Working with your utility managers and developing plans for storage, demand management and alternate sources of drinking water reduces the risk of being unprepared for when an emergency happens. The U.S. Environmental Protection Agency has a guidance manual for communities and their utilities to develop emergency drinking water plans, and details the important questions and information needed to ensure continuous, safe and reliable drinking water service.

The Illinois Environmental Protection Agency regulates pollutant releases to surface waters. However, your community should be proactive in preventing accidents. For example, if there are major facilities that discharge waste into a water source, or have the potential for a spill of a harmful material upstream of your water supply intake, the facilities should have contingency plans for an accidental release. Similarly, groundwater can become contaminated by activities or incidents in the area. For example, if material from a tanker truck spill infiltrates the ground, the groundwater could become unusable. Due to the importance of groundwater quality, many communities implement programs designed specifically to protect groundwater. Procedures should be put in place for your water system to be notified immediately if there is an accidental release, and your water utility should have a response plan if there is an emergency.

The American Water Works Association has an Emergency Preparedness Resource Community to help support utilities in responding to emergencies, as well as a guidance manual, titled Emergency Planning for Water Utilities, that outlines what steps to take to help ensure your community has access to clean and safe water, even in times of emergency. Additionally, developing a communications plan that includes communication with employees, critical facilities in your community, consumers and media is an important part of being prepared for emergencies.

Photo Credit Psuba 98

GO Embrace regional water supply coordination + service sharing

There are more than 400 community water supply systems operating in Northeastern Illinois. Yet our water sources are shared. Our collective impact on water resources is significant and coordinating and communicating across municipal and utility boundaries is imperative.

Transform Illinois
Government effectiveness is imperative. Transform Illinois was created to improve the delivery of public services and infrastructure in Northeastern Illinois. This coalition of local elected officials, civic organizations and research institutions is dedicated to promoting and supporting local government efficiency efforts.

Each utility collects and treats, or purchases, drinking water, and distributes it through a system of pipes and pumps that it maintains. Most of these utilities are owned and managed by a municipality, which means that costs associated with operating and maintaining the system over time are borne by one community. By forming partnerships across municipal and utility boundaries, there are many opportunities to reduce costs for providing water service. Given the rising costs of operating and maintaining sustainable drinking water service, by embracing collaboration, shared services and, in some cases, regionalization, there is potential to save your community significant costs.

The Northwest Planning Alliance (NWPA) is a good example of coordinated communication on regional water supply right here in Northeastern Illinois. The NWPA was formed as a voluntary partnership to address the issues of water supply planning and management within the non-Lake Michigan service area of our region. NWPA seeks to collaboratively plan for and steward its shared river and groundwater resources to ensure a sustainable water supply for the people, economy, environment and future generations. Formed by intergovernmental agreement, NWPA brings together five councils of government (COGs) representing approximately 80 municipalities and five counties: DeKalb, Kane, Kendall, Lake and McHenry. This Alliance has developed numerous free and helpful resources for the region.

Regional coordination and service sharing is imperative to protecting communities and water resources into the future. Some communities have partnered together to supply water service—often through legal structures such as Water Commissions and Joint Action Water Authority's (JAWAs)—in order to save costs and improve system efficiencies. Exploring ways to partner with neighboring municipalities to save water and reduce costs for your community is important.

In addition to the steps outlined above, a number of guides and handbooks outline best practices for incorporating water resources into community planning and regional coordination. References and links to these helpful resources can be found in the resource section of this guide at **metroplanning.org/DrinkingWater123**.

Case Study
Collaboration + Service Sharing In Action

The Carpentersville and West Dundee Water Interconnect demonstrates two communities working together for the benefit of both. The water system interconnection between the Villages of Carpentersville and West Dundee was the result of an intergovernmental agreement to assist in sharing water during emergencies and for planned water system needs. While the Interconnect provides emergency use service, it was primarily designed to allow the high pressure zone of one community to maintain adequate pressure and fire suppression flow rates while the other community's elevated tank was removed from service for maintenance.

The removal of an elevated water tank for maintenance can require up to six months. During this time, a community may have sufficient capacity to meet average and maximum daily demand but then lose the capability to meet instantaneous peak demands and fire suppression. So by interconnecting the two systems, one elevated tank can maintain pressure and provide fire protection for both communities, thereby continuing to protect the health and safety of residents.

Both Carpentersville and West Dundee have recognized the mutual benefit of an emergency water supply and improved operational flexibility during elevated tank maintenance, and the interconnect has been used successfully on multiple occasions to help both communities.

Photo Credit Baxter & Woodman

Questions for your staff: Water planning and regional coordination

- How are we coordinating land-use decisions with drinking water management needs?
- Have we integrated water resource management within our community comprehensive plans?
- Are we incorporating the Chicago Metropolitan Agency for Planning's regional data, information and recommendations on water resources into our community plans?
- Are we monitoring drought conditions on a regular basis?
- Do we have a drought preparedness and response plan? Are we coordinated across departments on these plans?
- How are we prepared to take action to conserve water resources in the event of a drought?
- Does our community have an emergency-response plan (ERP) for drinking water service?
- What contingency plans do we have set up to handle a drinking water emergency?
- Have we done an assessment of possible pollution or contamination risks for our drinking water source(s)?
- Have we coordinated with our neighboring communities to plan collaboratively about drinking water management and service?
- What actions could we take to improve our collaboration with neighboring communities?
- How might we consider service sharing or joint procurement to save our community and citizens money?

Engage Your Community

6

As community leaders, it is important to engage your public in how they can participate and make a difference in protecting water resources and reducing costs. Consumers are often willing to do their part and participate in sound water management practices if given accurate and helpful information. The following section provides guidance on how you can best develop an effective water ethic in your community based on transparency and demonstrated stewardship.

GO Implement water conservation + demand management

Living in a water-rich region like ours, it is easy to question water conservation. Beyond reducing unnecessary water waste to avoid supply constraints, other benefits include extending the life of existing infrastructure, slowing down or avoiding the need for expensive, additional water sources, saving on energy and chemical costs for pumping and treating drinking water and providing the opportunity for economic development by having enough supply for additional industry and population growth.

Water conservation should not be something we think about only during times of drought. Water efficiency is a way of life and a method to ensure water is available at a reasonable cost for future generations. **Water conservation is any action, program or technology that**:

- reduces the amount of water withdrawn from a water supply source
- reduces consumer water use (indoor and outdoor)
- reduces water loss or waste
- improves the efficiency of water use
- increases water recycling and reuse
- prevents water pollution

The adoption of water-efficient practices such as conservation is seen as an important step to reducing peak demand for drinking water, getting more service out of existing systems and delaying the construction of new, expensive sources.

Case Study

Population Growth + Water Conservation Go Together

The Village of Algonquin, Illinois implemented a Water Conservation Plan in 2003 to address concerns about the quality and pressure of its water sources, which are shallow aquifers and one deep well. Under the constant threat of shortages, the Village established a Water Conservation Committee to annually implement and revise the goals of the local Water Conservation Plan—a document which includes both water conservation and increased resident awareness goals. While Algonquin has taken several measures to meet its goals, one of the most successful is water system status alerts—which address restrictions on landscape irrigation. Color-coded alerts are placed around the village to inform residents and businesses of outside water restrictions. If residents or businesses are found to have violated these restrictions, they are fined $100.

From 2003-2009, the Village has added 800 households and 300,000 sq. ft. of commercial space. Despite this growth, Algonquin's summer pumping volumes have decreased from 6 million gallons per day to 3 or 4 million gallons per day. Further progress has also been made in continuing to reduce pumping volumes: From 2007-2016 the average pumping rate has decreased approximately 500,000 gallons per day. And the summer average pumping rates have decreased approximately 700,000 gallons per day. During this time, the Village added approximately 300 residential units and approximately 250,000 square feet of commercial space. Algonquin has proved that communities can grow and thrive without putting unnecessary demand on precious drinking water supplies.

Photo Credit Village of Algonquin

Water demand management involves the adoption of practices, policies or investments by a water utility to achieve efficient water use by all members of the community. **These practices help support water conservation, and include a wide range of measures to help consumers become better stewards of their drinking water**:

- Rebate programs for customers who install water efficient appliances and fixtures
- Outdoor watering restrictions
- The promotion of rainwater for outdoor watering purposes

These measures can be short- or long-term depending on the needs of the community. Strategic planning is a key aspect of a successful conservation program. This means analyzing how much water is used, when, by whom, for what purpose and at what level of efficiency. Based on this detailed data, a community can determine what the potential reduction in water use could be through conservation approaches to achieve improved water use efficiency.

GO Provide community education + engagement programs

Long-term solutions for conserving, protecting and managing our water resources will require that everyone understands the importance of drinking water, and are provided the programs and tools to help. Citizen education campaigns help highlight the importance of water issues and empower individuals to take action. Media, educational materials, schools and incentive programs help to ensure your community is appropriately informed.

Saving finite water resources
for our grandchildren and saving precious dollars for current taxpayers can both be accomplished through a strong water conservation ordinance. Peak demand management is especially important during the summer months when outdoor irrigation use of drinking water spikes and puts extreme pressure on water systems. In our region, the Northwest Water Planning Alliance (NWPA) developed an Outdoor Water Conservation Manual and Model Lawn Watering Ordinance, which has been used by a number of municipalities, and which can easily be adapted for your community to help reduce outdoor watering that puts pressure on drinking water operations.

Education may be the key to getting public support for a utility's water conservation efforts. Outreach should include the costs involved in supplying drinking water and detail how water conservation practices will provide long-term savings. **Opportunities to provide this information can include**:

- An understandable and informative, monthly water bill. Customers should be able to read and understand their water bills, which should include:
  - How much water they used
  - What their water rate is
  - How much they are being charged for their current bill
  - A usage comparison to their previous bill
  - Any information or tips on how they can conserve water
- Educational materials, bill inserts, informational pamphlets and brochures can be made available for customers by mail and at their local stores, libraries, schools, etc. This information can help consumers make informed choices about water use, and helps build trust in their community's local water utility operations.

There are a number of guides and handbooks that outline best practices for engaging your community in water efficiency practices. References and links to these helpful resources can be found in the resource section of this guide at **metroplanning.org/DrinkingWater123**.

The Environmental Protection Agency's WaterSense-labeled products such as showerheads, toilets and bathroom faucets all conserve water, provide savings on water bills and use at least 20 percent less water than conventional products. In 2008, WaterSense products saved consumers 9.3 billion gallons of water and $55 billion on utility bills. Nationwide, dozens of cities, counties and utilities use rebates to spur residents and businesses to purchase these water-efficient products. The WaterSense program also provides free brochures for distribution to customers about landscaping tips and other water conservation practices and facts. It's free to be a community partner and be a part of a brand that symbolizes water efficiency.

Photo Credit EPA WaterSense Program

Questions for your staff: Engaging your community in water efficiency

- What conservation practices have we enacted to reduce unnecessary water consumption?
- Do we have an outdoor watering restriction ordinance?
- How can we improve our water utility bills to provide clear information about usage and rates as well as tips about conservation practices for our customers?
- What community education materials do we have available for residents and businesses? Where?
- What programs have we implemented to help reduce peak demand on drinking water with our customers?

As a local leader, you hold the key to making sure your community has a safe and sustainable drinking water system now and into the future. The decisions you make, the actions you take (or do not take) regarding drinking water will impact the people, businesses and ecosystems in your region for decades.

As this guide has outlined, we have significant challenges to overcome, but they are fixable. The actions in *Drinking Water 1-2-3* will help, but it takes strong leadership from you.

MPC has created an interactive, online version of *Drinking Water 1-2-3* which contains a **Resource Guide** that provides additional handbooks, reports and websites categorized for your use. We encourage you and your staff to use these helpful resources to employ the practices outlined in this guide. Access the website at: metroplanning.org/DrinkingWater123.

Appendices

Glossary of Terms

Aquifer An underground layer of rock, can be shallow or deep, that can hold or transfer water.

Aquifer desaturation The over pumping or depletion of a groundwater source.

Cistern or Rain barrel A waterproof repository used to collect and store rain water runoff to prevent flooding and water quality issues.

Consumer Confidence Report (CCR) A required, annual drinking water quality report produced and distributed by a community water system to all its customers.

Contaminant A substance that may be found in drinking water which would produce nuisance or negative health consequences.

Drought A period of excessive dryness long enough to affect agriculture, habitats or people.

Groundwater The water beneath the surface of the ground, consisting largely of surface water that has seeped down. It is the source of water in springs and wells.

Groundwater recharge area Identified land where rainfall is able to seep into the ground and help refill an aquifer.

Hydrologic cycle The continuous movement of water from oceans, lakes, rivers and other water sources to air and land, and then back into these water bodies through rain and snow. It is a cyclical cycle.

Impervious surface A hard material such as concrete and asphalt that prevents water from seeping into the ground.

Maximum Contaminant Level (MCL) The maximum concentration of a contaminant that may be present in drinking water. Utilities are required to test their drinking water regularly and the concentration of a contaminant must not exceed the applicable MCL.

Non-revenue water The water loss in a drinking water distribution system due to leaking infrastructure, faulty meters or theft. These losses result in lost revenue and wasted water.

Potable water or drinking water Water that is safe to drink or use for food preparation without risk of health problems.

Private well An access point to groundwater in underground aquifers on private property.

Public water system A utility that delivers water to the public and charges a fee for this service—these systems can be publicly or privately owned.

Recharge An increase in the amount of water in a given water source from precipitation, infiltration or human activity.

Safe Drinking Water Act (SDWA) A law by Congress in 1974 which authorizes the establishment of minimum standards for drinking water and requires all owners or operators of public water systems to comply with these standards.

Stormwater runoff The rain or snow melt that is not absorbed into the ground, but, instead, flows over various surfaces, picking up pollutants, before draining into a local surface water source.

Surface water A water source on the surface, which includes lakes, ponds, rivers and reservoirs.

Water conservation Practices that promote the efficient use of water, such as minimizing losses, reducing wasteful use and protecting availability for future use.

Water demand An amount of water desired for use by a public water system's customers.

Watershed The specific land area that drains to a lake, river or stream.

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Drinking Water 1-2-3

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