Metropolitan Planning Council

Chicago Metropolitan Agency for Planning

MWH

Water Management Resource Guide

Materials from the 2013 Water Management Workshop Series

Letter to the Reader

Dear Reader,

Since 1992, the DuPage Water Commission (DWC) has been committed to providing reliable, quality, responsive, and cost-efficient Lake Michigan water service for existing and future customers as required by, or pursuant to, state statutes in the communities of DuPage County, Illinois.

To address the rising cost of water and the need to conserve limited resources, DWC created a Water Conservation and Protection Program. The purpose of the WCAPP is to provide all water users in DuPage County with a consistent message about water conservation and provide DWC customers with the tools needed to be good stewards of our finite water supply. The program's overall goal is to achieve a 10 percent reduction in water use per person within 10 years. You can find out more at PreservingEveryDrop.org.

As part of the implementation of the WCAPP, every community in our service area has a designated water conservation coordinator. Through this program DWC has developed a number of educational resources for residents and community conservation coordinators. These conservation coordinators are the ideal point person to address customers' water conservation concerns and to advocate for conservation efforts internally. To that end, this document summarizes a four-part workshop series that was held over the summer of 2013 to provide conservation coordinators with tools to support their conservation efforts. This workshop series was supported through a technical assistance grant through the Chicago Metropolitan Agency for Planning (CMAP) with support from the Metropolitan Planning Council (MPC) and MWH Global.

We hope you find these resources valuable to your water conservation efforts!

Sincerely,

Terry McGhee,
Manager of Operations
DuPage Water Commission

Funding Acknowledgement:
CMAP and the DWC would like to thank the U.S. Department of Housing and Urban Development (HUD) for funding the development and production of this document. This project is funded through HUD's Sustainable Communities Regional Planning grant, which supports CMAP's Local Technical Assistance (LTA) program.

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Introduction

To successfully manage water resources and incorporate water conservation into regular operations, it is necessary to understand the water system as a whole. This section sets local water management operations within the context of wider water supply and demand issues in the region as assessed by the Ill. State Water Survey. It provides an overview of utility planning, including tools from the U.S. EPA on asset management. It also includes tools and resources for integrating water supply management with other water and energy contexts. With the resources available in this guide, readers will be better able to:

1. Understand the region's water supply and demand issues and how they relate to local water supply management.

2. Recognize the importance of asset management for making informed decisions, improving efficiency of operations and maximizing limited financial resources.

3. Become familiar with water supply operations as integrated with other water resource planning and energy use.

To download the presentation, visit preservingeverydrop.org/Portals/0/docs/Presentations/Master%20slides_DWC_052913%20small%20with%20asset%20management.pdf

1.1 Northeastern Illinois Water Supply Planning Investigations: Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois, *Illinois State Water Survey*

To download the full report, visit isws.illinois.edu/pubdoc/CR/ISWSCR2012-03.pdf

ILLINOIS STATE
WATER SURVEY
PRAIRIE RESEARCH INSTITUTE

Contract Report 2012-03

Northeastern Illinois Water Supply Planning Investigations:

Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois

Scott C. Meyer, H. Allen Wehrmann, H. Vernon Knapp, Yu-Feng Lin,
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ILLINOIS

Northeastern Illinois Water Supply Planning Investigations:

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1 Introduction

1.1 Executive Order 2006-01

The availability and sustainability of an adequate and dependable water supply is essential for public, environmental, and economic health. This understanding led to the initiation, under direction of Executive Order 2006-01, of a three-year program for comprehensive regional water supply planning and management in Illinois. Under the framework of the order, the Illinois Department of Natural Resources' Office of Water Resources (IDNR-OWR), in coordination with the Illinois State Water Survey (ISWS), selected two priority water quantity planning areas for pilot planning: a 15-county area in east-central Illinois and an 11-county area in northeastern Illinois. This report focuses on the technical studies in support of water supply planning in the northeastern Illinois region, which includes Boone, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, McHenry, and Will Counties. These studies highlight the opportunities and challenges of meeting water demand in the region.

Stakeholder water supply planning committees were created in each priority planning area, and each planning committee was tasked with developing regional water supply planning and management recommendations in accordance with existing laws, regulations, and property rights. The Chicago Metropolitan Agency for Planning (CMAP) guided formation of a 35-member grassroots water supply planning group for northeastern Illinois, the Northeastern Illinois Regional Water Supply Planning Group (RWSPG). The ISWS and the Illinois State Geological Survey (ISGS), both within the University of Illinois' Prairie Research Institute, along with the IDNR-OWR, were responsible for providing technical support to the RWSPG and updating and expanding regional water resource information.

The RWSPG was charged with developing a regional plan that clearly describes water supply and demand issues of the region. IDNR-OWR suggested that the regional plan contain at least the following principal components:

- Descriptions of the sources of water available to northeastern Illinois;
- Plausible estimates of how much water may be needed to the year 2050;
- Estimates of the impacts of withdrawing sufficient water to meet demand; and
- Descriptions of options for providing additional sources of water and/or decreasing demand.

The RWSPG was assigned the responsibility of developing water demand scenarios to 2050, which was accomplished via contract with investigators at Southern Illinois University-Carbondale. The purpose of this report is to describe the water resources of northeastern Illinois and summarize the impacts on those resources from increased withdrawals to meet prescribed scenarios of water demand to the year 2050. Time and budget constraints limited the state surveys' assessment of water supply impacts to three principal sources of water: the deep bedrock aquifer that underlies all of the study area; the sand and gravel shallow bedrock aquifer underlying only the Fox River watershed; and the surface waters of the Fox River watershed. The study also took

into account surface water supplied from Lake Michigan based on summary information provided by IDNR-OWR. Figure 1 illustrates the planning region.

1.2 Report Structure

The Southern Illinois University Department of Geography developed three scenarios characterizing water demand to 2050 for the RWSPG (Dziegielewski and Chowdhury, 2008). The demand scenarios are summarized in Section 2. Section 3 discusses Illinois' use of Lake Michigan.

The methods, data, and analytical tools used to evaluate the impacts of withdrawals on surface waters of the Fox River watershed and on groundwater are reported in Section 4. Section 4 also includes descriptions of the impacts of the water withdrawal scenarios on these water resources in the region as well as a description of the nature of the water sources. The impacts of drought and possible climate change on Fox watershed surface water availability and the impacts on the environment of increased water withdrawals under drought and possible climate change conditions also are described. In addition, Section 4 describes the regional geology, especially regarding the availability of groundwater (aquifers). Summaries of model results are provided at the end of each modeling discussion.

Following a project summary (Section 5), the authors discuss ongoing and future work in Section 6. A glossary of key terms is provided in Section 7, and references are listed in Section 8. As background for those readers unfamiliar with groundwater, a discussion of basic groundwater concepts and terms is provided in Appendix A. A detailed discussion of the regional hydrogeology is found in Appendix B.

1.3 Caveats

The primary focus of the water supply planning initiative is water quantity. Although water quality is not emphasized in this planning effort, water quality issues are reported where existing relevant information is known to the ISWS.

Given the expertise available in the state surveys and the resources and time available to conduct the necessary studies, the following is a list of topics that are important in regional water supply planning and management but are not addressed comprehensively in this report:

- Economics;
- Legal matters;
- Societal and ethical issues and values;
- Water infrastructure;
- Water treatment;
- Water losses;
- Consumptive water use;
- Storm water and floods;
- Utility operations;

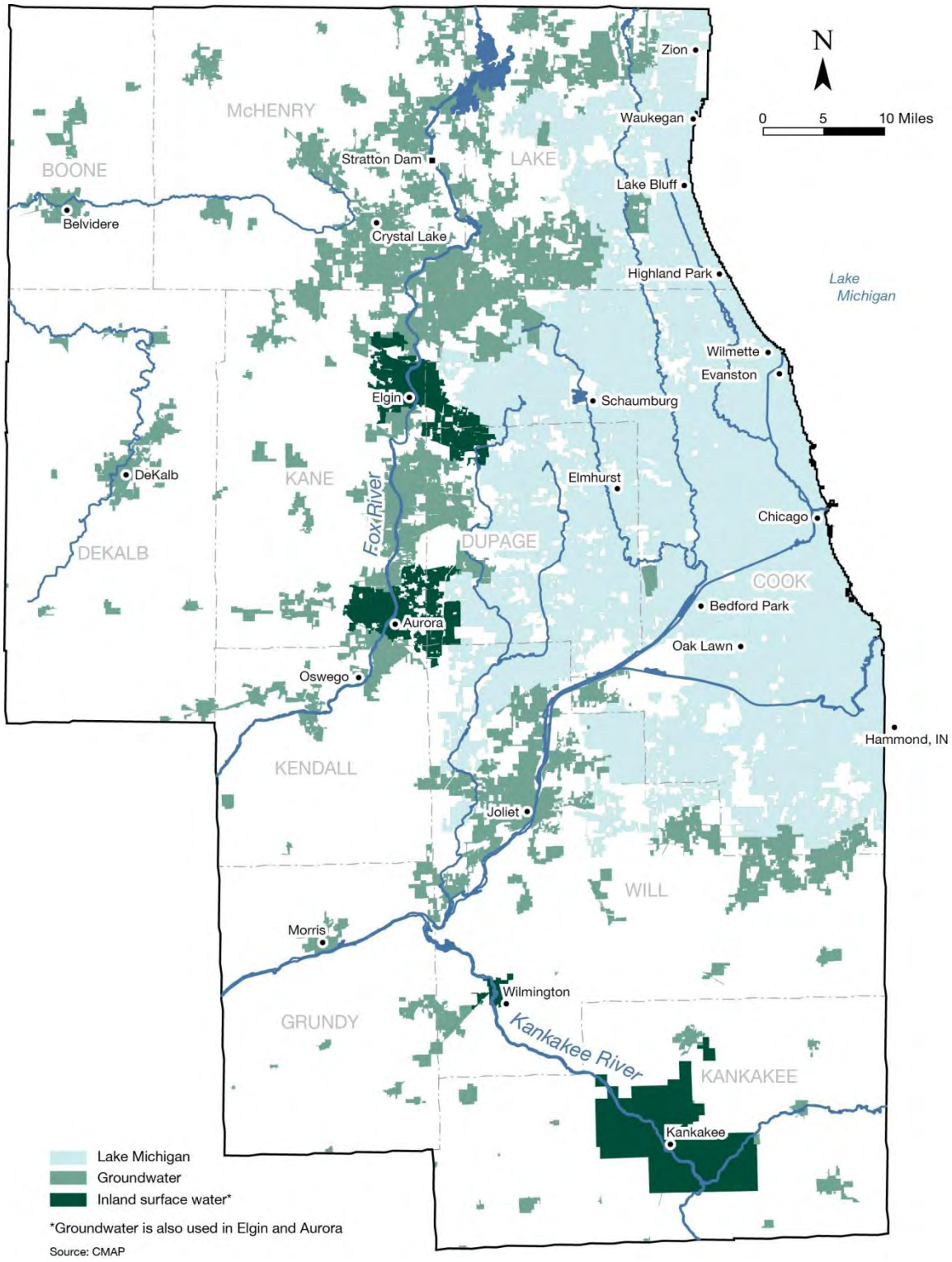

Figure 1. Eleven-county northeastern Illinois water supply planning region and currently utilized community water supply sources (adapted from the Chicago Metropolitan Agency for Planning)

- Conservation and water reuse;
- In-stream water uses (ecosystems, recreation, navigation, etc.); and
- Governance and management.

Surface and groundwater models were developed using the most accurate available knowledge of regional hydrologic conditions. Although the results represent a range of important impacts of the withdrawals simulated in the study, new information and more powerful tools could produce different results from those of this study.

1.4 How Much Water is Available in Northeastern Illinois?

How much water is available to users in northeastern Illinois long-term—that is, the sustainable pumping rate—depends on how water withdrawals affect the environment and what the public considers to be acceptable environmental impacts (Bredehoeft, 2002; Devlin and Sophocleus, 2005). Moreover, these impacts resulting from water withdrawals change constantly as the hydrologic cycle adjusts to climate variability and change, as new wells and surface intakes are put into service and old wells/intakes are taken out of service, and pumping rates at operating wells/intakes rise and fall to meet demands, not only in northeastern Illinois, but especially also in southeastern Wisconsin. Treated effluent that is added to streams increases the availability of water from the receiving streams. Finally, the availability of water is dictated by the price the public is willing to pay for it. If, for example, the expense of desalination of deep groundwater is found to be acceptable, more groundwater will be available. Complicating the issue of expense is the fact that the cost of providing water is constantly changing under the influence of new technologies, a changing economy, and other factors.

Consideration of the numerous impacts of groundwater withdrawals illustrates other complexities involved in computing water availability in a region. Such withdrawals cause the subsurface water pressure (head) in source aquifers to decline, and these head declines, if large enough, may in turn cause water levels in wells to decline (drawdown), possibly resulting in increased pumping expenses and decreased well yields. Head declines may also result in decreased groundwater discharge to streams, possibly leading to reduced stream base flow, reduced water levels in lakes and wetlands, reduced saturated conditions in wetlands, and changes in aquatic habitats and vegetation. In some settings, reduced heads can result in decreased groundwater quality, requiring expensive treatment. Where do scientists, and more importantly the public, draw the line as to what is or is not an acceptable impact?

In this study, instead of generating single-value estimates of water availability, models were employed to simulate the impacts of plausible future pumping conditions. If impacts suggested by the models are considered by stakeholders (in this case, represented by the RWSPG) to be unacceptable or too uncertain, they may recommend to adopt policies and target monitoring and water management efforts to track and mitigate impacts regionally or in specific affected areas, or to conduct additional studies to reduce uncertainty. The models developed for this project are intended to be used for future analysis of other scenarios to test effects of alternative management strategies.

5 Project Summary

The authors conducted an analysis of the impacts of increased water withdrawals to meet prescribed scenarios of water demand to the year 2050 for an 11-county area of northeastern Illinois that includes Boone, Cook, DeKalb, DuPage, Grundy, Kane, Kankakee, Kendall, Lake, McHenry, and Will Counties. Excluding once-through flows for electric power generation, the region may require 1,588 to 2,429 Mgd of water in 2050, an increase of 107 to 949 Mgd (7 to 64 percent) from the estimated 2005 withdrawal, corrected to 1971-2000 average climate, of 1,480 Mgd. Sources of water investigated for this study include Lake Michigan, the Fox River, shallow aquifers within the Fox River basin, and deep aquifers underlying the entire region. Excluded from the current analyses were other inland surface waters, most notably the Kankakee River, and shallow aquifers lying outside the Fox River basin, such as those shallow bedrock and sand/gravel aquifers supplying eastern Lake County.

Lake Michigan, which provided about 85 percent of all water used for public water systems in 2005 (1,063 Mgd), will probably continue to supply most of the region's water to 2050. Analysis using assumed and historical values for lake diversion components suggests Lake Michigan can continue to meet additional public supply demand or contribute to a water bank, the total diversion exceeding the 3,200 cfs (2,068 Mgd) limit, decreed by the U.S. Supreme Court, only in the final years under the MRI scenario. However, assumed values employed in the analysis, which are based on historical averages, may not be representative of future decades. Under the MRI scenario, Illinois' total diversion exceeds the Court limit by about 30 Mgd in 2050, but it is 145 Mgd below the Court limit under the BL scenario. IDNR believes that Illinois' Lake Michigan water allocation program can remain in compliance with the Court decree and still accommodate an increase of 50 to 75 Mgd in domestic water supply allocation without major policy changes in diversion management (while also continuing to accommodate the growing water demand within the current Lake Michigan service area). This additional supply could accommodate higher than expected demand within the existing Lake Michigan service area or expansion of the service area.

Although the Fox River supplies water to only two public water systems, those of Elgin and Aurora, effluent discharges to the Fox will continue to grow in proportion to community growth (and concomitant increases in water use) throughout the Fox River watershed. Our analysis suggests that, depending on the demand scenario, the Fox River could accommodate projected 2050 demand by Elgin and Aurora as well 14 to 58 Mgd in additional withdrawals, assuming that IDNR fixes the protected low-flow level at approximately its current value so that it does not continue to increase with increasing effluent. Further analysis of simulated low-flow reductions caused by shallow groundwater pumping is needed to assess whether such reductions would conflict with new points of river withdrawals. If captured streamflow is returned to the Fox River as effluent, however, the overall impact to Fox River water availability is probably minimal.

In general, regional groundwater flow model simulations show that drawdown in the deep bedrock aquifers is much greater than in the shallow aquifers, this difference reflecting the availability of replacement water to the aquifers—i.e., water entering the aquifers to replace groundwater withdrawn through wells. In northeastern Illinois, relatively impermeable confining units overlie the deep aquifers and greatly limit leakage

into the aquifers from above, so replacement water to these aquifers is derived principally by slow lateral movement from north-central Illinois, where the relatively impermeable cover is absent. In contrast, low-permeability materials do not as greatly limit entry of replacement water into the shallow aquifers, and drawdown in these aquifers is thus offset by higher rates of leakage into the aquifers and by captured streamflow.

Computer simulations of plausible scenarios of future pumping suggest that significant additional drawdown, reduction in stream base flow, and changes in the quality of groundwater withdrawn from deep wells are all possible in parts of the 11-county study area before 2050. Regional model simulations suggest heads will continue to recover to a limited degree in eastern parts of northeastern Illinois, where many water systems abandoned deep wells in the 1980s and 1990s. The combination of continued head declines in the Joliet - Aurora area and continued head recovery in Cook and DuPage Counties shifts the deepest parts of the Chicago area cone of depression west-southwest to the Joliet - Aurora area. Modeling suggests limited areas of partial to complete desaturation (draining of pore spaces) of the Ancell Unit by 2050. Deep wells in the areas where the Ancell Unit head is near to the top of the Ancell, and where the Ancell Unit is partially desaturated, may be vulnerable to increases in arsenic, barium, and radium concentrations that, left untreated, may be harmful to human health. Partial desaturation of the Ancell Unit will also lead to declines in well yield and increasing pumping expenses. Modeling also suggests desaturation of portions of the Ironton-Galesville may occur before 2050, which would contribute to further declines in well yields and increases in pumping costs.

Even with model uncertainties, the results, together with historical experience, suggest that demand assigned to the deep aquifers under the assumptions of this study will, over time, have severe impacts. Projected withdrawals from the deep aquifers in 2050 in the 11-county area total 197 and 251 Mgd under the BL and MRI scenarios, respectively. These rates that are higher than the area's peak historical withdrawal rate from the deep aquifers of about 190 Mgd, a rate known to cause rapidly falling heads in some deep wells. Our model simulations, which terminate in 2050, suggest that the assigned withdrawals under all scenarios result in some degree of mining of the deep aquifers. *Groundwater mining* refers to withdrawal of groundwater at rates exceeding rates of movement of replacement water to the locations of the withdrawals, either by leakage or by lateral flow, and it results in continued drawdown in the mined aquifer. Mining can continue, but doing so limits the future viability of the deep aquifers, because eventually the cost of constructing and operating a deep well will exceed benefits derived in the form of a usable water supply. Future research in support of water supply planning in northeastern Illinois might be directed toward identifying areas of groundwater mining, determining when the mined aquifers cannot yield groundwater economically to accommodate forecasted pumping, developing revised pumping forecasts that extend aquifer and well viability, and providing guidance to water systems seeking to shift from dependence on a mined aquifer to a source having greater long-term viability.

In general, model simulations show that drawdown in the shallow aquifers is much more scattered and of lesser magnitude than in the deep aquifers. However, pumping from shallow aquifers has the effect of reducing discharge to wetlands and surface waters. Model analysis suggests that natural groundwater discharge to streams in the Illinois portion of the Fox River basin declined by 10 percent from predevelopment

rates to 2005, and may decline as much as 14 percent basin-wide under the 2050 MRI scenario, reflecting increased pumping of shallow groundwater in the basin.

The results of this study should be looked at with some optimism. Our analysis suggests that the Fox River and Lake Michigan can accommodate demand from existing public water system recipients in Elgin, Aurora, and the Lake Michigan service area to 2050 and that additional water is available from both sources to satisfy demand elsewhere. Water may also be available from other inland water sources not examined for this study (e.g., the Kankakee River and shallow aquifers outside the Fox River basin), but these resources should be scientifically assessed in further studies. The present study identifies locations of potential water shortages that, with planning, can be offset by shifting demand to other sources and/or by reducing demand through such approaches as water conservation and reuse. Moreover, the present study has developed modeling tools and approaches that can be employed to simulate a range of alternative demand scenarios in support of an ongoing water supply planning effort in the region. There is time (from 10 to 30 years depending on the community) to pursue source and management alternatives, but since major construction projects and regional management plans take time to implement, planners should act now.

1.2 Check-up Program for Small Systems (CUPSS), *US EPA*

CUPSS Background

What is CUPSS?

How can CUPSS help me?

How is CUPSS structured?

Promoting CUPSS

For more information, visit: water.epa.gov/infrastructure/drinkingwater/pws/cupss/index.cfm

Water: Check Up Program for Small Systems (CUPSS)
US EPA

CUPSS Background

CUPSS was developed in response to a clear need from communities and trainers to consolidate and package asset management materials in an easy-to-use, clear and update-to-date fashion. EPA's Office of Groundwater and Drinking Water (OGWDW) developed CUPSS with the help of a workgroup that included representatives from state agencies, technical assistance organizations, EPA Regional offices, and small wastewater and drinking water utilities. With this collaborative approach, EPA was able to develop a comprehensive application that provides all the tools required to implement an asset management program and develop effective asset management plans.

What is CUPSS?

CUPSS is:

Free: You can download CUPSS from this Web site or you can request a copy of the application on CD.

A desktop application: CUPSS does not require an Internet connection to function. This allows for greater flexibility in how the program is used and helps keep your records secure.

Fully supported: EPA has developed a full suite of support documentation including the following:

- Getting Started with CUPSS workbook
- CUPSS User's Guide
- Training material
- Promotional material

In addition, the CUPSS application includes a comprehensive help guide (modeled after the ones found in Microsoft Office products) to walk you through its setup and to help you work through each module.

How can CUPSS help me?

What you bring to CUPSS:

- An understanding of a desired "sustainable" level of service
- Information about your current assets
- Financial information for your utility
- Information about which assets are critical to sustained performance

What CUPSS helps you achieve:

- Make more informed decisions
- Save time by planning ahead
- Back up budget talks with solid facts
- Improve customer service
- Prepare an asset management plan in seven steps

How is CUPSS structured?

CUPSS leads users through a series of modules to collect information on a utility's assets, operation and maintenance activities, and financial status to produce a prioritized asset inventory, a set of financial reports and an asset management plan. These modules include the following:

Set Up

The first step in the CUPSS setup process is to identify a project team. CUPSS contains a team assembly wizard that allows users to create team members, define roles and enter contact information. Users have the ability to establish or modify their team at any time but are encouraged to set up a team the first time they run CUPSS. CUPSS allows users to export the team roster and associated data into a Microsoft Excel file.

CUPSS Training

This module has been developed to help the user understand CUPSS and the asset management process through clear, concise instructional materials. In this section, the user finds a real-life introductory training video. The help section includes a keyword search and has a glossary section in addition to example forms and reports.

My Inventory

This module allows users to identify and characterize their water system's assets. Users can modify a pre-populated set of assets (based on the user's system schematic, another feature of the CUPSS application) or add new assets, which helps prioritize maintenance activities and better manage revenue for repair and replacement of assets.

My O&M (Operations and Maintenance)

This module allows users to create and track current, future and past operation and maintenance activities. The user is able to add tasks to the schedule and mark scheduled items as "completed." This module then records the status and history of each task, alerts users if the task status is past due or critically past due, or alerts the user when to reassess the asset condition if maintenance is not performed as scheduled.

My Finances

This module helps users determine the full costs of doing business and calculate how much is needed for full recovery. This knowledge gives users the ability to discuss their needs within the context of a community budget.

The user can provide the current year's budget (at a minimum), what was actually spent (financial statement) from the previous year, and calculate the annual costs of asset rehabilitation and replacement.

My Check Up

CUPSS generates two customizable reports: "My Asset Check Up" and "My Financial Check Up." The user can enter information to create targeted reports that will help them manage assets and plan for the future.

My CUPSS Plan

This module assembles, using a predefined template, an asset management plan that has been pre-populated with the information and calculations entered by the user. CUPSS allows the user to export the developed plan as a Word document for modification and review.

Promoting CUPSS

EPA and partnering organizations have developed a number of documents to help potential users understand the benefit of starting asset management using the CUPSS application.

- These tools are available on the Resources page.

What is asset management?

Asset management is a process for maintaining a desired level of customer service at the best appropriate cost.

Is CUPSS for me?

The primary user community for CUPSS consists of small drinking water and wastewater utilities

with fewer than 1,000 connections or 3,300 individuals. Larger utilities new to asset management might also find CUPSS useful.

How can CUPSS help my utility?
The goals of CUPSS are to...

- Assist with communication between utility staff and decision makers
- Help move utilities from crisis management to informed decision making
- Facilitate more efficient and focused utility operations
- Improve financial management to make the best use of limited resources

What is CUPSS?
CUPSS is a free, easy-to-use, asset management tool for small drinking water and wastewater utilities (generally, those serving fewer than 3,300 persons) and medium-sized systems new to asset management.

How can I get a copy of CUPSS?
CUPSS is available as a free download from this site. Alternatively, you can order a copy of the CUPSS application on CD by contacting the National Service Center for Environmental Publications (NSCEP).

- For more information on obtaining CUPSS, see the CUPSS Software page.

I'm having trouble installing or using CUPSS. What should I do?
The CUPSS User's Guide includes detailed instructions for how to install or use the CUPSS application; you might want to check the Trouble Shooting Guide first.

- Download the full CUPSS User's Guide (PDF) (115 pp, 5.1MB, About PDF)
  - Appendix G: Trouble Shooting Guide (PDF) (5 pp, 250K, About PDF)

I want my utility to use CUPSS. Are there any resources to help promote the application?
EPA and partnering organizations have developed a number of documents to help potential users understand the benefit of starting asset management using the CUPSS application. These documents are available for download on the Resources page. The "CUPSS and Us" presentation, in particular, is an excellent tool to help communicate the benefit of using CUPSS to local decision makers and stakeholders.

Who developed CUPSS?
EPA's Office of Groundwater and Drinking Water (OGWDW) developed CUPSS with the help of a workgroup that included representatives from state agencies, technical assistance organizations, EPA Regional offices, and small wastewater and drinking water utilities. With this collaborative approach, EPA was able to develop a comprehensive application that provides all the tools required to implement an asset management program and develop effective asset management plans.

Where can I go for training?
A variety of training opportunities are available for both CUPSS trainers and those interested in using the CUPSS application.

- A full list of training opportunities is available on the CUPSS Training Events page.

1.3 Energy Use Assessment Tool, *US EPA*

Tools & Guidance for Water Industry Professionals

Paying for Energy Efficiency Audits

To access the tool, visit: water.epa.gov/infrastructure/sustain/energy_use.cfm

Water: Sustainable Infrastructure
Determining Energy Use
US EPA

By determining baseline energy use, water and wastewater utility managers and operators can better understand their electricity provider's rate structure and how their current operations impact energy costs within that structure. Further, energy-intensive processes such as pumping and aeration can be identified and prioritized for improvement.

Baseline energy use can be determined through third-party energy audits or self-assessments. Water utility professionals and technical assistance providers can benefit from the resources provided below, including a protocol for conducting energy audits, an energy self-assessment tool, and funding resources for implementing energy efficiency strategies.

Tools & Guidance for Water Industry Professionals

- EPA's Energy Use Assessment Tool: Excel-based tool that can be used by small- to medium-sized systems to conduct a utility bill and equipment analysis to assess individual baseline energy use and costs.
  - Energy Use Assessment Tool for Excel 2003 (XLS) (4.1MB)
  - Energy Use Assessment Tool with Example Data for Excel 2003 (XLS) (4.1MB)
  - Energy Use Assessment Tool for Excel 2010 (XLS) (3.7MB)
  - Energy Use Assessment Tool with Example Data for Excel 2010 (XLS) (3.7MB)
  - Energy Use Assessment Tool User's Guide (PDF) (69 pp, 1.8MB, About PDF)
  - Energy Use Assessments at Water and Wastewater Systems Guide (PDF) (23 pp, 2.1MB, About PDF)
- Benchmarking Your Energy Performance with Portfolio Manager EXIT Disclaimer The ENERGY STAR™ program EXIT Disclaimer recently added wastewater and drinking water treatment facilities to the suite of facilities addressed under its Portfolio Manager, an interactive energy management tool that can be used to track and assess energy and water consumption. The tool can help a utility set targets for investment priorities, verify efficiency improvements, and calculate its carbon footprint.
- Wisconsin's Focus on Energy Fact Sheet: Understanding Your Electric Bill(PDF) (2 pp, 87K, About PDF) EXIT Disclaimer
- California Energy Commission's Energy Efficiency Project Management Handbook: How to Hire an Energy Auditor (PDF) (68 pp, 360K, About PDF) EXIT Disclaimer

- California Energy Commission's Energy Efficiency Project Management Handbook: Energy Accounting: A Key Tool in Managing Energy Costs (PDF) (36 pp, 304K, About PDF) EXIT Disclaimer

Paying for Energy Efficiency Audits

- U.S. Department of Energy's Save Energy Now Program EXIT Disclaimer Save Energy Now is an initiative to reduce industrial energy intensity. Companies can participate in no-cost energy assessments.
- U.S. Department of Agriculture's Rural Development Rural Energy for America Program Grants/Energy Audit and Renewable Energy Development Assist (REAP/EA/REDA) EXIT Disclaimer The REAP/EA/REDA Grant Program will provide grants for energy audits and renewable energy development assistance.
- Rural Assistance Center (RAC) EXIT Disclaimer RAC offers funding to help rural communities, including funds for energy audits and renewable energy.
- EPA's Clean Water and Drinking Water State Revolving Funds (SRF) are an important source of financing for drinking water and wastewater infrastructure. SRF funds can be used to conduct energy audits.

    - Clean Water State Revolving Fund

    - Drinking Water State Revolving Fund

1.4 The Value of Stormwater Utilities for Local Governments in the Chicago Region, *CMAP*

Title Page

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Introduction

To download the full report, visit cmap.illinois.gov/documents/20583/25603/Value_of_Stormwater_Utilities_Local_Govts_Chicago_Region-1-8-12.pdf

CMAP

The Value of Stormwater Utilities for Local Governments in the Chicago Region

January 2013

The Chicago Metropolitan Agency for Planning (CMAP) is the region's official comprehensive planning organization. Its GO TO 2040 planning campaign is helping the region's seven counties and 284 communities to implement strategies that address transportation, housing, economic development, open space, the environment, and other quality of life issues.

See **www.cmap.illinois.gov** for more information.

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Introduction

Communities in the Chicago region face increasing challenges in managing stormwater.

Flooding is a major problem in many areas. Storm sewers, culverts, and a host of other stormwater infrastructure components need repair, but funding for capital improvements is scarce. Likewise, many communities are interested in stabilizing stream banks and other restoration projects, yet they have limited resources to do so. And local responsibilities in complying with the federal Clean Water Act have multiplied and will likely increase in the future.

The stormwater utility is a good option for local governments to respond to these challenges. Setting up a stormwater utility allows a community to establish a user fee based on the demands property owners place on the drainage system. It provides a dedicated revenue stream for stormwater programs as well as an incentive for property owners to reduce the amount of runoff they generate. While special service areas may be used to fund projects at the neighborhood level, many needs are community-wide in scope and require a community-wide source of revenue.

A federal survey in 2008 found that municipalities in the Chicago region had a stormwater funding backlog of $233 per household.[1] Annualized flood damages in the Chicago region amount to $55 million per year.[2]

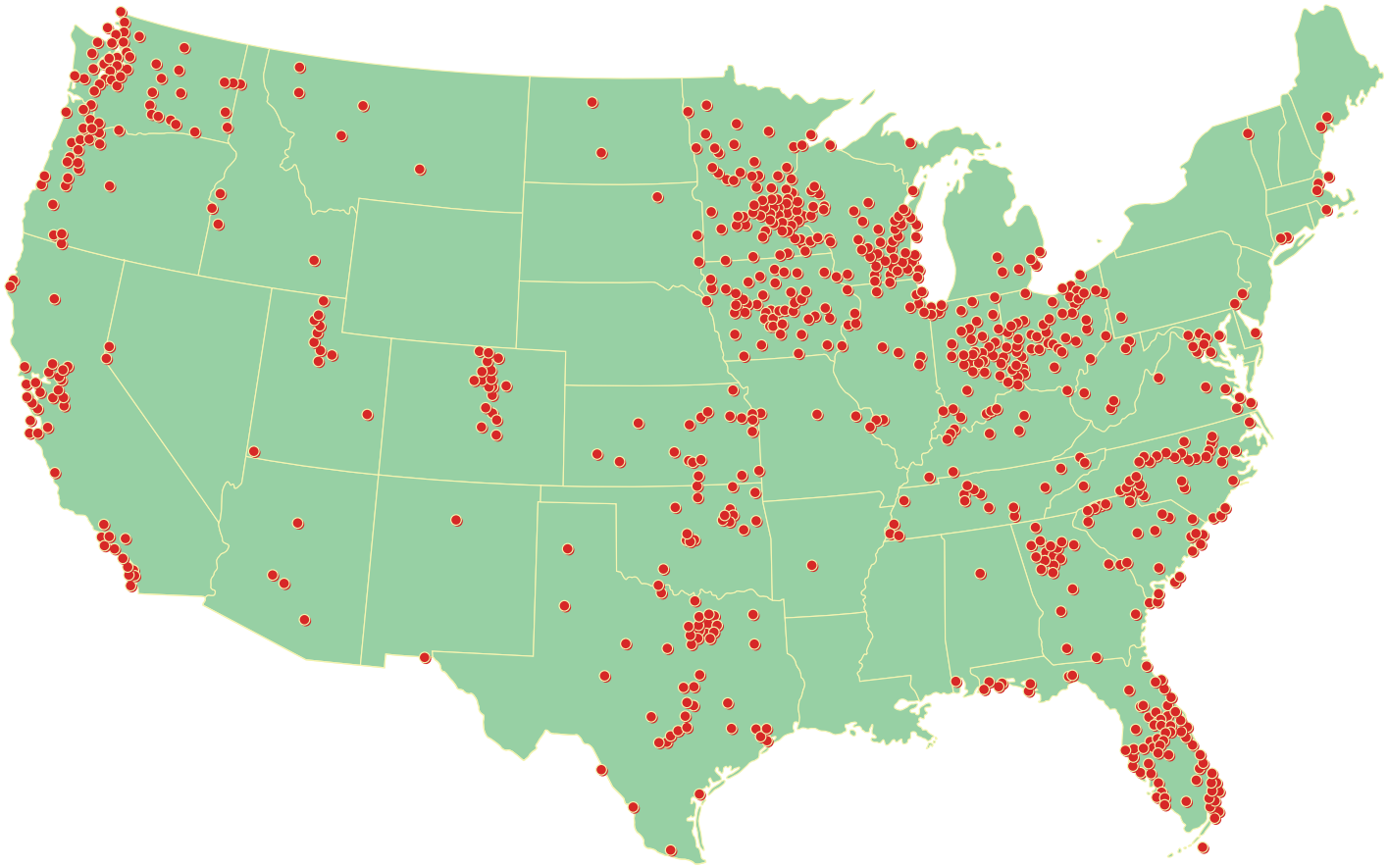
1 Calculated from the municipalities that provided stormwater needs estimates in the 2008 Clean Watershed Needs Survey, inflated to 2012 dollars. **http://water.epa.gov/scitech/datait/databases/cwns/2008reportdata.cfm**.

2 Illinois Department of Natural Resources. 1998. Our Community and Flooding. Estimate inflated to 2012 dollars. About half of the damages are in the Des Plaines basin. **http://www.dnr.illinois.gov/WaterResources/Documents/OurCommunityAndFlooding_Oct1998.pdf**.

Stormwater is the only major infrastructure system in the Chicago region that is not typically paid for through user fees. Whether public or private, drinking water, sewer service, electricity, natural gas, and telecommunications are all provided on a user-fee basis. Stormwater management, on the other hand, is usually funded through general revenue. Under the current system, then, some property owners are overpaying for stormwater services, while others are being subsidized. For example, a homeowner who builds an addition onto a house will pay higher property taxes than one who merely installs a patio of the same area, yet they would generate the same amount of runoff. A stormwater fee is a more equitable approach to paying for stormwater services.

Although they are still relatively rare in Illinois, stormwater utilities have become more common across the country (Figure 1), and many case studies exist. A number of communities have begun to study them more closely. Stormwater fees are within the powers of local governments in Illinois and have withstood legal challenges. Most local governments already operate water and wastewater utilities; stormwater can be readily addressed as a utility program.

Figure 1. Stormwater utilities in the United States as of 2012



Source: Western Kentucky University 2012 Stormwater Utility Survey.

2. Changing Regulations and Ordinances

Introduction

Successful implementation of water conservation at both the utility and local scales requires alignment of the regulations and ordinances that govern those actions. This section highlights how existing regulations and ordinances can hinder or help water management operations and influence water conservation. It includes a number of local model ordinances that can easily be adopted to improve water conservation and sustainable development. With the resources available in this guide, readers will be better able to:

1. Understand the role of regulations and ordinances on effective water supply management.

2. Recognize the barriers to successful implementation of water conservation ordinances and identify strategies to reduce them.

3. Become familiar with upcoming regulatory changes and how they will affect local water supply operations, including encouraging water conservation.

To download the presentation, visit preservingeverydrop.org/Portals/0/docs/Workshops/June%2026%20WkSh%202.pdf

2.1 Issue Brief: Auditing Your Town's Development Code for Barriers in Sustainable Water Management, *EFCN*

Why audit your code?

Steps in the Process

Case study: Cleveland Heights Sustainability Audit

Resources to help you get started

To download the report, visit sclearningnetwork.org/sites/default/files/code_audit_issue_brief_sept_2013.pdf

Environmental Finance Center Network
HUD/EPA Capacity Building for Sustainable Communities
September 2013

Issue Brief: Auditing Your Town's Development Code *for* Barriers to Sustainable Water Management

CONTENTS

Why audit your code?

This issue brief is intended for town officials who want to understand how development regulations in their community affect local water resources. Municipal development codes – the set of regulations that control the built environment – can have a great influence on the availability of clean and healthy water for drinking, recreation, and commercial uses. This in turn affects the community's social, environmental, and economic vitality.

Comprehensive plans, zoning codes, and building standards are just a few examples of regulations that intentionally or unintentionally regulate the way water is transported, collected and absorbed. Regulations that produce dispersed development or large amounts of impervious cover, for example, can impair stream water quality, worsen flooding, and reduce recharge of drinking water supplies. Auditing local development codes for such unintended consequences is an exercise that many communities are finding well worth the effort.

Steps in the process

In its Code and Ordinance Worksheet, the Center for Watershed Protection recommends a four-step process for conducting a code audit for more sustainable water outcomes[1]; the following is adapted from that guide.

1. Identify the codes (and people) that affect water

A great range of local regulations can affect water quality and quantity. The first step in a code audit is to gather the plans, ordinances, and other regulations that may have an impact – either directly or indirectly – on water resources (see box, right). It might not be obvious which codes are relevant, so err on the side of gathering more than you will need.

Regulations that may affect water

Zoning ordinances
Building codes and design standards
Subdivision ordinances
Street standards
Parking requirements
Erosion and sediment control rules
Stormwater management ordinances
Parks and open space plans
Landscaping and tree ordinances
Grading ordinances
Floodplain or buffer regulations
Environmental regulations
Water and sewer district plans
Dept of Public Works standards

Armed with your pile of codes, do a preliminary scan to highlight sections that address the following aspects of development (which in turn will influence the amount of impervious surfaces in the community as well as how water flows and is absorbed):

- Lot dimensions, setbacks, coverage, yards driveways
- Parking lot design
- Parking requirements
- Street design, lay-out, right-of-way, and cul-de-sacs
- Landscaping, planting, buffers, trees
- Neighborhood density
- Low impact development
- Drains, sewers, stormwater detention facilities
- Maintenance requirements
- Streams, wetlands, floodplains, and natural areas
- Community open space

Be sure to flag any ordinance that contains the words roof, curb, edge, or tree as these typically affect water.[2]

Just as important as the rules governing water are the *people* in charge of developing and implementing those rules. Think about which agencies and stakeholders have authority over development rules, and invite them to be a part of the audit right from the start. The development process is often quite complex and involves multiple governmental departments and agencies. Convening a team that includes representatives from these various agencies will help build support for the audit process and make the work more manageable.

2. Score your codes against model codes

The next step is to evaluate your codes against a model or benchmark. Worksheets such as the Center for Watershed Protection's Code and Ordinance Worksheet or EPA's Water Quality Scorecard walk

This issue brief was developed by Environmental Finance Center Network (EFCN) through the Capacity Building for Sustainable Communities program funded by the U.S. Department of Housing and Urban Development and the Environmental Protection Agency. Through a cooperative agreement with HUD, EFCN is providing technical assistance to recipients of grants from the federal Partnership for Sustainable Communities, which helps towns, cities, and regions develop in more economically, environmentally, and socially sustainable ways.

you through categories of regulations, for example those governing streets, parking, and buffers, and help you score your regulations against model standards that have been shown to result in healthier water resources. Alternatively, you may wish to develop your own scoring formula based on codes borrowed from a community you'd like to emulate.

As you evaluate your code, remember that there is no one-size-fits all approach to sustainable water management, and that what works in one community may not be appropriate for yours. Further, how you measure up depends on your community's particular challenges and goals. Is your principal aim to reduce impervious cover? Conserve natural areas? Reduce stormwater pollution? Regulations affecting these particular areas may deserve closer scrutiny. Nevertheless, walking through the entire code audit will help you identify areas of weakness in your regulations, including ones you might not have expected.

3. Prioritize which development policies and practices should be changed

Using the scores developed in the preceding step, your audit team now determines which areas of your code should be targeted for change. To prioritize, it is helpful to consider which regulations pose the greatest impediments to sound water management and/or those that, if changed, would yield the greatest water benefits.

It will also be worthwhile to identify the low-hanging fruit: those amendments that will be easiest to implement logistically and/or politically. Examples might include allowing activities that are currently needlessly prohibited such as using pervious paving material, creating vegetated swales along roadways or parking lot edges, sharing parking facilities, and installing low impact development features such as green roofs. Relaxing minimum parking requirements and stall sizes may also be relatively popular and easy fixes.

4. Launch a roundtable process to amend rules

With your code audit scores and your prioritized list of changes in hand, the next step is to convene a local roundtable tasked with overseeing the code amendment process. The roundtable should consist of your initial audit team, plus additional key players as appropriate (see box, right). This team will review the audit, create a formal prioritized list of code amendments, oversee the development and adoption of new regulatory language or standards, and conduct public outreach as needed in order to address stakeholder concerns and build buy-in.

Partners to consider including in the process

Planning and Zoning staff
Code Enforcement staff
Public Works staff
Emergency Management staff
Elected officials
Development professionals
Key business leaders
Environmental organizations
Citizen groups

Ideally, roundtable members will become champions for a regulatory framework that supports better water management in the community. This will help the code amendment process go beyond fixes to isolated regulations. Smart water management policies and practices should be integrated into the entire planning and permitting process, including not only the zoning code, but also the comprehensive plan, the site plan review process, and the post-construction inspection and enforcement protocol. It should become part of the planning culture in your town.

Case study: Cleveland Heights Sustainability Audit[3]

In 2010, Cleveland Heights, Ohio, initiated a sustainability audit to review of the city's zoning code and other regulations in order to remove barriers to ecological practices in land development and building construction. The review process included two phases: the first was designed to engage the public and the second to develop an easily understood and administered document. Planning staff and consultants reviewed general zoning provisions as well as specific provisions for large-scale developments, residential districts, commercial districts, accessory structures and uses, principal uses, parking standards, and landscape and water conservation. The final report made the following recommended changes:

- **Large-scale development process:** expand planned development to include sustainable benefits; encourage energy efficient buildings, conservation easements, innovative water management, public infrastructure improvements (complete streets, bike lanes), public open spaces, public plazas, public art, ADA compliant units, proper solar orientation
- **Residential districts:** allow greater lot coverage; reduce impervious surfaces and parking requirements
- **Commercial districts:** encourage pedestrian-oriented, compact design, transparency along street frontages; bike access and storage; connections to surrounding areas; high quality, sustainable building materials; proper and appropriate landscaping
- **Accessory structures and uses:** allow structures and uses that encourage alternative energy production (solar, thermal, wind), water and energy efficiency (rain barrels, cisterns, clotheslines, rain gardens), and local food production (greenhouses, chicken coops)
- **Parking standards:** adjust parking demand formulas; include *maximum* number of parking spaces rather than minimum; allow land-banked parking; update shared parking flexibility; reduce parking for car-sharing programs; allow car sharing in parking lots and structures; allow compact spaces; allow parking for charging of electric vehicles; allow semi-pervious material for paving; require parking lots over a certain size to use semi-pervious materials for a percentage of the parking lot; encourage retention basins; require

bike parking in new lots; create design and siting requirements for bike parking; allow racks in the public right-of-way where space is available

- **Landscape and water conservation:** minimum installation sizes for all plant types; allow for naturalized lawns and native landscapes and gardens; establish recommended and prohibited plant list

Resources to help you get started

Top Ten Green Infrastructure Issues in Plans and Codes, Tetra Tech, 2011: Part of the webcast "Using Local Codes to Cultivate Green Infrastructure." Identifies common code barriers in local codes and ordinances, and offers solutions.

Using Local Codes to Cultivate Green Infrastructure and Foster Sustainable Stormwater Management, US EPA Region 5, 2011: Describes the interaction of zoning and building codes with water quality; presents several examples of code audits; and highlights the top 10 obstacles to green infrastructure in local codes and ordinances.

tool **Water Quality Scorecard**, US EPA, 2009: A program evaluation tool that local governments can use to identify the barriers to green infrastructure in local codes and ordinances. The scorecard guides municipal staff through 230 policies, codes, and incentives that could be adapted to promote sustainable stormwater management.

Revising Local Plans, Codes, and Ordinances, US EPA 2009: One of six two-hour webcasts on green infrastructure offered by EPA in the spring and summer of 2009.

Managing Wet Weather with Green Infrastructure Municipal Handbook, US EPA 2008: Provides local governments with a step-by-step guide to growing green infrastructure in their communities. Chapters address funding options, retrofit policies, green streets, rainwater harvesting, and incentive mechanisms

Better Site Design: A Handbook for Changing Development Rules in Your Community, Center for Watershed Protection, 1998: Outlines 22 guidelines for better developments and provides detailed rationale for each principle. Also examines current practices in local communities, details the economic and environmental benefits of better site designs, and presents case studies from across the country.

tool **Better Site Design Code and Ordinance Worksheet**, Center for Watershed Protection, 1998: Allows users to enter data to see how the local development rules in their community stack up against the model development principles outlined in the Better Site Design Handbook (above).

[1] Center for Watershed Protection. 1998. *Code and Ordinance Worksheet.* http://www.cwp.org/online-watershed-library/cat_view/64-manuals-and-plans/82-stormwater-management-manuals-plans-and-guidance

[2] US Environmental Protection Agency. 2012. *Green Infrastructure Website: How Can I Overcome the Barriers to Green Infrastructure?* http://water.epa.gov/infrastructure/greeninfrastructure/gi_barrier.cfm

[3] Ibid. For more info on the case study, see: http://water.epa.gov/infrastructure/greeninfrastructure/upload/gi_webinar_part4.pdf

2.2 Model Water Use Conservation Ordinance, *CMAP*

Title Page

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Preface

To download the full report, visit cmap.illinois.gov/c/document_library/get_file?uuid=daa29360-dab6-4ab2-84b6-8b118784c240&groupId=20583

Chicago Metropolitan Agency for Planning

CMAP

Model Water Use Conservation Ordinance

March 2010

Contents

Preface

Introduction

This document is an update of the 1980 Model Water Use Conservation Ordinance completed by the Northeastern Illinois Planning Commission (NIPC). The need for this proposed ordinance resulted from various federal acts, advances in water efficiencies as well as from the findings of the Northeastern Illinois Regional Water Supply/Demand Plan (RWSDP) adopted on January 26, 2010. This document is intended to serve as an implementation tool for the water conservation recommendations detailed in the above plan. The RWSDP was the result of a three-year planning effort undertaken by the Chicago Metropolitan Agency for Planning (CMAP) and the Regional Water Supply Planning Group (RWSPG) in response to Executive Order 2006-1 issued in January 2006 by the Governor of Illinois. CMAP formed the RWSPG in 2006 as part of the scope-of-work contract with the Illinois Department of Natural Resources (IDNR).

As the region's population increases to 12 million, withdrawals from Lake Michigan, groundwater sources and inland rivers must be balanced with demand projections to attain sustainability. Recommendations of the RWSDP emphasize the importance of water use conservation at all sectors to maintain the demand at levels that are comparable to supplies. The 2010 CMAP Model Water Use Conservation Ordinance will give governmental bodies in the northeastern Illinois region a mechanism for more sustainable water use.

Municipalities may choose to adopt the entire ordinance and insert it as a chapter in their codes, adopt portions of it or modify existing ordinances to include relevant items. It should be noted that water conservation ordinances may need to updated as local situations change and water efficient technologies continue to advance. Governing bodies in the region may benefit from using this document as a marketing tool to educate their residents and businesses on the various aspects of water conservation and to form partnerships for addressing sustainable water use.

This update to the 1980 document incorporates the Energy Policy Act (EPAct) which took effect in 1992 – implemented in Illinois in 1994 - and has been updated several times, the most recent being in 2005. The water-related requirements of the act require and encourage the installation of water use efficient plumbing fixtures and appliances in new construction. This document builds on these guidelines and references EPAct at the relevant sections.

Methodology

This ordinance is a result of extensive review of over 60 existing ordinances and research on water conservation measures. Documents such as the Green Code Supplement of the International Association for Plumbing and Mechanical Officials (IAPMO) and the US Environmental Protection Agency (EPA)WaterSense publications were important sources that informed the ordinance with up to date and

state of the art material. Appendix A lists key resources and ordinances examples. In addition, staff obtained feedback from the various experts in the field as part of a Technical Advisory Committee that was convened to review the pre-final draft.

Document organization

The document addresses conservation measures by sectors: Residential and Commercial/Industrial/Institutional. For the latter sector, the ordinance does not address the specifics of operations which are mostly unique to the industrial processes; rather it takes a more general approach that covers the basic measures that apply to most activities in this sector. Ordinance items are also organized by use classification: indoors and landscape. Additional sections of the document include variances, water waste, pricing, violations and education. The Commentary section provides more information about the ordinance items and includes examples in the "In Practice" section, where available, as well as additional resources in the "Learn More" section. Local examples are highlighted where applicable. To demonstrate the effectiveness of some of the quantifiable water use conservation measures, calculations of water savings are included, where possible. The Appendices include sample forms that are used elsewhere in the country that a local unit of government may review prior to designing its own forms.

Adopting the ordinance

CMAP recommends that prior to adoption or modification of existing ordinances to include water use conservation measures, local units of government should embark on a 1-2 year public information campaign to promote awareness and empower residents with knowledge of specific actions to be taken for insuring reduction in water demand. Where possible, such efforts should be complemented by assistance in the form of rebates or retrofit kit distribution that may ease the burden on residents and businesses as well as insure a smoother transition to water efficiency. The public information campaign will be most successful if it continues even after the ordinance has been adopted to increase compliance and to maintain a presence of the need for water conservation in the community. It is important that local governments inform the public about the enforcement program that will be employed. This ordinance does not specify enforcement actions as this might be best addressed at the local level and according to local circumstances. Furthermore, this ordinance is not exhaustive on water use regulations, there are several aspects, e.g. Water Emergency Regulations, that are not addressed. It is more appropriate for local governments to address such matters.

Acknowledgments

CMAP staff wishes to acknowledge the following individuals whose review and input was valuable to the development of this document: Tom Barrett, Green Water Infrastructure Inc.; Mary Ann Dickinson, Alliance for Water Efficiency; Jeffery Edstrom, Environmental Consulting & Technology; Scott Grams, Illinois Landscape Contractors Association; Larry Harpster, CJ Erickson Plumbing; Karen Hobbs, Consultant; Martin Jaffe, University of Illinois at Chicago; Andrew Kimmel, Lake County Forest Preserve District; Kevin Lehman, Village of Orland Park; James Majerowicz, Plumbing Contractors' Association of Chicago and Cook County; Cassandra McKinney, McHenry County Water Resources Department; Peter Mulvaney and Michael Sturtevant, Chicago Department of Water Management; Dave Viola,

International Association for Plumbing and Mechanical Officials; Peter Wallers, Engineering Enterprises Inc.; Patricia Werner, Lake County Stormwater Management Commission. Additionally, Staff expresses appreciation to members of the CMAP Land Use and Environment and Natural Resources Committees for their input on this document.

2.3 Regional Water Conservation Lawn Watering Ordinance, *NWPA*

Lawn Watering Ordinance

To download the document, visit nwpa.us/pdfs/resource_center/NWPA%20Regional%20Lawn%20Watering%20Ordinance%20110712-FINAL.pdf

NWPA Regional Water Conservation Lawn Watering Ordinance

Outdoor limitation on the use of water

A. Purpose: Based on research from the Illinois State Water Survey, the Chicago Metropolitan Agency for Planning, local counties and other organizations, [Name of local government] recognizes that potable water is a finite natural resource; that communities within the Northwest Water Planning Alliance rely on shared groundwater and river water sources; and, that water conservation is a necessary component of a sustainable water supply.
B. Definitions: The following words and phrases when used in this section shall, for the purposes of this section, have the following meanings:

CITY or VILLAGE: [name of local government]

DRIP IRRIGATION SYSTEM: An IRRIGATION SYSTEM that saves water by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone. Such systems include but are not limited to soaker hoses.

HANDHELD WATERING DEVICE: A means of watering that requires the watering device to be held in order to operate, including watering cans, buckets, and hoses equipped with automatic shutoff valves. This also includes the handheld use of a hose, provided it is continuously attended.

HARVESTED RAINWATER: Water that is accumulated and stored during times of precipitation, such as through rain barrels and cistern systems, is prevented from entering the stormwater treatment system, and is redirected for reuse onsite.

IRRIGATION SYSTEM: A system consisting of pipes, valves and sprayers connected to the potable water supply to manually or automatically irrigate lawns or landscaping.

LANDSCAPE: The area of the property planted with vegetation other than grass.

LAWN: The area of the property planted with grass.

LAWN SPRINKLER: A device attached to a hose designed to allow for the unattended watering of lawns or landscaping, but does not include a drip irrigation system.

LAWN WATERING: Any means or methods of applying water to a lawn.

NORTHWEST WATER PLANNING ALLIANCE (NWPA): An interjurisdictional alliance of five counties, five councils of government, and roughly 80 municipalities that collaborate and cooperate on regional water resource planning issues, particularly concerning shared groundwater aquifer resources.

PERSON: Any individual, firm, partnership, association, corporation, company, organization or entity of any kind.

RECLAIMED GREYWATER: Water that is produced by treating onsite wastewater generated by household activities, such as laundry, dishwashing, and bathing, is

prevented from entering the municipal wastewater treatment system, and is redirected for reuse onsite.

RECYCLED EFFLUENT: Water that was formerly municipal wastewater and has been treated to remove solids and impurities for reuse for non-potable purposes.

C. Application Of Regulations:
   1. The provisions of this section shall apply to any person using water within [name of local government], and:
      a. the property is supplied by the [city or village]'s water system, regardless of whether:
         i. the property is located within the municipal boundaries of the [city or village]or
         ii. the person using the water has a contract for service with the [city or village]; or
      b. the property is located with the municipal boundaries of the [city or village] and uses water other than municipal water that is supplied by the same aquifers as the municipal water supply.
   2. The provisions of subsection (D) of this section shall apply year-round, subject to any modifications thereof, including application of these or other regulations during this or any other time, by an emergency proclamation.

D. Permitted Hours And Days For Specified Uses:
   1. All persons using water shall adhere to the following schedules for lawn watering:
      a. All properties with even numbered street addresses (i.e., numbers ending in 0, 2, 4, 6 or 8) may use water for lawn sprinkling only on even numbered calendar dates between the hours of six o'clock (6:00) A.M. and nine o'clock (9:00) A.M., or six o'clock (6:00) P.M. and nine o'clock (9:00) P.M.
      b. All properties with odd numbered street addresses (i.e., numbers ending in 1, 3, 5, 7 or 9) may use water for lawn sprinkling only on odd numbered calendar dates between the hours of six o'clock (6:00) A.M. and nine o'clock (9:00) A.M., or six o'clock (6:00) P.M. and nine o'clock (9:00) P.M.
      c. All properties which cannot be readily identified as having even-or odd-numbered street addresses are hereby designated as even-numbered for water conservation purposes.
      d. No property will be allowed to use water for lawn sprinkling on July 31 and August 31 of the calendar year.
   2. There shall be no restrictions as to hours or days when water may be used for any of the following:
      a. Lawn watering where such watering is done using reclaimed greywater, recycled effluent, or harvested rainwater;

b. The watering of landscape, such as trees, shrubs, flowers and gardens, with a handheld hose not larger than one-inch diameter or by means of an automatic root feed or drip irrigation system;

c. Lawn watering where such watering is done with the proper, attended use of a handheld watering device;

d. Vehicle or equipment washing, provided that all water hoses are equipped with positive shutoff nozzles; or

e. Any other lawful use of water such as bathing, clothes washing, or other normal household uses not otherwise specifically restricted by the provisions of this section.

E. Sod Laying And Seeded Lawn Installation Restrictions And Permit Requirements:

1. Notwithstanding the above provisions, sod laying, lawn seeding, and the planting of other landscaping for the establishment of a new lawn or new landscaping is prohibited from July 1 through August 31 each year, unless the source of watering for said sod, lawn seeding or planting of landscaping is derived from reclaimed greywater, recycled effluent, or harvested rainwater. The prohibition shall not apply to soil erosion and sedimentation plans required pursuant to city ordinances (with approved plans) or for restorations due to required repairs of public utilities (e.g., water main breaks).
2. Except for the period of July 1 through August 31 of each year or during an emergency proclamation event, water from the city water distribution system or private wells may be used for the establishment of sod or seeded turf lawns planted or installed in the current year, only as follows:

    a. A permit issued by the [director of public works] (or his designated representative) is required for the installation of all seeded and sodded lawns. The application shall include the following information:

        i. The address of the property where the sod is to be laid;
        ii. The name and address of the owner of said property;
        iii. The name and address of the contractor;
        iv. The number of square feet of sod to be laid; and
        v. The date on which the sod is to be laid.

    b. On the day new sod or seed has been placed on a property, a person may use a lawn sprinkler to apply water to the sod or seed for a total period of time not to exceed eight (8) hours. For the next nine (9) days thereafter, a person may use a lawn sprinkler to apply water to said sod or seed each day during permitted hours of water use. Following the first ten (10) days after the sod or seed is placed, the provisions of subsection (C) and (D) of this section shall apply.

F. Waste of Water Prohibited: No person shall allow a continuous stream of water to run off into any gutter, ditch, drain, or street inlet while using water for restricted purposes, nor shall a person spray or sprinkle streets or sidewalks.

G. Exceptions: The provisions of this section shall not apply to any commercial or industrial entity for which the use of water is necessary to continue normal business operations, or to maintain stock or inventory. This exception shall not apply to any uses of water not essential to normal business operations or maintenance of inventory or stock, and specifically shall not apply to lawn watering.

H. Emergency Proclamation: Whenever the water supply is diminished from any cause, including, but not limited to, prolonged dry period or drought, increased water demand, equipment failure, or water quality concerns, to an amount which in the opinion of the city engineer or director of public works is or is likely to become dangerous to the health and safety of the public, the [mayor or manager] is hereby authorized and empowered to issue an emergency proclamation specifying different or additional regulations on the use of water.

    1. In the case of regional dry periods or drought, the mayor shall take into account the recommendations of the regional water supply planning group, the Northwest Water Planning Alliance (NWPA), on making the decision to issue an emergency proclamation.
    2. Such regulations may provide for limitations on the usage of water, limitations on days and hours of use of water for some or all purposes, and the prohibition of specified uses of water. The following shall constitute the default emergency regulations:
        a. In the case of moderate to severe drought conditions or similar regional water supply constraints as advised by the NWPA, the use of sprinkler systems shall be prohibited. Outdoor use of water shall still be allowed for those exempted uses in subsection (D)(2) and do not have to follow hour or day restrictions.
        b. In the case of extreme to exceptional drought conditions or similar regional water supply constraints as advised by the NWPA, the use of water outdoors for any purpose shall be prohibited.
    3. Upon issuing such proclamation, the [mayor or manager] shall make the contents thereof known to the public by posting a copy at the [city or village] hall, and by news release to local newspapers and radio media, and may also endeavor to notify the [city or village] residents and other persons in any other practical manner that he or she shall devise. Further, the [mayor or manager] shall immediately deliver notice of such proclamation, and the regulations that have been imposed by such proclamation, to all members of the [city council or village board].
    4. The emergency proclamation of the [mayor or manager], and the regulations imposed thereby, shall remain in full force and effect until any one of the following shall first occur:

a. The [mayor or manager] determines that the emergency no longer exists and that the emergency proclamation, and the regulations imposed thereby, shall no longer continue in effect.
b. The [city council or village board] modifies or repeals the emergency proclamation, and the regulations imposed thereby, by means of an ordinance enacted at any regular or special meeting of the [city council or village board].

5. Any [city or village] employee or officer may, at the direction of the [mayor or manager], notify and warn any person of the effect of said emergency proclamation and direct said person to comply with said watering or sprinkling restrictions. If any said person, after having first been warned about said restrictions of the emergency proclamation, shall continue to violate said restrictions of the proclamation, they shall be deemed to be in violation of this section.

I. Authority: The authority to prohibit and further regulate the sprinkling of lawns, shrubbery and gardens shall be expressly reserved and may be amended from time to time, as necessary, by the [mayor or manager] and [city council or village board].

J. Violation And Penalty:
1. Any person who violates, disobeys, neglects, fails to comply with or resists enforcement of the provisions of this ordinance shall, within ten (10) days of receiving notice of such violation, pay the [city or village] a fine, as follows:
a. Fifty dollars ($50.00) for a first offense;
b. One hundred dollars ($100.00) for a second offense; and
c. Two hundred dollars ($200.00) for each subsequent offense.
2. Each day a violation occurs or continues shall be considered a separate violation for purposes of this section.
3. In addition to penalties provided herein, the city may recover reasonable attorney fees, court costs, court reporter fees and other expenses of litigation.

Alternatively, the ordinance may be constructed as a color-coded ordinance, whereby subsection (D)(1) would be adjusted to add language about “Condition ‘Green,’” and subsections (H)(2)(a) and (b) would be adjusted to add language about “Condition ‘Yellow’” and “Condition ‘Red,’” respectively and to remove language about the process for issuing an emergency proclamation. In addition, the following section would be added:

K. Signs: The [city or village] shall cause signs to be posted in conspicuous public places at entrances to the [city or village], as well as posting information on the [city or village] website, advising residents of the watering conditions then in effect.

2.4 Promoting Sustainable Building and Development Practices in Lake County: Sample Ordinances and Information Sources, *Lake County*

To download the full report, visit issuu.com/lakecounty/docs/sustainablepractices

Promoting Sustainable Building and Development Practices in Lake County
Sample Ordinances and Information Sources

December 2011

This material is based upon work supported, in whole or in part, by the Department of Energy - Office of Energy Efficiency and Renewable Energy under Grant Award Number DE-EE0000758 from the Energy Efficiency and Conservation Block Grant Program made available pursuant to the American Recovery and Reinvestment Act (RECOVERY ACT) of 2009.

Executive Summary

This report highlights dozens of sustainable building and development practices that can be promoted local governments in Lake County. The ordinances and studies identified in the report are intended to serve as a guide for how the county and area municipalities can update zoning, subdivision and building regulations to promote sustainability. Several of the sample code and ordinance provisions work by removing unintended regulatory barriers to sustainable building and development practices. Others offer flexibility and incentives that encourage builders and developers to use sustainable building and development practices. A few of the sample approaches suggest ways in which regulations can be amended to require more sustainable building and development measures. The following practices are addressed in the report

Hyacinth Place in Highland Park – USGBC-certified LEED Gold.

ENERGY CONSERVATION AND RENEWABLES

This section focuses on the role of building and development regulations in accommodating the use of renewable energy sources and conserving energy use associated with buildings, lighting and mechanical equipment. Improving energy conservation practices and promoting greater use of renewable energy resources can help reduce pollution and greenhouse gases, foster a more energy-independent and sustainable future.

LAND USE, TRANSPORTATION & MOBILITY

The important linkage between land use patterns and transportation is reflected in one of the Lake County Regional Framework Plan's nine vision statements:

> *In the year 2020, Lake County will have… A development pattern and transportation system that provides a variety of living and transportation choices, meets the mobility needs of all residents, and minimizes adverse environmental impacts.*

Solar Array on the Prairie Crossing Charter School – USBC-certified LEED Gold.

Realization of long-term planning and sustainability goals requires an integrated approach to land use and transportation planning. This section focuses on practices that will promote a vibrant, connected multi-modal future.

OPEN SPACE & NATURAL RESOURCES
This section includes a description of regulatory measures aimed at the conservation of open space and natural resources.

WATER QUALITY & QUANTITY
This section explores several sustainable building and development practices that can help in realization of the water-related sustainability goals, including ensuring a reliable supply of clean water.

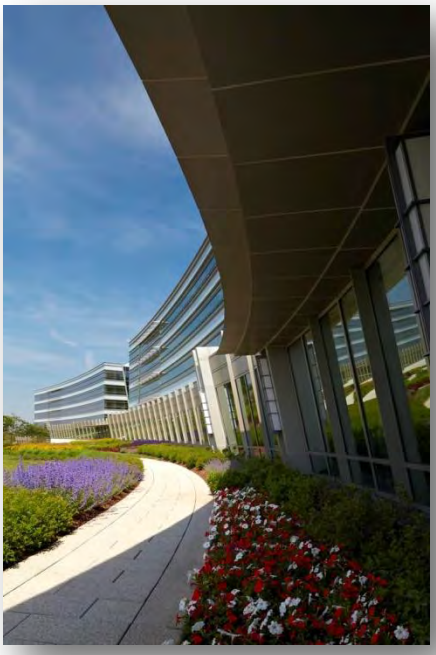
STORMWATER MANAGEMENT
This section focuses on stormwater management strategies that can help reduce the impacts associated with runoff from developed (and undeveloped) sites by reducing runoff volumes and contaminants, primarily through on-site infiltration and by mimicking predevelopment hydrology.

Bioswales in parking lots help filter stormwater runoff. This one is at the Ryerson Woods welcome center – USGBC-certified LEED Platinum.

REDEVELOPMENT, WASTE MINIMIZATION & MATERIALS REUSE
This section focuses on building and development practices that focus on redevelopment of land and the minimization of waste and, in turn, the need for virgin materials.

CONSTRUCTION PHASE POLLUTION CONTROLS
When creating sustainable buildings or developments, it is important to look at not only what sustainable elements and features are included in the final development, but also how these structures are built. Construction activities can produce significant amounts of air and water pollution and solid waste. Because of this, responsible management of construction activities is an important early step that sets the tone for the ultimate development in terms of environmental sustainability.

OUTDOOR LIGHTING
This section focuses on practices that reduce the energy spent and the light pollution created by outdoor lighting. Such practices can result in energy and cost savings and an improved nighttime environment.



Takeda Pharmaceuticals' North America Headquarters is certified LEED Gold by the U.S. Green Building Council (USGBC). The use of native plants helps reduce water consumption by 50%.

INDOOR ENVIRONMENTAL QUALITY (IEQ)
IEQ addresses the elements of our indoor environment that may not have an obvious impact on occupant well-being, but have been proven to increase occupant productivity and comfort with lower employee turnover rates, fewer sick days and higher

productivity. IEQ can enhance occupant well-being when buildings permit adequate ventilation, maintain clean air, comfortable temperatures, and allow individuals to have a sense of control over their own spaces.

FOOD SUPPLY

Ensuring that people have access to healthy, safe and affordable food is a basic tenet of sustainability. This section describes current and possible future efforts aimed at increasing access to local food sources.

INCENTIVE-BASED APPROACHES

There are several economic benefits to green building and sustainable development strategies for property owners and developers, including reduced operating costs, increased return on investment, increased productivity and human health, and enhanced image and marketability.

Apart from regulations, local governments can also establish incentive measures to stimulate property owners and developers further to consider creative, sustainable solutions to building and development challenges. Local governments can encourage green building is through procedural and financial incentives in the permitting process. Official green recognition programs are a common method to offer incentives, by offering plaques to designate achievement levels and local governmental recognition and promotion of the project's green attributes. Rewarding builders, developers, and homeowners who choose to employ sustainable building practices has proven to be a very popular and effective way to encourage the use of green building practices.

Introduction

In 2009, the Lake County Board adopted the goal of "promoting a sustainable environment" in its Strategic Plan and the *Strategy for a Sustainable Lake County*, the purpose of which is to "make Lake County more sustainable and environmentally sensitive." In adopting the *Strategy,* the County Board endorsed a broad definition of "sustainability," which is very similar to the widely accepted definition of sustainable development first endorsed by the United Nation's World Commission on Environment and Development in 1987. According to the *Strategy: "being 'sustainable' means the County is achieving economic prosperity while protecting the planet's natural systems; and meeting the needs of the present generation without compromising the ability of future generations to meet their own needs."*

In 2010, building on the momentum established by the *Strategy for a Sustainable Lake County,* the County retained The Lakota Group, Duncan Associates and Primera to assist Planning, Building and Development Department staff in identifying sustainable development practices that can be promoted through building codes and land development regulations. This report includes findings from the project's research and highlights dozens of sustainable building and development practices that are being promoted or can be promoted by Lake County and other local governments in the region. The ordinances and studies identified in the report are intended to serve as a guide for how the county and area municipalities can update zoning, subdivision and building regulations to promote sustainability. Several of the sample code and ordinance provisions work by removing unintended regulatory barriers to sustainable building and development practices. Others offer flexibility and incentives that encourage builders and developers to use sustainable building and development practices. A few of the sample approaches suggest ways in which regulations can be amended to require more sustainable building and development approaches.

2.5 Glendale Heights Rain Barrel Ordinance, *Glendale Heights*

A Resolution Supporting the Water Conservation and Protection Program Established by the DuPage Water Commission

An Ordinance to Amend Title 4 Entitled, "Building Regulations," of the Village Code of the Village of Glendale Heights, Illinois

For more information, visit: glendaleheights.org/goes_green/rain_barrel.html

RESOLUTION NO. 2011 – R - 54

**A RESOLUTION SUPPORTING
THE WATER CONSERVATION AND PROTECTION PROGRAM
ESTABLISHED BY THE DuPAGE WATER COMMISSION**

WHEREAS, the Earth has a finite source of fresh water suitable for human use; and

WHEREAS, Lake Michigan (hereinafter the "Lake") is the third largest Great Lake by surface area and the sixth largest freshwater lake in the world; and

WHEREAS, approximately seventy-seven (77%) percent of the population in northeast Illinois gets its water from Lake Michigan; and

WHEREAS, the DuPage Water Commission provides an average day supply of approximately eighty-eight (88) million gallons of Lake water to approximately 750,000 residents and businesses in DuPage County; and

WHEREAS, the diversion from the Lake into the Mississippi River basin through the Illinois Waterway at the Chicago River allows for water to be withdrawn from the Lake and diverted to the Mississippi River rather than being returned to the Lake; and

WHEREAS, due to projected growth of the population and economy, Illinois could require 20 to 50 percent more water in coming decades; and

WHEREAS, it is understood that sustaining adequate water supplies is essential to the people and economies of DuPage County, northeastern Illinois, and cities of the region; and

WHEREAS, communities must act to ensure the protection and conservation of the waters and water-dependent natural resources of the region for future generations; and

WHEREAS, water conservation is the beneficial reduction in water loss, waste, or use and includes all measures of water use efficiency; and

WHEREAS, effective water conservation and water stewardship involve a municipal commitment to best management practices and effective public outreach tools; and

WHEREAS, the DuPage Water Commission (hereinafter "DWC") has developed a water conservation and protection program (hereinafter "WCAPP") for its current and future customers which focuses on customer public outreach and education and reducing water usage among their customers in term of per person water use by ten (10%) percent in ten years; and

WHEREAS, the WCAPP establishes a consistent message about water conservation and provides tools and resources to aid communities in implementing water conservation; and

WHEREAS, the DWC asks their customers to voluntarily participate in the WCAPP and formalize their intent to enhance the stewardship of water resources within their jurisdictions; and

WHEREAS, the Village of Glendale Heights (hereinafter the "Village") has committed to participate in the DWC's WCAPP and promote the programs and events set forth in the program.

NOW, THEREFORE, BE IT RESOLVED by the President and Board of Trustees of the Village of Glendale Heights, DuPage County, Illinois:

Section 1: That the Village will work toward achieving a ten (10%) percent reduction in water use expressed in gallons per person per day between 2011 and 2018.

Section 2: That the Village will pass ordinances and resolutions, if necessary, to help achieve the target reduction.

Section 3: This Resolution shall be in full force and effect upon its passage and approval in accordance with law.

AYES: Trustees Schmidt, Light, Maritato, Pojack, Schroeder

NAYS: None

ABSENT: Trustee Fonte

Linda Jackson, Village President

PASSED: This 19th day of May, 2011.

APPROVED: This 19th day of May, 2011.

ATTEST:

Village Clerk

VILLAGE OF GLENDALE HEIGHTS CORPORATE SEAL ILLINOIS

ORDINANCE NO. 2011 - 24

AN ORDINANCE TO AMEND TITLE 4 ENTITLED, "BUILDING REGULATIONS," OF THE VILLAGE CODE OF THE VILLAGE OF GLENDALE HEIGHTS, ILLINOIS

PASSED AND APPROVED BY
THE PRESIDENT AND BOARD OF TRUSTEES
THIS 19th DAY OF May, 2011.

Published in pamphlet form by
authority of the corporate authorities
of the Village of Glendale Heights, Illinois,
the 19th day of May, 2011.

253398-1

ORDINANCE NO. 2011- 24

AN ORDINANCE TO AMEND TITLE 4 ENTITLED, "BUILDING REGULATIONS," OF THE VILLAGE CODE OF THE VILLAGE OF GLENDALE HEIGHTS, ILLINOIS

WHEREAS, the Village of Glendale Heights is committed to enhancing its natural environment and overall well being; and

WHEREAS, stormwater runoff from roofs, lawns, and gardens often has a deleterious effect upon our lakes and streams; and

WHEREAS, the use of rain barrels in conjunction with the use of lake and stream friendly lawn and garden practices will mitigate the negative effects from stormwater runoff; and

WHEREAS, lawn and garden watering make up nearly forty percent (40%) of total household water use during the summer; and

WHEREAS, a rain barrel will save most homeowners about one thousand three hundred (1,300) gallons of water during the peak summer months; and

WHEREAS, saving water not only helps protect the environment, it saves residents of the Village of Glendale Heights money and energy; and

WHEREAS, the Village of Glendale Heights is committed to promoting the use of rain barrels in the community and establishing rules and regulations pertaining to such use; and

WHEREAS, the Village of Glendale Heights deems it necessary and desirable to amend Title 4 of the Glendale Heights Village Code.

NOW, THEREFORE, BE IT ORDAINED by the President and Board of Trustees of the Village of Glendale Heights, DuPage County, Illinois, as follows:

Section 1: The facts and statements contained in the preambles to this Ordinance are found to be true and correct and are hereby adopted as part of this Ordinance.

Section 2: That Title 4 entitled, "Building Regulations," of the Glendale Heights Village Code is amended as follows:

By adding Chapter 20 entitled, "Rain Barrels," to read as follows:

"CHAPTER 20: RAIN BARRELS

SECTION:

4-20-1: STANDARDS ADOPTED

Every person, residential property owner, and residential property occupant shall comply with the following standards in regards to the use of rain barrels within the Village of Glendale Heights.

A. Type and Size:

1. The rain barrel unit or device, whether constructed or manufactured, may vary in style, but shall function as a collector of rooftop rain water for reuse purposes; and

2. The unit or device shall have a secure lid; and

3. The unit or device's opening shall be protected by a double screen; and

4. The capacity or volume of the unit or device shall not exceed sixty five (65) gallons; and

5. The unit or device shall have an overflow hose affixed to the upper portion of it to allow release of excess water; and

6. The exterior of the unit or device shall not be painted or decorated in such a manner that is inconsistent with the surrounding area or offensive to the general senses of the neighboring properties.

B. Location:

1. The unit or device shall only be allowed upon properties zoned residential or upon properties whose use is consistent with that of a property zoned residential; and

2. The unit or device shall only be located in an interior side yard or the rear yard of a property. A variance obtained pursuant to the provisions of the Glendale Heights Zoning Ordinance is required to locate a unit or device in any other location upon a property.

C. General Requirements:

1. The unit or device's overflow hose shall be directed safely away from it, and shall not obstruct or drain upon a neighboring property; and

2. The unit or device may be elevated by a concrete, wood, or brick paver platform, if required. The platform shall not exceed eight inches (8") to twelve inches (12") inches in height; and

3. The unit or device shall not be connected directly to the gutter. A maximum five inch (5") air gap shall separate the gutter and the unit or device's lid to provide easy access to clean the screening and to prevent ice damming in the event the unit or device is not properly winterized; and

4. Only one unit or device is permitted upon a property. A variance obtained pursuant to the provisions of the Glendale Heights Zoning Ordinance is required for more than one unit or device.

Section 3: That this Ordinance shall be in full force and effect from and after its passage, approval, and publication in pamphlet form as provided by law.

AYES: Trustees Schmidt, Light, Maritato, Pojack, Schroeder

NAYS: None

ABSENT: Trustee Fonte

Linda Jackson
Village President

ATTEST:

Marie R. Schmitt
Village Clerk

PASSED: This 19th day of May, 2011.

APPROVED: This 19th day of May, 2011.

PUBLISHED: This 19th day of May, 2011.

3. Managing Indoor and Outdoor Water Use

Introduction

Local water conservation efforts tend to focus on reducing water use and improving efficiency among end users. This section focuses on how municipalities and utilities can work directly with their residential, industrial, commercial and institutional end users to use water more efficiently both indoors and out. It includes a number of tools available from Illinois-Indiana Sea Grant, the Alliance for Water Efficiency and others to help design effective conservation programs and communicate them to end users. With the resources available in this guide, readers will be better able to:

1. Understand the role of managing indoor and outdoor water use in water conservation and sustainable water management.

2. Design customer water conservation programs to be cost-effective and targeted for the most impact.

3. Learn how to prioritize and track the performance of water conservation initiatives.

4. Become familiar with existing resources to help water utilities encourage water conservation by their customers.

To download the presentation, visit preservingeverydrop.org/Portals/0/docs/Workshops/Workshop%203%20Presentation.pdf

3.1 Lawn to Lake, *Illinois-Indiana Sea Grant*

Natural Lawn Care

Training

Teaching in the Community

For more information, visit: iisgcp.org/l2l/index.html

LAWN TO LAKE

Lawn to Lake is a collaborative program promoting healthy lawn and landscape practices to protect water resources in the Great Lakes region. The Great Lakes are a globally important natural resource. They represent approximately 20 percent of the world's fresh surface water and provide habitat for over 100 species of globally rare plants and animals. Additionally, 42 million people depend on the Great Lakes for their drinking water.

Natural Lawn Care

How does my lawn affect lakes, ponds, and rivers?
Fertilizers and chemicals used to grow a thick and full carpet of green grass can run off your lawn and pollute local waterways. If your lawn is bare and patchy, then soil, phosphorus, and pesticides are washed off even more easily, reducing their effectiveness and wasting your money. The solution is to create an attractive and lake-friendly lawn by building soil that is high in organic matter and supports a microbe community that releases nutrients and combats fungal pests.

How can I care for my lawn without compromising the quality of our water?
Convert to a healthy natural lawn by mowing the grass 3 or 4 inches tall with a sharp lawnmower blade, leave clippings on the lawn as a source of nitrogen for the soil, and core aerate in the fall to improve roots and watering.
Also, follow these tips:

- **Build healthy soil.** Healthy soil is essential for healthy plants; it can be achieved by adding compost. Compost improves the soil's ability to hold water and nutrients and retain beneficial microorganisms. If you take care of your soil, the soil will care for your plants.
- **Test your soil.** Many soils don't need additional phosphorus, and many areas have ordinances restricting its application. A soil test will tell if adequate nutrients are available for plant growth. If your soil test shows that you need to add nutrients, consider using non-synthetic products like compost, which contains plenty of nitrogen, phosphorus, and potassium.
- **Let nature do the work.** Use natural, non-synthetic fertilizers. Plant- or animal-based fertilizers improve soil and plant health, reducing the need for pesticides and reducing nutrient runoff. Pesticides kill beneficial soil organisms that keep lawn thatch from building up.
- **Shrink your lawn.** Focus on what you want from your landscape—for example, a play area for kids or pets or an attractive border—and design and maintain your landscape based on how it will be used. Reducing unnecessary lawn area will help to cut down on maintenance expenses over time.
- **Right plant, right place.** Different plants have specific water, nutrient, and light requirements, and pests attack poorly adapted plants. Choosing appropriate plants for your area can also help cut down on lawn care expenses. Also, avoid invasive plants that can out-compete native plants.
- **Let the rain soak in.** Rainwater that is captured or filtered on your property provides several benefits. Using water on-site can help reduce runoff and prevent storm water problems, such as erosion and nutrient loading in nearby waterways. You can use water wisely by integrating rain gardens, cisterns and rain barrels, permeable pavers, swales, and terraces into landscape design.
- **Water Smart.** Over-watering reduces the health of your plants. Proper watering and reducing the water requirements of your lawn and landscape can save you time and money. In addition, many municipalities have watering restrictions.
- **Integrated Pest Management.** Correct the underlying problem prior to applying pesticides. Persistent problems with pests can be a sign of poor lawn and landscape health. Using an integrated approach to pest management, including building your soil and using the right plants, can help stop the problem before it starts.

Training

Lawn to Lake conducts collaborative workshops in Lake Michigan so that landscape professionals, municipal leaders, grounds keepers, master gardeners, teachers, and residents can learn about the connection between lawn care and water quality, and how to create a naturally beautiful lawns and landscapes.
When:

- View our training calendar here, or
- contact Lawn to Lake to arrange your own workshop. Leslie Dorworth at**dorworth@purduecal.edu** in Indiana. In Illinois, please contact Margaret Schneemann at **MSchneemann@cmap.illinois.gov**.

More Info:

View agendas from past workshops

- **Natural Lawn Care and Sustainable Landscapes Workshop – April 13, 2012**
- **Natural Lawn Care Workshop for Schools and Childcares – March 22, 2012**
- **Natural Lawn Care Workshop For Professionals – March 21, 2012**
- **Natural Lawn Care and Sustainable Landscapes Workshop – October 13, 2011**
- **Natural Lawn Care Workshop for Professionals – March 23, 2011**

View presentations from past workshops

- **Natural Lawn Care and Sustainable Landscapes Workshop – October 13, 2011**
- **Avoiding Nature Deficit Disorder**
- **Creating the Rain Friendly Landscape**
- **Chicago Park District Case Study**
- **Contracting Stewardship-Native Plant Nursery**
- **Example Contract**
- **Getting the Ideal Lawn Naturally**
- **Greening Landscape Ordinances**
- **Greening the Green Industry**
- **Panel Discussion**

Teaching in the Community

Master Gardeners, Master Naturalists and teachers can help communities learn about water quality and protect lakes, rivers and streams with sustainable landscaping practices. These community trainers learn about watersheds, landscaping practices and outreach strategies through a series of workshops offered by the Lawn to Lake program. And—they can borrow watershed models to use at community events and in classrooms to help their communities understand that clean water depends on all of us.

The Lawn to Lake program has joined with University of Illinois Extension's **Master Gardener** and**Master Naturalist** programs to provide sustainable lawn and landscape information as part of the continuing training requirement for Master Gardener/Naturalist certification. The Lawn to Lake program has provided continuing training on water smart landscaping and sustainable lawn care practices to almost 300 Master Gardeners.

Borrow a model!
Watershed models are available throughout northeastern Illinois and northwestern Indiana for Master Gardener/Naturalist volunteers and teachers to borrow. The models (EnviroScape® Models) are a great hands-on activity that helps people understand watersheds and water pollution. The model is a useful tool in classrooms and public presentations—and it grabs attention at fairs, farmers markets and other tabling events.

To borrow a model, contact Susan Ask at**sask@illinois.edu**.

Here are some key themes and ideas for getting a conversation started.

- Read ideas for starting a discussion about water quality, landscaping and watersheds. **http://www.iiseagrant.org/l2l/watershed_discussion_tips.pdf**
- Find more about aligning the model with science standards and tips for using the model. **http://www.enviroscapes.com/support.html**

Share this!
If you'd like to hand out these brochures at your event, please download and print as many as you want! Illinois Extension's **Lawn Talk** can also provide infomration on sustainable lawn care.

These brochures are a sample of what is offered. Please visit our **Natural Lawn Care product page** for more materials.


Right Plants
for the
Right Place


Absorb the Storm
Create a Rain-friendly
Yard and Neighborhood


Don't "P" On
Your Lawn


Integrated Pest
Management (IPM)
Prevent
Control
Monitor

3.2 Sustainable Lawn & Landscape Practices for Communities Manual, *Illinois-Indiana Sea Grant*

Title Page

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Introduction

To download the full report, visit iiseagrant.org/catalog/downlds_09/LawnToLake_Guidebook.pdf

CMAP

NORTHWESTERN INDIANA REGIONAL PLANNING COMMISSION

UNIVERSITY OF ILLINOIS EXTENSION

PURDUE UNIVERSITY CALUMET

Sea Grant ILLINOIS - INDIANA

INDIANA LAKE MICHIGAN COASTAL PROGRAM

Save the Dunes

Sustainable Lawn & Landscape Practices for Communities

Lawn to Lake Guidebook for Illinois & Indiana

2012

Acknowledgements

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Jennifer Birchfield, *Save the Dunes*

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Richard Hentschel, Illinois Extension Educator, *Horticulture DuPage/Kane/Kendall Unit*

This project has been made possible in part through a Great Lakes Restoration Initiative (GLRI) grant.

Chicago Metropolitan Agency for Planning (CMAP)
CMAP is the official regional planning organization for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will. CMAP developed and now leads the implementation of GO TO 2040, metropolitan Chicago's first comprehensive regional plan in more than 100 years. To address anticipated population growth of more than 2 million new residents, GO TO 2040 establishes coordinated strategies that help the region's 284 communities address transportation, housing, economic development, open space, environmental, and other quality-of-life issues. See **www.cmap.illinois.gov** for more information.

Illinois-Indiana Sea Grant
Illinois-Indiana Sea Grant (IISG) is one of 32 college programs nationwide, and is dedicated to conducting research, education, and outreach to serve Lake Michigan's southern coast. With its mandate to bring the latest university-based science to those who need it, IISG brings together scientists, educators, policy makers, community decision makers, outreach specialists, business leaders, and the general public to work towards a sustainable environment and economy. Visit **www.iiseagrant.org**.

Lake Michigan Coastal Program
The purpose of the Lake Michigan Coastal Program (LMCP) is to support coordination and partnerships among local, state, and federal agencies and local organizations for the protection and sustainable use of natural and cultural resources in the Lake Michigan region. To learn more, visit **www.in.gov/dnr/lakemich**.

Lawn to Lake
Lawn to Lake is a collaborative program to protect water resources in the Great Lakes region by promoting healthy lawn and landscape practices. With funding from the U.S. EPA Great Lakes Restoration Initiative, partners are coordinating a pollution prevention campaign addressing the needs of those responsible for lawn and landscape care in the Southern Lake Michigan basin.
Visit **www.lawntogreatlakes.org**.

Northwestern Indiana Regional Planning Commission
NIRPC is a regional council of local governments serving the citizens of Lake, Porter, and LaPorte counties in Northwest Indiana. NIRPC provides a forum that enables the citizens of Northwest Indiana to address regional issues relating to transportation, the environment, and community and economic development. NIRPC has developed a 2040 regional comprehensive plan for the northwestern Indiana region providing vision and implementation actions.
Visit **http://www.nirpc.org**.

Purdue University Calumet
Purdue University Calumet, a vital part of Purdue University and the leading post-secondary institution in the Calumet region, is a comprehensive, public university in the land grant tradition offering educational programs of excellence focused on the professional, general educational, and lifelong learning needs of the people of the Calumet region. See **www.purduecal.edu** for more information.

Save the Dunes
The mission of Save the Dunes is to preserve, protect, and restore the Indiana Dunes and all natural resources in Northwest Indiana's Lake Michigan Watershed for an enhanced quality of life.
Visit **www.savedunes.org**.

University of Illinois Extension
University of Illinois Extension is the flagship outreach effort of the University of Illinois at Urbana-Champaign, offering educational programs to residents of all of Illinois' 102 counties — and far beyond. Through learning partnerships that put knowledge to work, U of I Extension's programs are aimed at making life better, healthier, safer, and more profitable for individuals and their communities.
See **web.extension.illinois.edu/state** for more information and **urbanext.illinois.edu/lawntalk** for more information on lawn care.

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Introduction

Lawns are a significant feature in the urban environment. These often heavily managed landscapes have the potential to contribute to runoff pollution due to over-fertilization, over-application of pesticides, and overwatering.[1] Over the past few years, a number of Great Lakes states, including Illinois, Michigan, Minnesota, New York, and Wisconsin, have restricted the use of fertilizers containing phosphorus for some applications.

Research has shown that concentrations of total nitrogen and phosphorus in urban runoff are certainly high enough to contribute to eutrophication (over-enrichment) of nutrient-sensitive lakes and streams.[2] While many watershed management practitioners admit the difficulty in quantifying the contribution of lawn runoff to receiving waterbodies, a study conducted by the U.S. Geological Survey in Lauderdale Lakes, Wisconsin evaluating the effectiveness of a "lake-friendly" fertilizer program showed that median dissolved phosphorus concentrations in runoff were greater from regular-fertilizer sites than from non-phosphorus fertilizer and unfertilized lawn sites.[3] The U.S. Geological Survey has also shown higher concentrations of pesticides in urban waterways than in agricultural streams.[4] Conversely, turf scientists have shown that turf grass does have water quality benefits such as erosion reduction.[5] There is supporting literature for both sides.

One concern that watershed managers have is that land owners often do not necessarily see themselves as having an impact on water quality as individuals. However, we all live in a watershed and, therefore, we have to consider the cumulative impacts. Additionally, some landowners may fail to realize that while they may not live right next to a lake or stream, runoff from their lawns may be readily conveyed to nearby waterbodies through a network of curbs, gutters, and storm drains in their neighborhood. When you couple overuse of fertilizers and pesticides, overwatering, and the often compacted soils of the urban environment, there is an increased risk of polluted runoff.

The intent of this guidebook is to provide landowners with information that can help them reduce these risks with an emphasis on natural lawn care (also known as sustainable or organic lawn care). These terms are representative of a similar ideal, the replacement of synthetic pesticides and fertilizers with the lawn's natural abilities to look good through natural methods. Organic lawn care depends on a single principle: that a healthy lawn will be able to resist most weeds, diseases, and insects. The goal of such lawn care, therefore, is to promote soil and turf health.

Sustainable lawn care doesn't mean you have to give up your lawn, and it certainly doesn't mean that you have to give up the rest of your life tending your lawn. It is an option for landowners to consider over traditional lawn care practices that rely on synthetic products. It means planting what will do well in your climate, conserving water, using organic sources of nutrients, minimizing the use of pesticides, building soil health, and minimizing the impacts of polluted runoff from your property. This manual should help, whether you're obsessive about your lawn, want to contribute as a private individual in source reduction opportunities to protect local lakes and streams, or just want to take a test drive in sustainability.

1 U.S. Environmental Protection Agency – National Management Measures to Control Nonpoint Source Pollution from Urban Areas. **www.epa.gov/owow/NPS/urbanmm/pdf/urban_ch09.pdf**.

2 Barth, C.A. 1995. "Nutrient Movement from the Lawn to the Stream." *Watershed Protection Techniques*. 2(1): 239-246.

3 Garn, H.S. 2002. "Effects of Lawn Fertilizer on Nutrient Concentration in Runoff from Lakeshore Lawns, Lauderdale Lakes, Wisconsin." USGS Water-Resources Investigations Report 02–4130.

4 U.S. Environmental Protection Agency- National Management Measures to Control Nonpoint Source Pollution from Urban Areas. **www.epa.gov/owow/NPS/urbanmm/pdf/urban_ch09.pdf**.

5 Beard, J.B. & R.L. Green. 1994. "The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans." *Journal of Environmental Quality*. 23:452-460.

3.3 Water Conservation Tracking Tool, *Alliance for Water Efficiency*

What the Tracking Tool Is

How the Alliance Will Help

How to Get the Tracking Tool

Tracking Tool Resources

To access the tool, visit: allianceforwaterefficiency.org/Tracking-Tool.aspx

AWE Water Conservation Tracking Tool

Need help in planning your water conservation programs? The Alliance for Water Efficiency now has a solution for you. Many months in development, the AWE Water Conservation Tracking Tool was finished after a successful beta testing period with a number of water utilities. The Tool -- complete with a detailed User Guide -- is available free of charge to all AWE members in good standing.

What the Tracking Tool Is

User Guide 2.0 CoverThe Tool is an Excel-based model that can evaluate the water savings, costs, and benefits of conservation programs for a specific water utility, using either English or Metric units. Using information entered into the Tool from the utility's system, it provides a standardized methodology for water savings and benefit-cost accounting, and includes a library of pre-defined conservation activities from which users can build conservation programs.

Water utility managers can use the Tool in a variety of ways to aid their water resource planning and operations:

- Develop long-range conservation plans. Construct conservation portfolios containing up to 50 separate conservation program activities.
- Quickly compare alternative conservation measures in terms of their water savings potential, impact on system costs, and potential benefits to utility customers.
- Track the implementation, water savings, costs, and benefits of actual conservation activities over time.
- Evaluate a utility's changing revenue requirement with conservation.
- Estimate the reduction in GHG emissions resulting from plumbing/energy codes and conservation program activity.

The Tool counts the savings achieved from national plumbing code and appliance standards. Due to differing standards among states, there are three editions: the Standard, California/Texas, and Georgia. The Standard Edition applies to all states other than Texas, California, and Georgia. The California/Texas Edition takes account that ULFT requirements in California and Texas began two years earlier than for the rest of the U.S. (1992 rather than 1994), and also the transition to HET toilets beginning in 2014. The Georgia Edition reflects the recent changes to that state's efficiency codes for toilets and urinals.

How the Alliance Will Help

The Alliance will provide a detailed User Guide with the Tool, as well as one (1) hour of free technical assistance to any member using the Tool. Please let us know about your experiences with the Tool! We would like to feature successful examples of the Tool in use on our web site, so please let us know how it has worked for you.

How to Get the Tracking Tool

The Tool is available free of charge to AWE members, but it is subject to your agreement to the Water Conservation Tracking Tool Terms of Use. Current members click here to read and accept the Terms of Use and to obtain a copy of the Tool from the AWE staff. AWE members in California, Texas, and Georgia will automatically receive the version of the Tool appropriate for those states, and AWE Members in Australia will also receive the appropriate version of the Tool for their region.

Tracking Tool Resources

List of User Data Inputs for Version 2.0

Detailed Updates Made to the Library of Conservation Activities for 2.0

Differences between Version 1.2 and Version 2.0 of the Tracking Tool

Average Baths and Half Baths Per Dwelling Unit - Supplemental Data Table (now included with Version 2.0)

November 8, 2011 Tracking Tool Webinar PowerPoint Presentation

3.4 Additional Resources

Never Waste, *Alliance for Water Efficiency*

home-water-works.org/neverwaste

Water Conservation and Protection Program (WCAPP), *DuPage Water Commission*

preservingeverydrop.org/

Water Sense, *US EPA*

epa.gov/watersense

What our Water's Worth, *MPC*

chicagolandh2o.org

4. Water Rates and Revenues

Introduction

The most critical question for any utility is its ability to pay for its operations and infrastructure investments. A major concern for utilities when promoting water conservation is its implication for budgets and revenue. This section provides an intensive look into utility revenue options and rate-setting, identifying ways in which improved water management and valuing of water can lead to savings of both water and money. It presents the case for water infrastructure investments in the region, includes information on different ways to fund utility improvements and provides guidance on adequately valuing water services and setting appropriate rates. With the resources available in this guide, readers will be better able to:

1. Understand the relationship between water rates and utility revenues, including the effect of water conservation.

2. Design water pricing mechanisms that fit utility goals, customer types and effective management.

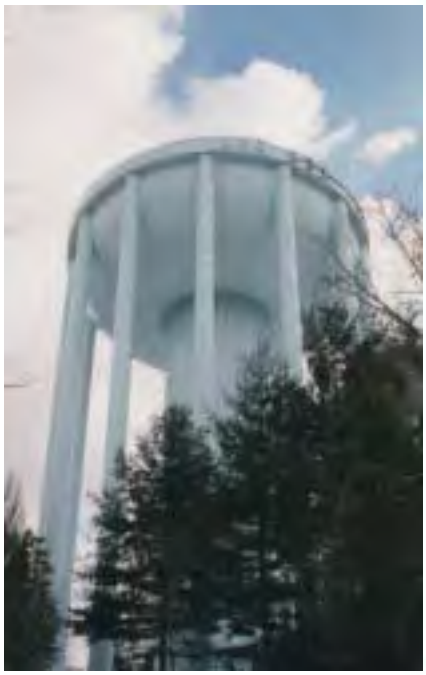
3. Learn about opportunities for financing water infrastructure investments from both traditional sources, as well as from emerging sources.

To download the presentation, visit preservingeverydrop.org/Portals/0/docs/Workshops/Master%20slides_DWC_082813.pdf

4.1 2002 Clean Water and Drinking Water Infrastructure Gap Analysis, *US EPA*

To download the full report, visit epa.gov/safewater/gapreport.pdf

The Clean Water and Drinking Water Infrastructure Gap Analysis



Message from EPA's Assistant Administrator for Water

As our economy and population grow, we must periodically take a good look at the challenges ahead and reassess our nation's needs for infrastructure to ensure clean and safe water. By "infrastructure" we mean the pipes, treatment plants and other critical components that deliver safe drinking water to our taps and remove waste water from our homes and other buildings. Recognizing the importance of having a common understanding of the challenges ahead, the U.S. Environmental Protection Agency (EPA) undertook a "Gap Analysis" to review the historical patterns of infrastructure investment, compare it to projections of future needs, and provide a transparent assessment of the gap between needs and spending. The result of our effort is this report on the *Clean Water and Drinking Water Infrastructure Gap Analysis*.

In keeping with our commitment to subject our analysis to external scrutiny, EPA submitted the methods and data used in the Gap Analysis to a diverse panel of peer reviewers drawn from academia, think tanks, consulting firms, and industry. Overall, the reviewers commended the report as a reasonable effort to quantify the gap. As a result of the peer review process, we revised the preliminary projections and approaches to incorporate the comments and views of these expert external reviewers.

This report makes clear that there is no single correct number to describe the gap. Any gap study must be built using methodologies and definitions of need, which in turn rest on assumptions about the present conditions of infrastructure nationwide, and desirable or appropriate policies to follow in the future. While much of the projected gap is the product of deferred maintenance, inadequate capital replacement, and a generally aging infrastructure, it is in part a consequence of future trends we can anticipate today, such as continuing population growth and development pressures. Yet, funding gaps need not be inevitable. They will occur only if capital and operations and maintenance (O&M) spending and practices remain unchanged from present levels. The analysis suggests that a large gap will result if the challenge posed by an aging infrastructure network—a significant portion of which is beginning to reach the end of its useful life—is ignored.

EPA has encouraged a national dialogue on the appropriate roles for addressing infrastructure needs and continues to work in partnership with Congress and other stakeholders in helping to define effective approaches to meeting these emerging challenges. This report on the *Clean Water and Drinking Water Infrastructure Gap Analysis* is one of EPA's contributions toward an ongoing dialogue. Our objective is to ensure clean and safe water for generations to come. Water infrastructure is key to that future.

G. Tracy Mehan, III

Office of Water (4606M)
EPA-816-R-02-020
www.epa.gov/safewater
September 2002

Printed on Recycled Paper

The Clean Water and Drinking Water Infrastructure Gap Analysis

United States
Environmental Protection Agency

Office of Water
(4606M)

EPA-816-R-02-020
September 2002

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Table of Contents

Executive Summary

To gain a better understanding of the future challenges facing the clean water and drinking water industries, the U.S. Environmental Protection Agency (EPA) has conducted a study to identify whether there is a quantifiable gap between projected clean water and drinking water investment needs over the twenty-year period from 2000 to 2019 and current levels of spending. The analysis found that a significant funding gap could develop if the nation's clean water and drinking water systems maintain current spending and operations practices.

However, this gap largely disappears if municipalities increase clean water and drinking water spending at a real rate of growth of three percent per year. This real rate of growth represents a three percent per year increase over and above the rate of inflation and is consistent with the long-term growth estimates of the economy.

The scope of this report is limited to a discussion of methods for calculating the capital and operations and maintenance (O&M) gaps for clean water and drinking water. Although the findings will inform policy discussion, this report confines itself to estimating the gap, and it does not attempt to discuss the array of policy considerations stemming from the results.

In calculating capital investment needs over the twenty-year period, both the clean water analysis and the drinking water analysis used their respective Needs Surveys as a starting point. Adjustments were made to account for under-reporting of needs, especially with regard to needs associated with capital replacement. Estimates of capital needs for clean water from 2000 to 2019 range from $331 billion to $450 billion with a point estimate of $388 billion. Estimates of capital needs for drinking water over the twenty-year period range from $154 billion to $446 billion with a point estimate of $274 billion.

The methods used several alternative assumptions that generated hundreds of different permutations for estimating the capital and O&M gaps. The range represents the uppermost and lowermost extremes of these estimates. Providing a range explicitly acknowledges the uncertainty of the analysis, which stems from the limited quality of the available data and the potential for variance in key factors affecting costs. The point estimates were calculated by taking an average of each possible combination of assumptions.

The analysis also compared projected operations and maintenance (O&M) needs to current spending. O&M needs for both clean water and drinking water were assumed to be a function of capital stock. To estimate current O&M spending, both analyses used historical O&M spending data from the Congressional Budget Office and the Census Bureau and held this level constant over the 20-year period.

The resulting O&M gap for clean water over the next twenty years is between $72 billion and $229 billion with a point estimate of $148 billion for the no revenue growth scenario, and the gap is between $0 billion and $80 billion with a point estimate of $10 billion[1] for the revenue growth scenario. The drinking water O&M gap is between $0 billion and $495 billion with a point estimate of $161 billion[2] for the no revenue growth scenario, and this gap is between $0 billion and $276 billion with a point

1 The actual range is $-55 to $80 billion with a point estimate of $10 billion. Under the assumptions used for certain scenarios, the models predict a surplus of infrastructure funds, or rather, a negative gap. In these scenarios, total spending and/or revenues will exceed the total need over the next 20 years. The report excludes these negative values in the text, because systems generally would not collect revenues in excess of their current estimated infrastructure needs. However, it should be noted that doing so would free infrastructure funds for situations where gaps remain.

2 The actual range is $-67 to $495 billion with a point estimate of $161 billion. See Footnote 1 for further explanation.

estimate of $0 billion[3] for the revenue growth scenario.

Whereas municipalities pay O&M costs from current revenues, they often use debt instruments to finance some of their clean water and drinking water infrastructure investments. However, the portion of clean water infrastructure that is financed is significantly greater than the portion of drinking water infrastructure that is financed. The analysis assumes that clean water and drinking water systems will finance a significant portion of projected capital needs over the estimation period. Estimates of payments for clean water capital needs range from $321 billion to $454 billion, while estimates of payments for drinking water capital needs range from $178 billion to $475 billion.

Capital spending (payments) estimates for the twenty-year period were made using historical data from the Congressional Budget Office and the U.S. Census Bureau. Current capital spending for clean water is estimated at $13 billion per year. For drinking water, current capital spending is estimated at $10.4 billion per year.

The capital payments gap is equal to the capital payment needs less the current spending on capital. For clean water, estimates of the capital gap range from $73 billion to $177 billion with a point estimate of $122 billion for the no revenue growth scenario, and the estimates range from $0 billion to $94 billion with a point estimate of $21 billion[4] for the revenue growth scenario. For drinking water, estimates of the capital gap range from $0 billion to $267 billion with a point estimate of $102 billion[5] for the no revenue growth scenario, and the estimates range from $0 billion to $205 billion with a point estimate of $45 billion[6] for the revenue growth scenario.

It is also important to note that the range of needs and gaps are provided to explicitly acknowledge variations within the estimates, but are not intended to support comparative analysis between the clean water and drinking water industries. The drinking water analysis was able to use data sets that were not available to clean water, e.g., data sets of pipe inventory and age of assets. These data allowed drinking water to use four different methods to estimate capital needs and vary assumptions within each method, whereas the clean water analysis used a single method and varied assumptions within that method. The broader array of methods available to the drinking water analysis generated a broader range of needs and gaps. As such, the resulting ranges provide insight into the impact of varying assumptions within each industry, but the data and methods cannot be used to conduct a valid comparison of the funding gaps facing the clean water and drinking water industries.

EPA submitted the methods and data used in this analysis to a panel of peer reviewers drawn from academia, think tanks, consulting firms, and industry. In general, the reviewers found that the analysis represented a commendable and credible effort to quantify the infrastructure gap. EPA refined the analysis to address comments made by the reviewers, although implementation of some of the recommendations would require data that are as yet unavailable. The results, therefore, should be viewed with the understanding that the present body of data constrains our ability to estimate the gap with a high degree of certainty. This caveat aside, the report offers estimates to ensure that policy discussions of a pressing infrastructure challenge will not be forestalled while we await improvements in data quality—rather, any refinements to the estimates should inform ongoing deliberations. The major issues and concerns raised by the peer review panel are summarized in Appendix B.

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3 The actual range is $-286 to $276 billion with a point estimate of $-58 billion. See Footnote 1 for further explanation.
4 The actual range is $-39 to $94 billion with a point estimate of $21 billion. See Footnote 1 for further explanation.
5 The actual range is $-17 to $267 billion with a point estimate of $102 billion. See Footnote 1 for further explanation.
6 The actual range is $-94 to $205 billion with a point estimate of $45 billion. See Footnote 1 for further explanation.

Introduction

1.0 Purpose

The objective of this report is to determine whether a potential funding gap could emerge between projected needs and current spending with respect to clean water and drinking water infrastructure. The analysis presents in detail the methods for quantifying the gap for the purpose of providing transparency as to how the estimates were derived. The results are expressed as a range; each range also has a point estimate that is the average of the different combinations of assumptions that could be used in calculating the gap. By presenting the findings as a range, the report acknowledges the uncertainty. The report confines itself to quantifying the funding shortfall for capital and operations and maintenance (O&M) investments that will be needed to ensure that clean water and drinking water systems can continue to protect the environment and public health. The policy implications of the funding gap are beyond the scope of the present analysis. The remainder of this chapter provides the historical and technical context for understanding the infrastructure issues confronting the clean water and drinking water industries.

1.1 Background

Water is life. Clean and safe water is critical for human health and ecosystem health. As early as 5000 years ago, centralized systems supplied drinking water to communities in parts of the Middle East. Twenty-five hundred years ago, Athens, Greece rebuilt its city with sewers that transported sanitary waste to rural areas for disposal onto orchards and agricultural fields. In the centuries since, these two services—supply of drinking water and disposal of wastewater—have become intrinsic responsibilities of communities worldwide.

As recently as the mid-nineteenth century, however, drinking water supply and wastewater disposal were largely matters of transportation—of bringing drinking water to citizens and removing wastewater. In the United States, health concerns and technological advances brought changes to drinking water infrastructure around the turn of the twentieth century. In 1872, Poughkeepsie, NY introduced slow sand filtration to reduce turbidity in drinking water. This treatment via filtration removed microbial contaminants that had caused typhoid, dysentery, and cholera epidemics. In 1908, Jersey City, NJ introduced drinking water disinfection treatment, and chlorination further reduced drinking water disease outbreaks.

If a community's wastewater received any treatment prior to 1900, this treatment consisted of physically separating solids and floating debris from wastewater before discharge into a nearby waterbody. In 1907, Gloversville, NY built the nation's first wastewater filtration facility, and in 1916, Chicago, IL constructed an activated sludge treatment plant. These advances, called secondary treatment, helped to alleviate epidemics of typhoid, cholera, and other waterborne diseases. This treatment also improved ecosystem health—highlighted by resurging fish and shellfish populations.

In the last century, treatment of drinking water and wastewater has become more advanced, and it has spread to almost all systems in the country. The 1972 Clean Water Act mandated that all publicly owned treatment works (POTWs) provide secondary treatment of wastewater. By 1996, fewer than 200 systems—out of 16,204 nationwide—had not met this standard. The 1974 Safe Drinking Water Act established a system of nationwide standards for drinking water contamination. Today, the Environmental Protection Agency regulates more than 80 drinking water contaminants and the vast majority of people receive drinking water from systems that have no reported violations of health-based standards.

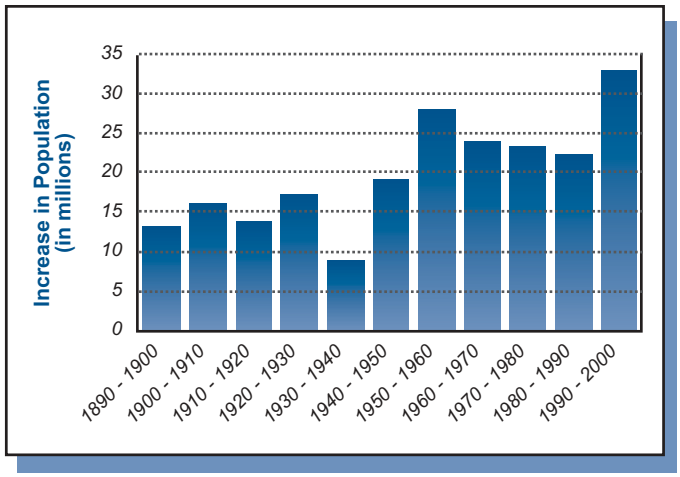

Figure 1–1: Increase in U.S. Population by Decade

The advancement and expansion of clean water and drinking water systems has been worthwhile but costly. In the last twenty years, communities have spent $1 trillion in 2001 dollars on drinking water treatment and supply and wastewater treatment and disposal.[7] This spending is impressive, but it may not be sufficient to keep pace with infrastructure needs of the future. Several issues provide cause for concern.

- *Our systems are aging.* Generally, installation of clean water and drinking water infrastructure has followed overall patterns of population growth in cities across the country (Figure 1–1). Treatment plants typically have an expected useful life of 20–50 years before they require expansion or rehabilitation. Pipes have life cycles that can range from 15 to well over 100 years—with actual pipe life varying considerably depending on soil conditions, pipe material, climate, and capacity requirements. In some eastern cities, systems have some pipes in use that are almost 200 years old.

- *Populations are increasing and shifting geographically.* The 2000 Census identified a population of 281 million in the country, an increase of more than 32 million from the 1990 Census. This change was the largest census to census increase in United States history. The Census Bureau projects a population of more than 325 million by the year 2020. Systems will need to increase capacity to meet the demands posed by this growth. To complicate the issue, population is shifting geographically, requiring rapid increases in system capacity in some parts of the country and requiring maintenance of aging systems in other parts of the country with diminishing populations (and a diminishing rate base).

- *Current treatment may not be sufficient.* In 1998, states, tribes, and interstate commissions assessed water quality in 32 percent of the nation's estuaries and found 44 percent of the assessed areas to be impaired. Wastewater treatment facilities and combined (wastewater and stormwater) sewer overflows were two of the leading causes of impairment. Wastewater treatment efficiencies may be leveling off, which, when combined with population and economic growth, could have the effect of reversing hard-won water quality gains. By 2016 pollution levels could be similar to levels observed in the mid-1970s (Figure 1–2).

- *Investment in research and development has declined.* Innovation, research, and development are essential elements in promoting the use of more effective, efficient, and affordable technologies in water and wastewater treatment. A recent EPA report on R&D expenditures (public and private) associated with water pollution abatement showed that expenditures decreased by half from the early 1970s to the late 1990s (Figure 1–3).

7 Based on annual outlays reported in the Bureau of the Census Government Finances Data Series for local government expenditure for sewerage and the Engineering News-Record's Construction Cost Index (www.enr.com/cost/costcci.asp).

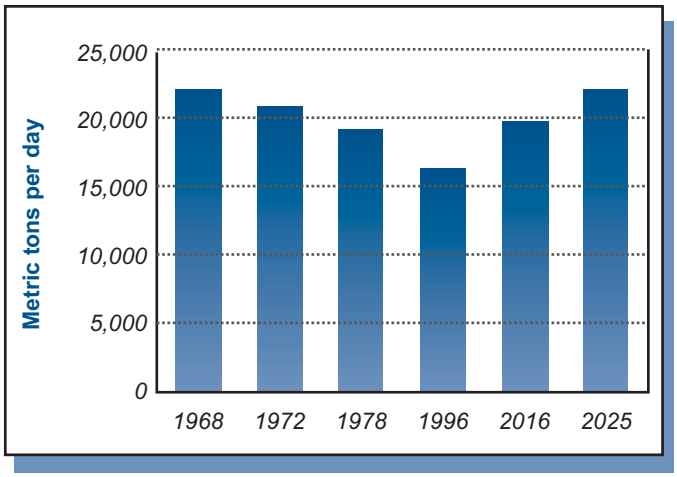

Figure 1–2: Projection of Increase in Biological Chemical Oxygen Demand (BOD)[8]

• *Services are non-centralized.* Twenty-five percent of all households in the U.S. have on-site wastewater treatment systems and 15 percent of all households receive drinking water from private wells. Generally, states and communities have not established adequate management programs to assure proper functioning of onsite systems for wastewater treatment and private drinking water wells. This under-investment in support results in poor location and design decisions, inferior materials, faulty installation, and a general lack of maintenance. Adequate investment is critical to ensuring that these systems operate properly. At the local, state, and national level, more attention will have to be paid in the future, not only to replace and repair existing infrastructure, but also to establish and support management programs.

• *Some communities will have a difficult time meeting funding challenges.* Some communities, particularly small communities which lack the economies of scale associated with a large customer base, are challenged in meeting the cost of installing and maintaining infrastructure. The financial impact of the need to address aging infrastructure will be greater for these communities. There are also communities in the country that are unserved or underserved by clean water and drinking water systems (Indian Tribes, *Colonias*, Alaska Native Villages).

To gain a better understanding of the challenges the clean water and drinking water industries will face in the future, EPA has conducted a study to identify whether there is a quantifiable gap between the estimated investment needs for clean water and drinking water systems and current spending by these systems over the next 20 years. In order to frame the discussion, Chapter 2 of this report describes the characteristics of the clean water and drinking water industries. Chapters 3 and 4 lay out the Agency's identification of the needs and spending associated with clean water and drinking water infrastructure, respectively, in an effort to identify whether there is a gap. Chapter 5 summarizes the findings and suggests areas for further research.

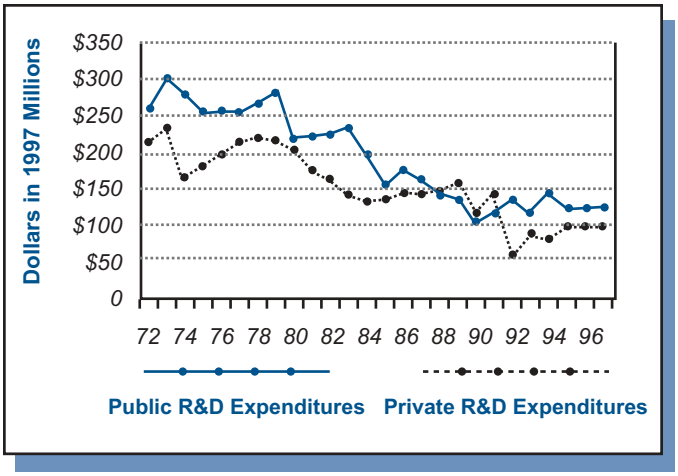

Figure 1–3: Declining Trend in R&D Water Pollution Abatement Expenditures[9]

8 U.S. EPA, *Progress in Water Quality: An Evaluation of the National Investment in Municipal Wastewater Treatment*, June 2000.
9 U.S. EPA, *A Retrospective Assessment of the Costs of the Clean Water Act: 1972 to 1997*, October 2000.

Conclusion

5.0 Findings

This report estimates the gap between the projected need and current spending for clean water and drinking water infrastructure over the next 20 years using data available from EPA, the Census Bureau, and the Congressional Budget Office. In broad terms, the gap analysis concludes that clean water and drinking water systems will need to use some combination of increased spending and innovative management practices to meet projected needs. This analysis estimates that the clean water capital payment gap is between $73 billion and $177 billion with a point estimate of $122 billion in the no revenue growth scenario, and it estimates that the capital payment gap is between $0 billion to $94 billion with a point estimate of $21 billion[38] for the revenue growth scenario. The analysis estimates that the drinking water capital payment gap is between $0 billion and $267 billion with a point estimate of $102 billion[39] in the no revenue growth scenario, and it estimates that the gap is between $0 billion and $205 billion with a point estimate of $45 billion[40] in the revenue growth scenario.

It is important to recognize that the funding gaps occur only if capital and O&M spending remains unchanged from present levels. This assumption clearly understates future spending and ignores other measures, such as asset management processes or capacity development, that systems could adopt to reduce both capital and O&M costs. In reality, increasing needs will likely prompt increased spending. However, the analysis presents an approximate indication of the funding gap that will result if we ignore the challenge posed by an aging infrastructure network; a significant portion of this infrastructure network is beginning to reach the end of its useful design life.

A panel of industry experts evaluated a draft of this report, and to the extent possible, the panel's critiques and comments are incorporated into this final report. The major points made by the reviewers are summarized in Appendix B. The reviewers agreed that the Gap Analysis provides an important starting point for the discussion about the magnitude of drinking water and clean water infrastructure funding issues. The general consensus was that the document represents a reasonable effort to quantify the infrastructure gap, given the limitations imposed by the available data. This praise, however, also contains the principal criticism of the analysis; the poor quality of the data severely constrains any effort to quantify the infrastructure funding gap with great accuracy. EPA acknowledges the uncertainty associated with the analysis. Nonetheless, in proposing these provisional estimates, the report encourages a policy discussion of the challenges confronting the nation's clean water and drinking water systems. Most experts familiar with the industry agree that these challenges must be met if we are to continue to advance environmental and public health protection.

5.1 Suggestions for Future Research

In developing this analysis and reading the comments from the peer reviewers, EPA noted that further research would help future efforts to quantify the infrastructure gap. Although far from an exhaustive list, the research areas identified below

38 The actual range is $-39 to $94 billion with a point estimate of $21 billion. Under the assumptions used for certain scenarios, the models predict a surplus of infrastructure funds, or rather, a negative gap. In these scenarios, total spending and/or revenues will exceed the total need over the next 20 years. The report excludes these negative values in the text, because systems generally would not collect revenues in excess of their current estimated infrastructure needs. However, it should be noted that doing so would free infrastructure funds for situations where gaps remain.

39 The actual range is $-17 to $267 billion with a point estimate of $102 billion. See Footnote 38 for further explanation.

40 The actual range is $-94 to $205 billion with a point estimate of $45 billion. See Footnote 38 for further explanation.

offer opportunities to improve the estimates.

- The inventory of the nation's clean water and drinking water capital stock and the condition of the capital stock should be more fully explored. Data providing an improved picture of the remaining life of these critical capital assets and data identifying the different classes of inventory (e.g., treatment, pipe, storage) would provide a foundation for progressing to the next step—assessing the condition of the nation's infrastructure. These data would greatly improve decision-making about investment needs for maintaining, upgrading, and expanding infrastructure.

- The relationship between O&M needs and capital stock is not fully understood. A more refined approach than the one adopted in this analysis would investigate how O&M needs vary as a function of gross (not net) capital stock and the age or condition of the capital stock. These data, other than in purely speculative form, are not yet available.

- Clean water and drinking water systems will incur significant costs over the next 20 years as they expand capacity to serve current and future growth. Methods for estimating capital investment needs associated with growth and changes in service standards were excluded from the analysis.

- This analysis would benefit from research into an array of issues that ultimately will determine, or at least influence, the scale of future capital investment needs. These issues will also determine how future capital investment needs are met. These issues include, but are not limited to, topics such as the following:

    - Implementation of best management practices, including asset management processes and capacity development

    - Restructuring, integrating, and amalgamating service providers to seek economies of scale in the provision of services

    - Pricing policies and their effect on demand elasticity for water

    - Demographic shifts within the United States

    - Efficiencies gained or lost due to the installation of the latest technology

    - Trends in operating costs (e.g., of chemicals and energy)

    - Criticality analysis (i.e., which components of a system should take precedence for investment due to age, condition, and importance)

    - Effects of non-like-for-like replacement of assets

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Environmental Protection
Agency
Washington, DC 20460

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4.2 2010 Report Card for Illinois Infrastructure, *American Society of Civil Engineers*

Report Card

To download the document, visit isasce.org/web/section/2010%20Infrastructure%20report/ASCEBrochureOutIndd.pdf

SUMMARY

In Illinois, the condition of our infrastructure is deteriorating. We cannot stand by and allow that to happen. Our quality of life depends on it and our citizens deserve better.

"I am a firm believer in the people. If given the truth, they can be depended upon to meet any national crisis. The great point is to bring them the real facts."

-Abraham Lincoln

When the American Society of Civil Engineers (ASCE) released its 2009 Report Card for America's Infrastructure in January 2009, several notable points stood out. The five-year investment need was estimated to be $2.2 trillion, an increase of $500 billion since ASCE's last Report Card in 2005. The longer we delay investment, the higher the cost will rise.

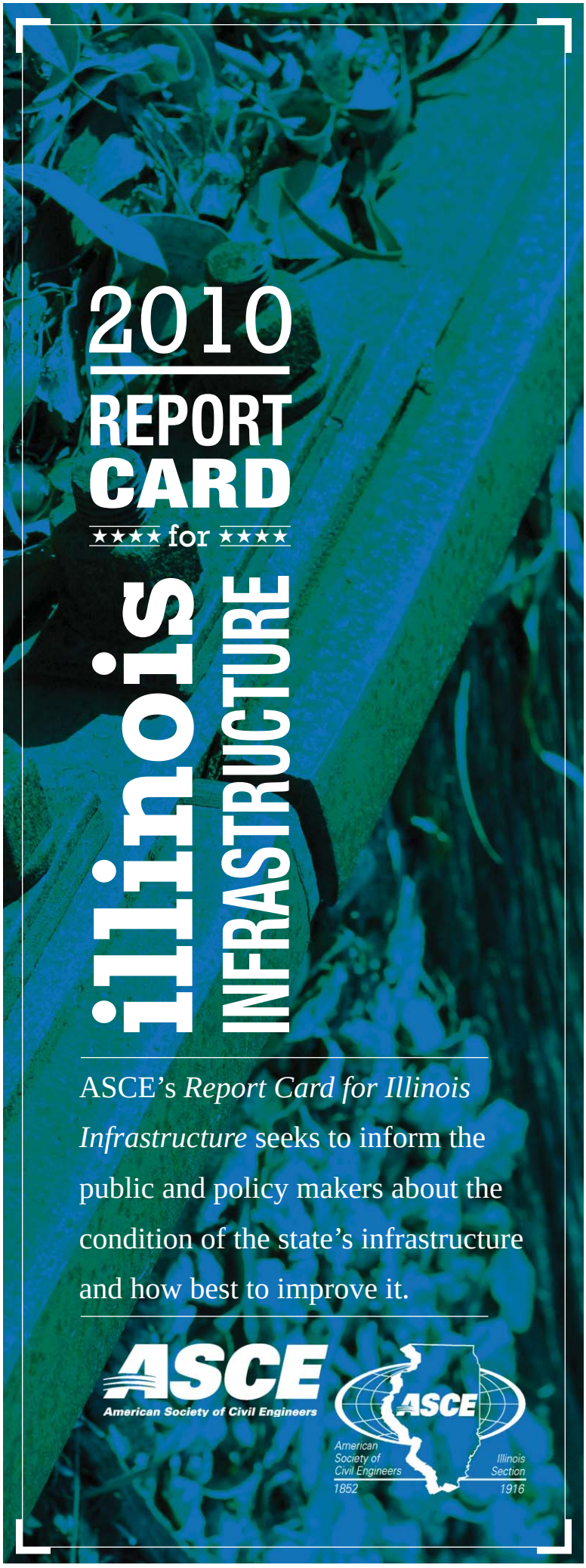
The second point is more sobering. The current five-year outlay, including funds from the American Recovery and Reinvestment Act of 2009, covers less than 46 percent of needed investment.

Does Illinois mirror this bleak national picture?

To find out, the Illinois Sections of ASCE authored a report card for the state of Illinois. This report card brings the state's infrastructure needs to the attention of our local legislators and the public. Similar to five-key solutions included in the 2009 Report Card for America's Infrastructure, the Illinois Sections also developed five key solutions to the infrastructure crisis our state is facing.

- ★ **INCREASE** federal and state leadership in infrastructure to address the crisis. The nation's infrastructure is more than a funding issue; it is a key basis to our economy and our way of life.
- ★ **PROMOTE** sustainability and resilience in infrastructure to protect the natural environment and withstand natural and man-made hazards.
- ★ **DEVELOP** national, state and regional infrastructure plans that complement a national vision and focus on system-wide results. Doing so will more effectively marshal funds while creating solutions with efficient expenditures.
- ★ **ADDRESS** life-cycle costs and ongoing maintenance to meet the needs of current and future users and to do so sustainably.
- ★ **IMPROVE** and increase infrastructure investment from all stakeholders –for as our infrastructure fails, such as the roads we use to drive to work or school every day, our neighborhoods fail.

Infrastructure has a direct impact on our personal and economic health, and the infrastructure crisis is endangering our future prosperity. For the safety and security of our families, we can no longer afford to ignore the congested roads and contaminated drinking water we face every day. We can no longer stand by and accept the status quo, or worse, reductions. The time has come for the citizens of Illinois to demand better.



2010 REPORT CARD for illinois INFRASTRUCTURE

Each category was evaluated on the basis of condition vs. need and funding vs. need.

A = Exceptional
B = Good
C = Mediocre
D = Poor

AVIATION	C+
BRIDGES	C+
DAMS	C
DRINKING WATER	D+
NAVIGABLE WATERWAYS	D-
RAIL	D
ROADS	D
TRANSIT	D+
WASTEWATER	D+

ILLINOIS 2010 GRADE D+

AVIATION. Our aviation infrastructure is a key component of both the nation's and state's transportation infrastructure network. A lack of attention to the aviation infrastructure results in deterioration of the current system and compromises its ability to meet future travel demands. According to the FAA's Terminal Area Forecast for 2008 to 2025, large hub and medium airports are expected to grow 43 or 35% in terms of enplanements for the next 18 years. Chicago O'Hare is projected to continue to be within the top three busiest airports in the nation.

BRIDGES. Seventeen percent of bridges in Illinois are classified as structurally deficient or functionally obsolete. Our bridges are a critical link not only for our local economy, but also for the national economy. Illinois is the cross roads for the movement of goods, both locally and nationally. With the continued expansion of goods distribution, an inevitable increase in the number of trucks will continue to degrade the condition of bridges in Illinois.

DAMS. Illinois has 445 dams (32%) that are more than 50 years old. Beyond 50 years of age marks the point when added monitoring and maintenance are needed to ensure the integrity of the dam. Of the 445 dams, nearly 74 percent have not been reviewed or issued a dam safety permit by the state. Each year as dams continue to age and downstream development increases, the potential for deficient high hazard dams also increases because of the growth in population below the dams. In 2009 only $266,000 and 4.5 full-time equivalent employees were dedicated to the safety of Illinois dams.

DRINKING WATER. Illinois's drinking water systems face a required investment of $13.5 billion over the next 20 years to replace aging facilities and comply with safe drinking regulations. In 2009, total federal funding for drinking water was less than $3 billion, which included a one-time $2 billion infusion of funds from the American Recovery and Reinvestment Act. The Congressional Budget Office estimates that between $10 and $20 billion must be spent on drinking water annually. With such great needs nationally, federal funding alone cannot meet Illinois's needs.

NAVIGABLE WATERWAYS. The Mississippi, Illinois and Ohio rivers and Lake Michigan locks near Chicago provide vital commercial shipping links for goods to travel throughout the country. However, inadequate funding and an unreliable lock-and-dam system threaten the future viability of the state's navigable waterway infrastructure

RAIL. Congestion on the state's rail system costs millions of dollars in shipping delays, and causes substantial noise and air pollution as trains idle for hours waiting for track clearance. With freight traffic expected to double in the next 20 years, these problems will only worsen.

ROADS. Severe traffic congestion costs Illinois's economy tens of billions of dollars in lost productivity each year. Congestion is estimated to cost $4 billion for the Chicago area alone. 16% of Illinois roads are in poor to mediocre condition and cost the state $2.2 billion annually. The economic loss related to traffic crashes in Illinois cost $10 billion annually.

TRANSIT. Current 5-Year Capital needs in Northeastern Illinois is over $10 billion, the recent Illinois Capital Bill provides only $2.7 billion. Transit ridership in Illinois increased 6% in 2008. Although the dramatic growth in intra-suburban commuting is a major challenge for transit given the automobile orientation of many suburban developments, environmental concerns and the cost of gasoline leave open the prospect for transit at some level. Much of the infrastructure for a world-class transit system, particularly in Northeastern Illinois, is in place. It has suffered as a result of age and lack of funding.

WASTEWATER. Wastewater management systems are aging and discharge billions of gallons of untreated sewage into Illinois surface waters each year. Currently, the Environmental Protection Agency (EPA) estimates that the state of Illinois must invest $13.4 billion over the next 20 years to replace existing systems and build new ones to meet increasing demands. Federal assistance alone cannot be expected to meet Illinois's needs.

4.3 White Paper on Water PPPs, *American Water*

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To download the document, visit files.shareholder.com/downloads/AMERPR/407078680x0x188153/38598562-1200-4545-A08E 63C9B6D5EE85/Challenges%20In%20The%20Water%20Industry%20PPP041608.pdf

WHITE PAPER

AMERICAN WATER

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Challenges in the Water Industry:

Public-Private-Partnerships as a Solution

That the U.S. faces massive infrastructure challenges is widely acknowledged among opinion leaders, pundits, journalists, and government and utility industries experts. Chief among these issues, but often less discussed, is water. Communities across America face huge obstacles as they struggle to provide reliable water in the face of aging infrastructure, growing demand and increasing complexity of water management. Indeed, the Obama Administration has noted the critical need for increased investments in US infrastructure, of which water is expected to play an essential role.

To meet their obligations, communities are faced with investing vast amounts of money, resources and expertise to renew their water systems. Even with the willingness to spend the money and access to capital, many communities lack the in-depth experience, to design and/or implement such a plan on their own. One solution that is expected to gain significant traction over the next few years is the Public-Private- Partnership model, whereby private-sector water companies assist in the design, rebuilding and operation of publicly owned water systems.

CHALLENGES

Before discussing the solutions partnerships can offer, it is important to first consider the types of challenges communities face. Here are some of them:

Aging Infrastructure

A sobering EPA projection is that some $335 billion is required to replace aging water infrastructure.[1] But with water related services twice as capital-intensive as electricity and three times as capital intensive as gas,[2] many communities simply cannot afford to upgrade their systems, many of which are decades to a century old.

In 2010, nearly 87% of city finance officers reported declining revenues and that their cities were less able to meet fiscal needs than in previous years. One way for these cities to cover budget deficits is to delay or cancel infrastructure projects.[3] Despite spending billions on infrastructure each year, there is an annual gap of $19 billion in what we need to invest and we actually do invest to replace aging facilities that are near the end of their useful life and to comply with

1 Environmental Protection Agency 2007 Drinking Water Infrastructure Needs Survey and Assessment, presented March 2009. http://www.epa.gov/ogwdw000/needssurvey/index.html
2 Wolff, Gary and Eric Hallstein. Beyond Privatization: Restructuring water systems to improve performance. Retrieved December 19, 2006 from http://www.pacinst.org/reports/beyond_privatization/
3 National League of Cities 2010 Research Brief on America's Cities

existing and future federal water regulations.[4] The shortfall does not account for any growth in the demand for drinking water over the next 20 years.

Meeting increasing complexity

Another challenge relates to the increasing complexity of water management, which some communities are ill-equipped to address. For example, the EPA is continuously updating regulations on water quality and safety. Thus, the knowledge, experience and investment required make compliance increasingly difficult. Likewise, efficient water management is no longer simply about supplying water to the tap -- it encompasses waste water treatment, storm water management, water reuse and desalination systems -- all of which require a high level of skill and expertise to design and implement. These challenges can be facilitated through Public-Private-Partnerships. These alliances also have increasing value in helping plan and deliver water to meet specialized industrial needs, a vital component of any city's economic development efforts. Finally, the rise in demand across a variety of regions that lack proper infrastructure means that extensive planning and expertise are needed to develop cost-effective regional water supply solutions.

Growing demand

Increasing demand for water and the pressure it puts on infrastructure is also an issue and takes a variety of forms. In many large, older cities growing populations drive demand.[5] In western states like Nevada, California, and Arizona entire communities are sprouting in places where basics such as piping and water supply sources do not yet exist.[6] And frequently, smaller communities with an aging system have a critical need for a stable and sophisticated water management system to meet incremental growth.

SOLUTIONS

Currently, 85 percent of water systems are operated by municipalities and other government entities, which have been confronted with declining property tax revenue, which is often used to issue bonds, as a result of the gradual impact of the declining housing market.[7] The remaining 15 percent are owned and operated by the private-sector. But the devil is in the detail. Given the billions needed to upgrade infrastructure, the potential cost burden may be more than local political structures can sustain. Transcending this dilemma and offering a more holistic approach to water management, Public-Private-Partnerships offer an answer to the country's pressing water challenges. And with key water industry experts recommending a revamped role of the national government regarding water infrastructure investments as well as increased partnerships with the private sector, Public-Private Partnerships are expected to rise.[8] Some of the ways in which these partnerships can positively impact communities are outlined below.

Leveraging Expertise

One way in which partnerships can help local municipalities is by leveraging the knowledge and experience of a skilled partner. Small communities may significantly upgrade their water systems

4 National League of Cities 2010 Research Brief on America's Cities
5 In fact, New York recently launched a PLANYC 2030 initiative to address some of its challenges in relation to its growing population as well as its water management.
6 For additional information on the challenges of meeting demand in water supply in the West, please refer the American Water White Paper, Challenges in the Water Industry: Meeting Demand in the West.
7 National League of Cities 2010 Research Brief on America's Cities
8 American Water Resources Association, Environment and Water Resources Institute of the American Society of Civil Engineers, and the National Wildlife Federation. "Fourth National Water Policy Dialogue," September 2008

only once every fifty years.[9] At such a rate of engagement it makes little economic sense for smaller towns to employ highly sophisticated full time personnel to manage complex updates. Because a primary aspect of private water company business is upgrading infrastructure, they accumulate skills based on operating multiple water systems in a variety of geographic settings. In terms of resources, these water utilities maintain highly specialized staffs of scientific experts and engineers who can be made available to communities as needed. Through partnerships, municipalities gain affordable access to such expertise.

Total Water Management

Water utilities can also address complicated issues through the implementation of solutions such as Total Water Management (TWM).[10] In harnessing the synergies between potable water and waste water management, for example, water poured down drains can be treated and reused for golf courses, heating-cooling and flush systems,[11] thereby conserving a city's precious ground water resource for drinking. Public-Private-Partnerships have created powerful models of such programs in Battery Park City in New York, Gillette Stadium in Massachusetts, the Homestead active adult community in New Jersey, to name a few. In other instances, a water utility can help communities gain access to an affordable and efficient water system. In West Virginia, for example, over 20,000 homes were supplied with drinking water and fire protection services through a public-private partnership, which would have otherwise taken years to provide.[12]

Finally, partnerships can help communities better manage the risks associated with water management, such as the increasingly stringent regulatory requirements and penalties associated with water and waste-water facilities. A case in point: Fillmore, CA recently engaged in a partnership for a Design, Build, and Operate (DBO) contract for a new wastewater recycling facility. In doing so, Fillmore transferred the specific risks associated with a DBO facility to a private company, which is better positioned and equipped to manage such ventures.[13]

Funding

In bridging the infrastructure gap, another way partnerships can assist communities is by bridging the capital gap. A town that has limited financial and staffing resources, for example, can contract its system out to a water utility. In return, the water utility can offer a greater economy of scale in its services by providing better management, modern metering techniques, leak detection technologies, access to capital, emergency response and ultimately a more cost-effective water system. In Seattle, the Tolt Water Treatment plant under American Water's management has saved 40 percent of previous costs.[14]

This model is one partnership program with particular advantages, since it grants communities access to funds that a private utility anticipates it can save. To illustrate, a water company can estimate relatively accurately how much money it will save a community. Numerous surveys indicate that governments traditionally realize cost savings of 20 to 50 percent when the private-sector is involved with providing services.[15] So a water system that costs a town $1 million to operate may only cost a water utility $800,000. Based on these averages, the water utility can

9 This is based on the fact that pipes last for only 50-100 years. Fritz, Anthony, Gabelli & Company. "The Water Market." www.pump-zone.com, 01/08/2007.
10 Developed by American Water, Total Water Management delivers innovative technologies and solutions such as water reuse, Design-Build-Operate, waste-water management, etc.
11 Examples of American Water reclaimed water solutions include the Solaire and Tribeca Green buildings in Battery Park City, Manhattan, the Gillette Stadium and Wrentham Mall in Massachusetts, and for fountains and park irrigation in Arizona.
12 Provided by West Virginia American Water.
13 The Fillmore PPP was contracted to American Water.
14 Partnerships & Alliances www1.fidic.org/conference/2004/talks/workshops/FIDIC_WS_6_William_Howard.pdf
15 The National Council for Public-Private Partnerships http://www.ncppp.org/presskit/topten.shtml

then offer a town a lump sum of money upfront, which the town can use for other purposes such as financing roads, schools or pension liabilities.

Responsibility

Finally, partnerships can offer greater accountability in water management. A partnership puts the focal point of responsibility on the water utility, which becomes the prime contractor responsible for the operation. Under a publicly managed approach, there is not always a clear line of authority. Shifting this level of responsibility to a private company means that issues can be clearly addressed and resolved, rather than be redirected through a sometimes contentious municipal process.

From a business standpoint, public-private partnerships are a promising area for stable growth in the water utility sector: over 90 percent of partnership contracts are renewed annually. A source at the National Association of Water Companies is quoted in *Water Policy Report*: "There are clear signs that municipal leaders are enormously satisfied with the results of these contracts."[16] Consider again Fillmore, CA. Building upon its current successful partnership with the private sector to operate and maintain the city's existing wastewater treatment facility, the city recently decided to partner again and on a much broader scale with the private sector to design, build and operate the city's new wastewater recycling facility. It is also worth noting that for Fillmore this new facility will be the largest one-time investment in its history.[17] In West Virginia, the Kanawha County Commission President noted that partnerships with private-sector companies "changed the lives" for many of the residents in his county. He added that "the need for private infrastructure investments in [the county] is so important, especially those that extend water to individuals that have gone without."[18]

Finally, the ability of private companies to earn a return on investment provides further incentive for capital investment that does not exist for their public counterparts.[19] Indeed, some contend that the country's infrastructure needs are so great that all forms of investment must be considered, including Public-Private-Partnerships.[20]

CONCLUSION

Water is one of our most essential commodities, and the infrastructure supporting the delivery of this essential product is in serious need of repair. If the infrastructure challenges are to be resolved, creative solutions must be generated and new partnerships need to be forged. Public-Private-Partnerships offer one of the most viable ways in which cities, towns, and communities can access the industry expertise and capital of the private-sector. With increased focus on such issues expected from the Obama Administration, these partnerships will play an increasingly critical role in helping the U.S. overcome its water infrastructure challenges.

16 "Cities' Skepticism Over Privatizing Drinking Water May Be Growing." *Water Policy Report.* Vol. 15, No. 12. June 12, 2006.
17 Contracted to American Water.
18 Kent Carper, Kanawha County Commission President, West Virginia, referring to a partnership with West Virginia American Water.
19 *Water and Sewer Needs and Capital Finance. Strategies in Appalachia.* Retrieved December 19, 2006 from http://www.efc.unc.edu/projects/ARCprojecthome2.htm
20 "Cities' Skepticism Over Privatizing Drinking Water May Be Growing." *Water Policy Report.* Vol. 15, No. 12. June 12, 2006.

4.4 Summary of Water Rates and Revenue, *Illinois-Indiana Sea Grant*

Summary

For more information, visit: iisgcp.org/

Summary of *Water Rates and Revenue*
DuPage Water Commission
2013 Water Management Workshop Series
August 28, 2013
Margaret Schneemann, Water Resource Economist
Illinois-Indiana Sea Grant

We know about the importance of proactive investment in water infrastructure. On top of the challenges involved in financially planning for future and legacy infrastructure, many water systems are finding it increasingly difficult to manage revenue risks associated with changing residential water use patterns. This is due in no small part to a historical trend of decreasing water use – for example, here in Illinois, we've seen a reduction in use of approximately 0.7 percent per year.[1] This trend is not unique to Illinois: we see it nationally and we see it locally.

Reductions in water demand are not free. For planned water conservation programs, there exist the costs of planning itself as well as implementation costs. Perhaps less obviously, both planned and passive conservation incur additional costs in the form of revenue adjustments as demand decreases. While using water more efficiently is beneficial for our shared regional water resources, reductions in water sales have very real, tangible financial impacts – revenue reductions – to our community water utilities. This is because, for the majority of water systems, conservation impacts only operational costs – costs such as chemicals and energy that, while inflating, remain a relatively small percent of the total water utility cost picture. Water suppliers are committed to cover the relatively larger fixed costs associated with maintaining the water system's readiness-to-serve – the vast amount of infrastructure that makes water delivery possible. From the utility's perspective, conservation only makes financial sense when the avoided cost of water production is greater than the cost per unit of the conservation program.

Reduced water demand is not limited to systems actively promoting conservation. There can be many reasons for demand reductions – cyclical weather patterns; recession-related effects (reduced incomes, curtailed construction, foreclosure vacancies, fewer industrial shifts); national plumbing code changes, resulting in more high-efficiency plumbing fixtures and household appliances; rising water prices; system operational improvements such as energy efficiency and more effective water loss control – it's a long list. Understanding the factors behind water use trends is the first step in making financial management planning more resilient to revenue risk.

Many analysts trace financial management difficulties to the mismatch between the high fixed costs in the water industry on the one hand, and the variable revenue stream from usage rates on the other – resulting in a revenue-expense mismatch. The majority of water systems in our region use a two-part rate schedule, including a charge that varies with water use (volumetric)

[1] The data shows a statistically significant (t-value = 6.4 ; $p < 0.0001$) declining trend of per capita use. Source: **Residential Water Use in Northeastern Illinois:** Estimating Water-Use Effects of In-Fill Growth versus Exurban Expansion Prepared by: Ben Dziegielewski August 25, 2009.

and a charge that does not vary with water use (fixed or base charge). The volumetric portion of the change provides a conservation message, whereas the base charge does not. The majority of the water and wastewater structures in our region include a volumetric component – 99% for water rates and 86% for wastewater rates. The bad news is that the greater the proportion of revenue recovered volumetrically, the greater the revenue risk.

The tension between conservation rates and revenue risk is referred to as the conservation conundrum. Utilities' costs are mostly fixed, not dependent on the amount of water sold to or used by customers. But the majority of revenues come from the amount of water sold. If customers conserve, revenues drop significantly, but costs do not. Revenue vulnerability and variability, like usage, varies from year to year and is a function of both use and price. Price responsiveness, given by the price elasticity of demand, only applies to the volumetric charge on the bill. Fixed charges provide no incentive to reduce use, and high fixed charges make it difficult for the utility to encourage conservation. But fixed charges contribute to revenue stability. In terms of rate design, the allocation between the fixed charge and the variable charge is therefore a key question. Since the cost of service approach allocates costs based on cost-causation, in theory, but not always in practice, the fixed charge reflects those costs associated with serving customers regardless of the amount of water used.

Balancing fixed and variable charges in the rate-setting process involves making trade-offs between competing objectives – objectives that would ideally be prioritized by rate-setting community stakeholders before designing and adopting rates. One thing for certain is that more and more communities will need to include revenue stability as a targeted water rate objective. Communities do seek to balance a number of other rate-setting objectives and so we see, and will continue to see, variations in rates and rate structures across the region depending on each community's unique situation. Because rate design involves communities weighting and ranking these multiple objectives, there is no one-size-fits-all rate structure design.

Failing to consider price effects, particularly when actively promoting water conservation, can have serious implications on sales and revenue recovery. Beyond using rates for full supply cost recovery, water rates can be used to recover the costs of a conservation program, and also used as part of the conservation program itself, due to the price responsiveness of water demand. Customer response to pricing varies depending on rate structure, service area, economic climate, seasonality and other factors. The sweet spot for public utility managers is revenue-neutral conservation – balancing sales reductions and resulting revenue impacts with cost-based price adjustments. Beyond this, encouraging conservation on a regional scale can benefit from providing tools and incentives that mitigate conservation's financial impact on our community water utilities.

For more information, see Forecasting Urban Water Demand (Second Edition), R.B. Billings and C.V. Jones. American Water Works Association. 2008. 350 pages. ISBN 1-58321-537-9.

IISG-13-86

4.5 Full-Cost Water Pricing Guidebook for Sustainable Community Water Systems, *CMAP*

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To download the full report, visit cmap.illinois.gov/documents/20583/1294521/Full-Cost+Water+Pricing+Guidebook/

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Full-Cost Water Pricing Guidebook

for Sustainable Community Water Systems

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Chicago Metropolitan Agency for Planning (CMAP)
CMAP is the official regional planning organization for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will. CMAP developed and now leads the implementation of GO TO 2040, metropolitan Chicago's first comprehensive regional plan in more than 100 years. To address anticipated population growth of more than 2 million new residents, GO TO 2040 establishes coordinated strategies that help the region's 284 communities address transportation, housing, economic development, open space, environmental, and other quality-of-life issues. See **www.cmap.illinois.gov** for more information.

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IISG is one of 33 college programs nationwide, and is dedicated to conducting research, education, and outreach to serve Lake Michigan's southern coast. With its mandate to bring the latest university-based science to those who need it, IISG brings together scientists, educators, policy makers, community decision makers, outreach specialists, business leaders, and the general public to work towards a sustainable environment and economy. Visit **www.iiseagrant.org**.

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See **web.extension.illinois.edu/state** for more information.

Full-Cost Water Pricing Guidebook for Sustainable Community Water Systems

Situated along the shore of Lake Michigan, metropolitan Chicago has benefitted for centuries from an abundance of fresh water. The infrastructure necessary for delivering water is primarily underground: out of sight, and out of mind. Recognition of the status of water infrastructure and the resulting challenges faced by our community water suppliers has been building. At the same time, a new regional understanding has emerged regarding the need to manage water demand and the role water price will play moving forward.

The long-range GO TO 2040 comprehensive regional plan specifically recommends full-cost pricing to encourage residents to conserve water and to provide communities with adequate revenues. Recovering the full cost of providing water service is fundamental to addressing both the need for investment in water infrastructure and the challenge of accommodating millions more residents in livable communities by mid-century. This manual explores full-cost pricing as a tool for local decision makers interested in sustainably managing community water supply.

The intended audience for this document is local decision makers. **Section 1: Full-Cost Water for Livable Communities** provides the 'why do it' for mayors, village managers, planners, board and council members, and interested residents. **Section 2: Towards Full-Cost Pricing** provides a basic 'how to do it' overview for readers interested in learning more details about effective utility management. **Section 3: Water Rate Structures** delves further into one of the most important decisions in setting water rates, designing the rate structure.

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Full-cost pricing has multiple benefits, from addressing the current disconnect between prices and sustainable infrastructure investment to ensuring sustainable levels of resource use. Economically-determined prices have additional benefits for managing and allocating scarce water resources. In order for full-cost pricing to take hold, challenges faced by communities implementing full-cost pricing, and ways to successfully motivate all communities to adopt full-cost pricing, need to be addressed.

On the ground, outreach and training programs will be key to moving the region towards full-cost pricing. This is because decisions about pricing are made based on utility-level analysis to make community-appropriate local decisions about water rates. When customers understand where their water is coming from, the full range of assets that need to be managed to make the tap turn on, they will understand the financial need for a rate increase, and more support will be generated for community water systems. Likewise, elected officials are more likely to go ahead with rate increases when provided with information on the condition of their system assets and the critical, time-sensitive nature of the replacement and rehabilitation projects that are often the primary drivers of rate increases.

Residents, given a choice, typically vote in favor of cheaper utility services. Public utility governing bodies, therefore, face the difficult task of ensuring that their decisions balance their constituents' need for affordable water with the long-term financial health of their community water system. Public water suppliers will lead the way, but only if supported by an informed public and backed by local elected officials. Long term, economically-determined prices have the potential as a policy tool not only to send correct signals about investment in system infrastructure, but also ensure sustainable use of our water resources for generations to come.

Figure 23. Benefits and risks of implementing full-cost pricing

BENEFITS OF IMPLEMENTATION	RISKS OF NOT IMPLEMENTING
Is a sound business practice	**Risk of lower credit rating and higher lending costs**
"Good Governance" including funding depreciation and incremental replacement costs	**Increased public health risk**
Ensures sustainability of water infrastructure as funds are available for regular maintenance	**System infrastructure degrades, insufficient recovery of capital costs creates pressures for general tax revenue subsidization**
Communicates investment needs	**Increase in costly emergency repairs**
Helps rate decision-makers (city councils, commissioners, regulators) evaluate rate requests	**Funding approval difficult**
The service provider can be accountable to customers and defend rates	**Potential negative community image/public relations**
Promotes water efficiency and reduction in system water loss, and associated deferral and/or downscaling of new water/wastewater supply projects, and increased water consumer awareness of the value of water	**Distortion in prices leads to insufficient use of water substitutes (such as water efficient appliances) and overuse of water, resulting in excessive investment in system capacity**
Promotes rate stability and customer support for rate adjustments	**Increasing risk of rate shock**
Promotes economic development	**Reduced ability to attract economic development/lost economic growth**
Reduces non-compliance risk	**Increasing non-compliance risk**
Demonstrates good fiscal management, visionary, planning improved financial practices and more efficient management	**Increased liability risk (e.g., fire, health, safety, water quality) and increasing risk of higher insurance costs**
Ensures target service levels meet sufficient revenues to ensure system reliability	**Increased environmental damage risk**
Available funds to protect watersheds and water sources	**Reliance on external funding for water quality protection**

Source: Author's construct.

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4.6 Infrastructure Sustainability, *US EPA*

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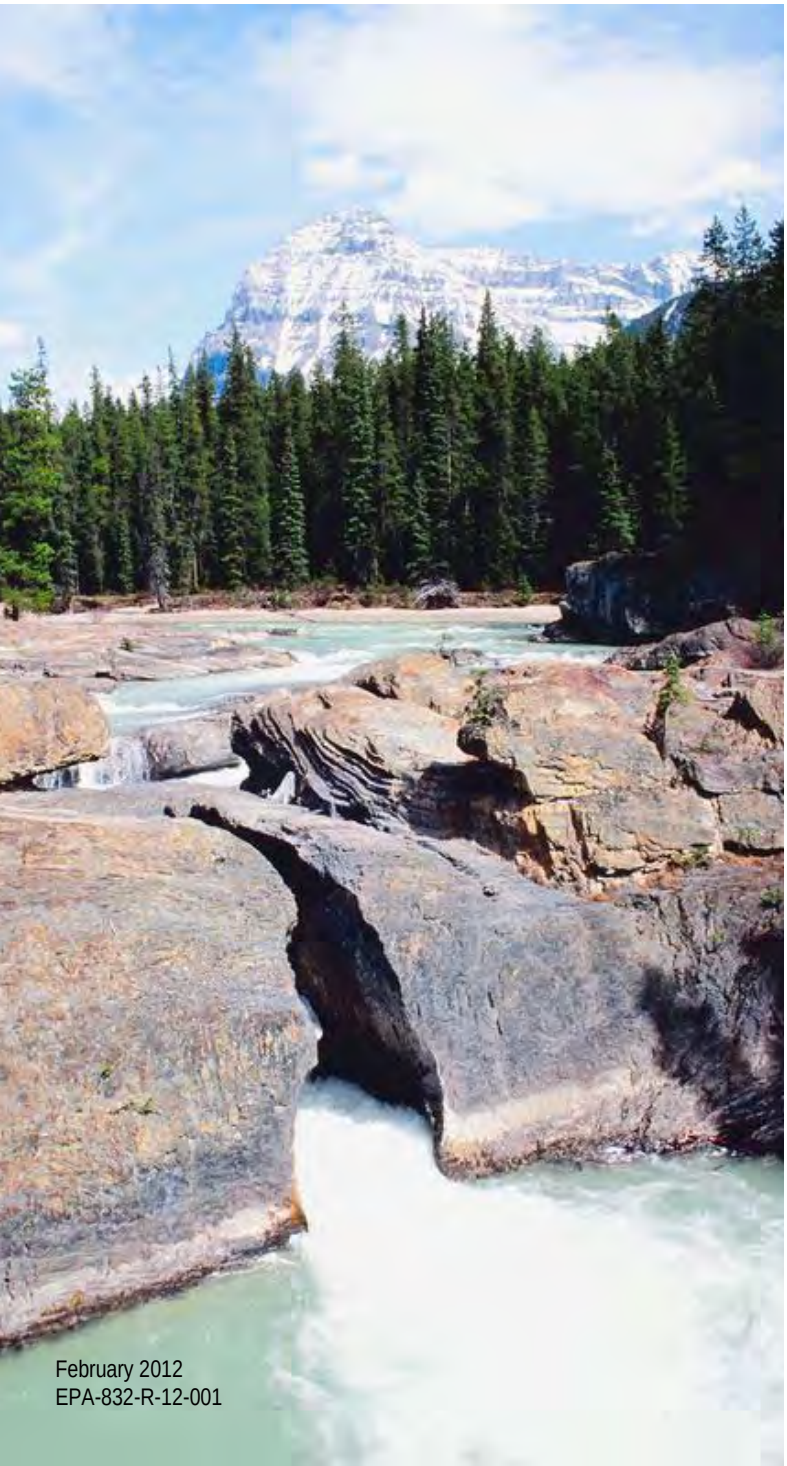
To download the full report, visit water.epa.gov/infrastructure/sustain/upload/EPA-s-Planning-for-Sustainability-Handbook.pdf

Planning for Sustainability

EPA United States Environmental Protection Agency

A Handbook for Water and Wastewater Utilities



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Foreword

Sustainable water infrastructure is vital to providing the American public with clean and safe water and helping to ensure the environmental, economic, and social health of the nation's communities. For the past several years, the U.S. Environmental Protection Agency (EPA) has worked with states, industry, and other stakeholders to help water and wastewater utilities sustainably plan and manage their water infrastructure and adopt innovative practices such as green infrastructure.

In September 2010, EPA released the *Clean Water and Safe Drinking Water Infrastructure Sustainability Policy* which described EPA's overall vision and priorities for ensuring the long-term sustainability of water infrastructure and communities throughout the nation. As the Policy was developed, stakeholders strongly emphasized the need to focus on the planning that takes place in the project development phase, before infrastructure solutions are designed and implemented.

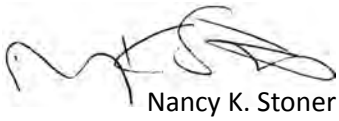
In response, EPA is issuing *Planning for Sustainability: A Handbook for Water and Wastewater Utilities.* The Handbook describes a number of steps utilities can undertake to enhance their existing planning processes to ensure that water infrastructure investments are cost-effective over their life-cycle, resource efficient, and support other relevant community goals. Developed after extensive consultation and input from utilities, states, and other stakeholders, the Handbook is organized around a series of Core Elements, including:

- Setting utility sustainability goals and objectives that also support relevant community goals;
- Analyzing a range of alternatives, including green infrastructure and other innovative approaches, based on full life-cycle costs; and
- Implementing a financial strategy, including adequate rate structures, to ensure the alternatives selected are sufficiently funded, operated, maintained, and replaced over time.

EPA believes that utilities which incorporate sustainability considerations into planning consistent with the steps in this Handbook will realize many benefits because they will be able to better:

- Optimize environmental, economic, and social benefits by setting goals and selecting projects through a transparent and inclusive process with the community;
- Consistently assess a range of alternatives that address utility and community goals; and
- Enhance the long-term technical, financial, and managerial capacity of the utility.

Protecting our communities and our precious water resources by sustaining our Nation's water infrastructure is a critical and ongoing challenge. This Handbook is designed to help address this challenge.



Nancy K. Stoner
Acting Assistant Administrator for Water

Introduction and Context

Sustainable water infrastructure is critical to providing the American public with clean and safe water and to help ensure the social, environmental, and economic sustainability of the communities that water utilities serve. For the past several years, the U.S. Environmental Protection Agency (EPA), working with states and utilities, has been undertaking a number of programs to help ensure the long-term sustainability of water infrastructure. A key component of EPA's work has been to promote the adoption of practices by water and wastewater utilities that will help these utilities plan and effectively manage their infrastructure and operations to ensure sustainability and develop and maintain the necessary technical, financial, and managerial capacity to do this planning.

These efforts act in support of effective utility management based on the *Attributes of Effectively Managed Utilities,*[1] and include the Safe Drinking Water Act's Capacity Development Program, and training and technical assistance on advanced asset management and energy management.

In October 2010, EPA issued a *Clean Water and Drinking Water Infrastructure Sustainability Policy* in accordance with directions set forth in the President's FY 2010 budget request to Congress.[2] This Policy describes EPA's overall vision and priorities for ensuring the long-term sustainability of the nation's water infrastructure and the communities this infrastructure serves. The policy is applicable to infrastructure funded through the clean and safe drinking water State Revolving Loan Fund programs (SRFs), traditional forms of community financing, or other appropriate financing mechanisms.

During public consultation as the Policy was being developed, stakeholders emphasized that utility infrastructure investments throughout the water sector could best be influenced through the planning that takes place in the project development phase, before infrastructure solutions are selected and designed. This planning is relatively low cost and can reduce long-term infrastructure costs. Such planning helps ensure that funded projects are financially sustainable over the long term and that they support other relevant community sustainability goals.

Water utilities typically have a long-term planning horizon and long-term infrastructure operation and maintenance commitments. The costs and potential benefits of investment decisions will be realized over a long period of time. Accordingly, EPA's Sustainability Policy calls on drinking water and wastewater systems to undertake "robust and comprehensive" planning to ensure that water infrastructure investments are cost-effective over their lifecycle, resource efficient, and consistent with other relevant community goals. Throughout the Policy, EPA emphasizes the important relationship between utility and community sustainability. The core mission of water sector utilities is to provide clean and safe water in compliance with all applicable standards and requirements at an affordable price in order protect public health and enhance the economic, environmental, and social sustainability of the communities they serve. Similarly, a community's approach to economic development,

[1] See: http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

[2] See: http://water.epa.gov/infrastructure/sustain/Clean-Water-and-Drinking-Water-Infrastructure-Sustainability-Policy.cfm

transportation, housing, and other relevant areas can also strongly influence the management, operations, and financial health of utility services—including the quality and quantity of available water, and drinking and wastewater capacity and treatment needs.

This handbook reflects a system-wide approach to planning that can drive a strategic shift from a project-by-project focus to one of utilities as systems. It can drive greater consideration of a utility's role within the community or watershed and open up opportunities to achieve water quantity and quality objectives. Many water infrastructure decisions share interdependencies with housing, transportation, and other infrastructure, requiring collaboration or pursuit of coordinated strategies to optimize these investments. A system-wide approach involves utilities looking "beyond the fence line" to include community institutions, and the implementation of projects outside the utility's direct span of control. There is also an opportunity to discuss collaborative partnerships with other municipal departments and with neighboring utilities to share information and services, or to plan on a regional basis.

A number of utilities are also facing challenging and sometimes competing infrastructure priorities driven by regulatory requirements. This handbook, supplemented by other more specific guidance, can help utilities consider a range of potential solutions that enable them to efficiently address their most pressing public health and welfare issues. Utilities that effectively incorporate sustainability considerations into planning can expect to achieve a number of benefits, including:

- **Minimizing costs** by optimizing investment choices, operating water and wastewater systems more efficiently, and pursuing cost-effective investment and management strategies, such as collaboration and partnering with neighboring systems to leverage resources and improve efficiency.
- **Maximizing results of investments** to ensure a continuing source of water, treatment, and discharge capacity, as well as financing capability.
- **Improving the ability to analyze a range of alternatives**, including (as appropriate) both traditional and non-traditional infrastructure alternatives, such as green infrastructure and/or decentralized **systems, and selecting the option or mix of options that best meet the needs of the utility and the community it serves.**
- **Engendering greater support for the utility** by recognizing community values and sustainability priorities.
- **Ensuring that financial and revenue strategies** are adequate to finance, operate, maintain, and replace essential infrastructure throughout its operational life, while appropriately considering the needs of disadvantaged households.

Reducing Costs through More Effective Water Utility Energy Management

Water utility planning that leads to adoption of energy efficient operational practices and technology can save utilities money. Nationally, water and wastewater energy costs are often 30-40% of a municipality's total energy bill. They are also often the largest controllable cost for these utilities.

The Hidden Valley Lake Community Service District in California, for example, found that it could save $70,000 per year in energy costs by pumping water during off-peak times when rates were lower.

This handbook focuses on helping utilities to incorporate sustainability considerations into their existing planning processes effectively. It will assist them in selecting projects that ensure protection of public health and water quality, support other relevant community goals, reflect full lifecycle costs, are based on a robust analysis of alternatives (including conservation or "green" approaches), and are implemented through an ongoing self-supporting financial strategy. If utilities are fully undertaking the actions described in this handbook, they will make decisions that are the most appropriate for the utility and the community and optimize economic, environmental, and social sustainability.

Some utilities and communities have been incorporating sustainability considerations into their planning processes but are looking for ways to improve and refine their current efforts. Others may choose to focus on how such considerations can help to cost-effectively meet existing regulatory or service requirements. Regardless of motivation, the steps described in this handbook can help to optimize infrastructure and operational investments.

Sustainability Planning and Regulatory Compliance

Compliance with regulatory requirements is a key focus of water and wastewater utilities. By incorporating sustainability considerations into planning, utilities can meet regulatory requirements in ways that also contribute to utility and community sustainability. Examples (described further in this handbook) include:

- Lenexa, Kansas, which met new Municipal Separate Storm Sewer permit requirements by aligning stormwater management strategy with community master planning priorities through a program that promotes economic vitality, addresses environmental concerns, and meets community needs (see page 12).
- Louisville and Jefferson County (Kentucky) Municipal Sewer District which evaluated and selected green infrastructure strategies based on community input to meet consent decree requirements for its sanitary and combined sewer system (see page 44).

Some utilities may want to start with small steps toward incorporating sustainability into their planning and operations and then pursue larger commitments to sustainability over time. To get started, utility managers should create time to discuss and seek input on their sustainability planning with their boards, commissions, and other leadership bodies. Appendix A includes resources for working with boards and commissions.

Utilities will want to improve their planning process continually over time by evaluating and refining their goals, objectives, and strategies. Recognizing that effectively incorporating sustainability considerations into planning is a long-term process, utilities may also want to consider codifying a policy that builds sustainability considerations as outlined in this handbook into their planning processes. A policy can provide for long-term planning continuity and drive continual improvement even as utility leadership and oversight changes over time. A policy can also convey the commitment to sustainability in the utility's strategic direction and day-to-day operations support a process of internal communication to board members and employees.

Purpose and Intended Use of this Handbook

This handbook is intended to provide information about how to *enhance* current planning processes by building in sustainability considerations. It is designed to be useful for various types and scales of planning efforts, such as:

- Long-range integrated water resource planning
- Strategic planning
- Capital planning
- System-wide planning to meet regulatory requirements (e.g., combined sewer overflow upgrades and new stormwater permitting requirements)
- Specific infrastructure project planning (e.g., for repair, rehabilitation, or replacement of specific infrastructure)

A plan's scope and time period will determine the scale of projects considered. For example, comprehensive, long-range planning will typically focus on large-scale infrastructure, watershed, and/or aquifer management decisions, while more routine, smaller scale project planning may focus on narrower investments in new or existing infrastructure components or operational changes.

In practice, the planning elements described in this handbook can enhance several planning processes at a utility. For example, a utility can establish goals and objectives reflecting sustainability considerations in a strategic planning process with a 10- to 15-year time horizon, then use them to guide 5-Year Capital Plan decisions.

Where applicable, utilities are also encouraged to engage with other municipal departments during the planning process. For example, there may not be enough sludge generated by the utility alone to justify the purchase and operation of a digester, but in combination with other organics collected by the solid waste department, there may be enough energy generated to make the purchase.

This handbook is intended to be used by utilities of various sizes and levels of capability regardless of their use of SRF or other federal water infrastructure funding. EPA recognizes that some elements of the handbook may pose challenges for utilities delivering water and wastewater services at a smaller scale, those that may have limited resources or capacity, or those that have not adopted a formal planning process. The handbook describes steps these utilities can undertake to enhance their planning. It also includes examples and resources specifically for utilities implementing activities at a smaller scale.

Finally, EPA recognizes that some period of testing and refinement of this handbook will be necessary to improve the document over time.

Approach

Utility planning processes typically involve a series of consistent and predictable activities that encompass identifying goals, setting objectives, assessing alternatives, and developing a financial

strategy. In many cases, this process is complemented by ongoing asset management programs and stakeholder involvement and communication. Based on this typical planning process, this handbook identifies four "core" elements where consistent and predictable practices can help utilities effectively build sustainability considerations into their planning processes. The elements will help utilities set sustainability goals and associated measurable objectives, consider a range of infrastructure alternatives (including various watershed, conservation, or "green" alternatives), and implement a financial strategy to ensure that the infrastructure alternatives selected are adequately financed, maintained, and replaced over time. The elements (along with any related measurable results) can also be revisited on an ongoing basis to ensure continuing implementation and improvement.

These core elements are:

1. **Goal-Setting**: Establish sustainability goals that reflect utility and community priorities.
2. **Objectives and Strategies**: Establish explicit, measurable objectives for each sustainability goal and identify strategies for meeting the objectives.
3. **Alternatives Analysis**: Based on sustainability goals and objectives, set explicit and consistent evaluation criteria to analyze a range of infrastructure alternatives.
4. **Financial Strategy:** Implement a financial strategy including adequate revenues so that new infrastructure and operational investments—as well as the overall system—are sufficiently funded, operated, maintained, and replaced over time on a full lifecycle cost basis, with appropriate considerations for disadvantaged households.

These elements are intended to build on each other as utilities go through a specific planning process or they may be inter-related parts of separate planning processes. Some utilities, however, may be adequately implementing one or more of the elements and therefore choose to focus greater attention on other elements as a means of enhancing their planning.

Planning Terms as Used in this Handbook

Goals: Broad, qualitative statements of what the utility hopes to achieve.

Objectives: Specific, measurable statements of what will be done to achieve goals within a particular time frame.

Strategies: General approaches or methods for achieving objectives and resolving specific issues. Strategies speak to the question "How will we go about accomplishing our objectives?"

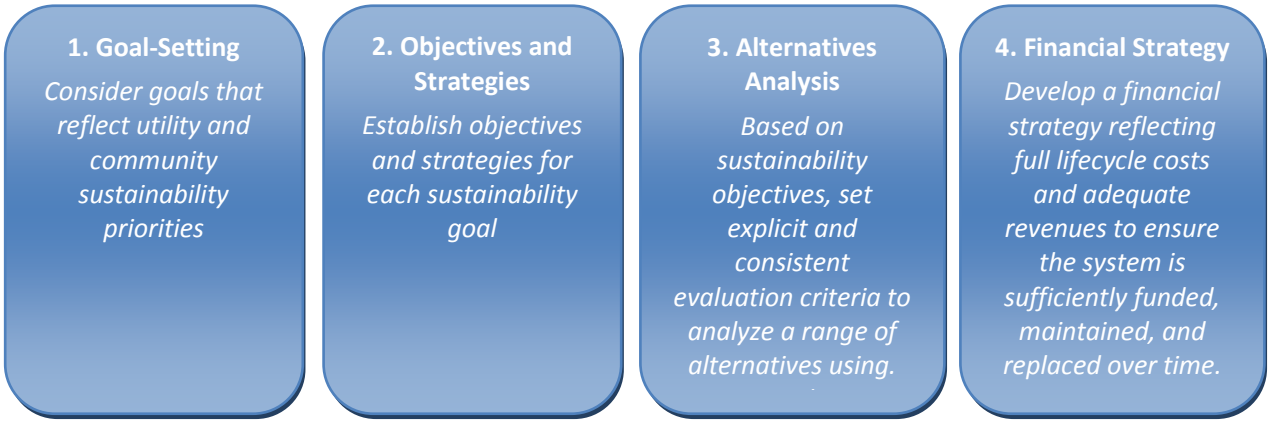
Alternatives: Within a strategy, specific infrastructure investments or operational changes for achieving objectives.

Criteria: Measures or considerations used to evaluate alternatives.

For each element, this handbook describes specific steps to enhance utilities' planning processes to aid effective and balanced consideration of sustainability in the selection of infrastructure projects. The steps for each element, along with brief case examples and call-out boxes, also describe suggested practices from utilities that have incorporated sustainability considerations into their planning. Each element also includes diagnostic questions for gauging how thoroughly each element is addressed.

Figure 1 summarizes the elements and illustrates how two sustainability goals—increasing energy efficiency and supporting infrastructure in existing communities—could be addressed in the process.

Figure 1: Core Planning Elements for Sustainability



Energy Use Example…

Sustainability Goal:	Objective and Strategies:	Alternatives Analysis:	Financial Strategy:
Utility seeks to reduce its energy use consistent with the community's energy efficiency program	Utility sets objective of reducing energy use by 25% in 5 years; it conducts an energy audit to determine its baseline energy use and identifies potential projects to meet its objective	Utility evaluates all projects, in part, on their relative lifecycle energy efficiency costs (e.g., installation of high efficiency heat pumps) and their relative ability to meet the 25% energy use reduction objective	Utility revenue and borrowing strategy ensures sustainable financing of new projects, taking advantage of lower energy costs

Supporting Infrastructure in Existing Communities Example…

Sustainability Goal:	Objective and Strategies:	Alternatives Analysis:	Financial Strategy:
Utility aligns itself with community goal to accommodate most expected growth by revitalizing urban areas rather than through new development	Utility sets objective to serve 75% of expected growth within its existing service boundary; it analyzes its current capacity to accommodate new growth within its existing service area and identifies strategies for increasing capacity	Utility evaluates all projects, in part, on the extent to which they increase the ability to serve growth within the service boundary (e.g., projects providing service near planned public transit services)	Utility revenue and borrowing strategy ensures sustainable financing of new projects, taking advantage of avoided costs of service boundary expansion (e.g., by ensuring that costs associated with growth outside of the existing service boundaries are paid by new users)

Providing a Solid Foundation for Planning through Asset Management and Community Engagement

Throughout the planning process, two aspects of utility management and operations—asset management and ongoing engagement with communities and customers—strengthen and reinforce the four elements.

Asset Management

An ongoing asset management program that includes detailed information on what assets a utility has, how long they will last, and how much it will cost to replace them, is essential to effective utility management. An infrastructure inventory; condition assessment; risk-based schedule for maintenance, repair, rehabilitation, and replacement of infrastructure; and financial plan are specific parts of a utility's asset management strategy. Asset management supports sustainability planning in many ways, including:

- Providing infrastructure capacity and condition information;
- Generating options for the repair, rehabilitation, and replacement of existing assets; and
- Providing information on full lifecycle costs of existing assets.

Beyond implementing asset management, utilities are also encouraged to perform an assessment of their operations using the *Effective Utility Management Primer* developed by EPA and six national water sector associations.[3] The Primer helps utilities to assess their operations based on a series of *Attributes of Effectively Managed Utilities* and to identify specific actions they can take to improve their performance (see call-out box).

Effective Utility Management

Effective planning is essential for an effectively managed utility. In 2007, EPA and six national water associations entered into a historic agreement to promote effective utility management based on a series of *Attributes of Effectively Managed Utilities* and *Keys to Management Success*. The Attributes describe a range of outcomes utilities should strive to achieve across all facets of their operations—from infrastructure and finances to building stakeholder understanding and support. *The Keys to Management Success* describe a series of frequently used management approaches that can help utilities achieve the outcomes called for in the Attributes.

The EUM partnering organizations have also developed a Primer to help utilities assess their operations and identify actions to improve their performance. Utilities are encouraged to learn more about the Effective Utility Management Initiative and use the Primer to do an assessment of their operations by going to http://www.watereum.org/.

The planning steps described in this handbook can help utilities manage their infrastructure and operations and achieve the outcomes embodied in the Attributes. In addition, two of the Keys to Management Success—Strategic Business Planning and using a Plan-Do-Check-Act management systems approach—are particularly relevant to implementing this handbook. Appendix B contains a description of the relationship between the four elements described in this handbook and in the *Keys to Management Success and Attributes of Effectively Managed Utilities*.

[3] The Primer and other information about Effective Utility Management can be found at: http://water.epa.gov/infrastructure/sustain/upload/2009_05_26_waterinfrastructures_tools_si_watereum_primerforeffectiveutilities.pdf

Guidance and other resources on asset management and effective utility management are included in Appendix A.

Community Engagement

Ongoing community engagement—including in-person involvement and outreach and communications with communities—is important for establishing and maintaining community understanding of the value of utility services and the resources needed to deliver them. Ideally, utilities undertake long-term planning in the context of an ongoing relationship and active engagement with their communities and customers. In the specific planning context, community input about sustainability goals and values can inform utility service levels, reliability standards, revenue strategy, and other considerations.

Communication and transparency throughout the planning process can lead to greater support for utility decisions by increasing public understanding of the value of water infrastructure and utility services. Building customer and community appreciation of infrastructure investment value is likely to require proactive, ongoing stakeholder education and involvement. For example, changes to utility rates and fees typically require the approval of a governing body (e.g., utility board, municipal or county council) and can be difficult in the absence of reasonable customer support. Utilities that have established and clearly communicated a case for infrastructure investment value and that have a reputation for effective management and transparency are more likely to garner support for needed rate and fee increases.

Building Customer Appreciation for Water Infrastructure Value in Rural New Mexico

A small water and wastewater utility (approximately 50 connections) serving a community located near Gallup, New Mexico, used an asset management process to prepare infrastructure and financial plans. The plans addressed infrastructure reaching the end of its useful life in 10 years. Replacement would require rate increases. Through transparency with the public using information from the asset management process, the utility made an effective case for infrastructure investment and general community support for a $6/month rate increase.

Ongoing community engagement can support the planning process by:

- Providing necessary input early in the process;
- Providing understanding of community goals and values (e.g., for green space or economic redevelopment) to guide the utilities' strategic direction and the identification and weighting alternatives assessment criteria;
- Generating specific ideas about strategies to meet goals, which may be also considered as part of the alternatives analysis where specific projects are selected; and
- Building a base of community understanding and support for selecting service levels, establishing reliability standards, and meeting revenue needs through rate changes or other mechanisms.

Recording and tracking issues raised by community members should be carefully undertaken and can help utilities be transparent and responsive. Appendix A includes several guides, tools, and case studies with other strategies for engaging with the community.

What Comes Next

The remaining chapters focus on the four planning elements. Each chapter includes:

- A description of the element and how it enhances existing planning approaches;
- Key steps to implement the element;
- Approaches to implement the element on a smaller scale;
- Diagnostic questions for gauging how thoroughly an element has been addressed; and
- One or more illustrative examples

Conclusion

Incorporating sustainability considerations into water and wastewater utility planning can produce substantial benefits. It can help utilities:

- Reduce lifecycle costs by operating more efficiently, pursuing cost-effective investment strategies and optimizing investment choices.
- Optimize social, environmental, and economic benefits by selecting projects through a systematic process of setting sustainability goals and objectives that also support community priorities.
- Increase community support through upfront dialogue with community members and active consideration of other community priorities as alternatives are considered.
- Balance assessment of a range of traditional and non-traditional infrastructure alternatives using consistent criteria.
- Increase fiscal sustainability by analyzing the full lifecycle costs of investments, developing low cost financing strategies, and ensuring that revenue needs are accurately assessed to support maintenance, renewal, and replacement of infrastructure while meeting all regulatory requirements.
- Provide sustainability benefits information for making replicable, consistent, and transparent decisions and for explaining decisions to board members, local elected officials, the public, and others.
- Increase customer support through clear rate expectations (and avoided "rate shocks"), increased system reliability, and increased responsiveness when disruptions occur.
- Enhance the technical, financial, and managerial capacity of the utility.

The case studies in this handbook provide examples of how to undertake certain aspects of planning. The guidance and tools referenced in the handbook and Appendix A provide further helpful resources. Utilities applying this guidance and these tools should utilize the identified processes on an iterative basis, refining them over time. This will help support the sustainability and responsiveness of the planning process.

As the practice of planning for sustainability evolves, more effective practices will emerge. EPA envisions this handbook as a resource that can be updated to provide water utilities with the most current advice and resources. These resources can help utilities more effectively use this planning approach over time and further optimize their infrastructure and operational decisions.

4.7 Because Water Doesn't Grow on Trees, *H2OScore*

Because Water Doesn't Grow on Trees

For more information, visit: h2oscore.com/

BECAUSE WATER DOESN'T GROW ON TREES

H2Oscore

CUSTOMER ENGAGEMENT | REVENUE STABILITY

What is H_2Oscore?

H_2Oscore is an online portal that helps municipal water utilities engage customers and stabilize revenues. Through H_2Oscore, individuals and businesses understand and control their water use, ensuring financial security for both ratepayers and utilities.

Contact Information:

McGee Young
mcgee.young@h2oscore.com
(414) 759-2599

Global Water Center
247 W. Freshwater Way | Suite 340
Milwaukee, WI 53204

Do we need extra staff time, expertise, computer software or metering technology to adopt a customer dashboard?

H_2Oscore is a turnkey solution that works with any type of utility metering/billing system. If you have AMI, you will enjoy all of the benefits of daily data updates, real time projections, and premium analytics for your high water users. Our software is optimized for AMI systems, such as Metron-Farnier's Innov8VN, Badger Meter's Galaxy, and Sensus' FlexNet.

If you read your meters monthly or quarterly, you will still find your customers pleasantly surprised by the value of a personalized water use dashboard. All non-AMI dashboards come with the H_2Oscore Rewards program, an innovative way to engage your customers.

Do we need a big conservation budget to afford a customer dashboard?

H_2Oscore dashboards are free for municipalities. If you have AMI, we allow customers to upgrade to premium packages with advanced analytics. If you do not have AMI, your H_2Oscore dashboards will be bundled with the H_2Oscore Rewards program for a low annual fee.

Rather than purchasing a huge proprietary software package that is hard to use, H_2Oscore allows you to take credit for bringing an innovative product to your community that uses the efficiency of the web to control costs and deliver value.

H_2Oscore

Do we need to launch a big campaign? Our residents don't pay much attention to water issues.

Most residents only think about their water when they read reports in the media about rate increases or watering restrictions. We focus their attention on existing programs and initiatives that are often forgotten about. When a resident can check their water use on their phone as they are watering their lawn, lessons about efficiency become much more powerful.

We are seeing an activation rate between 2% and 10% of all residential accounts in municipalities where H_2Oscore has been deployed. While we don't yet have the 40% market share that Facebook enjoys, we know that customer complaints have been reduced, engagement has improved, and usage is more predictable. If revenue stability and good customer relations are important to your utility, we can help you get there.

I need more details to see how other water professionals are currently utilizing H2Oscore. How can I find out more information?

Call at any time to request an informational demo. We will show you an active user account and answer any other questions.

"I am extremely happy that we are able to implement the new H_2Oscore program in Whitewater. I am pushing for this to really take off because I think your program will be a good fit for our AMI system."

Rick Lein
City of Whitewater
Water Superintendent

"The goal of the village is to be a good steward of natural resources. Finding ways to encourage residents to conserve water is consistent with that goal."

Darrel Hoffland
Grafton Village Manager

"Waukesha is excited to be one of the first communities to use H_2Oscore's new online dashboard. It's an innovative idea to help motivate and reward our customers for conserving water resources."

Donna Scholl
Administrative Services Manager
of the Waukesha Water Utility

4.8 Additional Resources

Conservation@Work, *The Conservation Foundation*

theconservationfoundation.org/what-we-do/conservationhome/conservationwork.html

CWI Information, *US EPA*

epa.state.il.us/water/financial-assistance/clean-water-initiative/index.html

Liquid Assets Documentary and Community Toolkit Outreach Guide, *American Society of Civil Engineers*

liquidassets.psu.edu

5. General Resources

Introduction

Northeastern Illinois has a wealth of resources available on effective water management. This section provides resources that touch on all aspects of effective water management, including the Chicago Metropolitan Agency for Planning's official water supply plan, Water 2050, which guides water management for the whole region, as well as the Metropolitan Planning Council's assessment on modernizing use of Lake Michigan water. It also includes contact information for all the speakers who spoke as part of the four-workshop series.

5.1 Water 2050: Northeastern Illinois Regional Water Supply/Demand Plan, *CMAP*

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To download the full report, visit cmap.illinois.gov/documents/20583/be751083-5476-4eb0-a66f-65b0059241b3

Chicago Metropolitan Agency for Planning

CMAP

Water 2050

Northeastern Illinois Regional Water Supply/Demand Plan

March 2010

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Executive Summary

Introduction

The prosperity of the greater Chicago region and its status as a global center depend on water availability. Historically blessed with ample fresh water, the region can no longer assume that water supplies are infinite. While other parts of the country struggle to meet growing water demand and some cities are losing their economic competitiveness due to shortage or inadequate planning, the Chicago region must act now to carefully plan and manage its surface and groundwater resources in a coordinated fashion. Nothing less than economic development, environmental protection, and social equity is at stake. It is for these reasons that the region's water supply plan is timely and important.

The Northeastern Illinois Regional Water Supply/Demand Plan (referred to hereafter as the Water Plan) is the result of a three-year planning effort undertaken by the Chicago Metropolitan Agency for Planning (CMAP) and the Regional Water Supply Planning Group (RWSPG) in response to Executive Order 2006-1. Issued in January 2006 by Governor Rod Blagojevich, EO 2006-1 called for development of Regional Water Supply Plans in two Priority Water Quantity Planning Areas. The 11-county northeastern Illinois region was identified as a priority planning area due to the degree of population growth occurring regionally. Prior to EO 2006-1, the northeastern Illinois region did not have an active interest-group led and state endorsed or funded water supply planning process in place.

CMAP formed the Northeastern Illinois RWSPG in 2006 as part of the scope-of-work contract with the Illinois Department of Natural Resources (IDNR). The RWSPG was advisory in nature and included 35 delegates representing nine different stakeholder-interest groups. CMAP and the RWSPG held near-monthly public meetings. The mission statement of the RWSPG is:

> *To consider the future water supply needs of northeastern Illinois and develop plans and programs to guide future use that provide adequate and affordable water for all users, including support for economic development, agriculture, and the protection of our natural ecosystems.*

The RWSPG adopted the following goals in order to achieve their mission:

1. Ensure water demand and supply result in equitable availability through drought and non-drought conditions alike.
2. Protect the quality of ground- and surface-water supplies.
3. Provide sufficient water availability to sustain aquatic ecosystems and economic development.
4. Inform the people of northeastern Illinois about the importance of water-resource stewardship.
5. Manage withdrawals from water sources to protect long-term productive yields.
6. Foster intergovernmental communication for water conservation and planning.
7. Meet data collection needs so as to continue informed and effective water supply planning.
8. Improve integration of land use and water use planning and management.

It is beyond the scope of this initial planning cycle to make recommendations aimed at changing the existing governance structure for water supply planning and management. Furthermore, IDNR indicated that the two pilot processes would not focus on capital projects. This plan makes recommendations that are designed to be implemented by a variety of stakeholders within the existing institutional structure of water supply planning and management. This regional water plan is designed to maintain or enhance regional prosperity to include economic development, environmental protection, and social equity. The plan depends entirely on voluntary action and cooperation among those entities identified by recommendations. In that vein, this regional water plan honors the spirit and intent of EO 2006-1.

This Executive Summary provides a brief outline of the Water Plan and summarizes some of the major focus areas and recommendations of the plan: the methodology for determining regional water demands and supplies, the importance of integrating land-use and water supply planning, and demand management and other water-saving strategies.

How the Water Plan is Organized

The Water Plan includes the following sections:

Chapter 1 is an **introduction** that provides background about how the regional water planning effort began, the context in which it takes place, and the Northeastern Illinois RWSPG's purpose.

Chapter 2, "Framework for Regional Water Supply Planning and Management," describes in detail the existing paradigms for planning and managing water in the region today, including adaptive systems geared toward achieving sustainability. It summarizes the current types of water users and the laws governing water management. With an unprecedented level of detail that includes computer modeling of groundwater, the section also quantifies current consumption and demand scenarios for water use through 2050. To determine how much water will be needed in the future, this chapter looks at variable factors such as climate change, water rates, water quality, and ecosystem impacts.

Chapter 3, "Land and Water," describes the intricate relationship between land use and water resources, looking at how development decisions profoundly affect demand for and availability of water. It details the need to integrate planning of land and water use and explores a number of existing programs and tools toward that objective. The chapter also addresses the need to protect water quality and aquatic ecosystems.

Chapter 4, "Demand Management and Other Strategies," offers a detailed regional framework for water planning and management. It describes specific programmatic strategies, including creation of Conservation Coordinator positions at the regional and local levels. The chapter includes recommended water-use conservation measures for individuals and other entities, including plumbing retrofits, leak detection and repair, incentives to purchase high-efficiency toilets and appliances, and more. Using "full-cost pricing" and reusing wastewater are also among the suggested conservation strategies. Furthermore, a public information campaign and a school education program should accompany any implementation of water-use conservation measures or demand-management strategies.

Finally, **Chapter 5, "Water Management in the 21st Century,"** looks at next steps that include methods for cooperative management across jurisdictions, drought preparedness, sustainable water-planning funding, and monitoring and data collection. This chapter looks forward to the next regional water-planning cycle, with an eye toward achieving true sustainability through integrated water-resource planning.

Regional Water Demands

Addressing water availability in northeastern Illinois involved forecasting regional population, modeling water demand, examining the impact of demand scenarios on water supplies, and identifying demand management and other strategies for addressing potential water shortages. Accordingly, a study of regional-water demand was completed in June 2008. *The Regional Water Demand Scenarios for NE IL: 2005-2050: Project Completion Report* (referred to hereafter as the Demand Report) feature three water-demand scenarios representing 1) water withdrawals under current demand conditions and reflecting recent trends in development (CT scenario), 2) a less-resource-intensive scenario (LRI), and 3) a more-resource-intensive-scenario (MRI). The baseline (i.e., normal weather) 2005 water use for the region, including all five water-use sectors studied (Public Supply, Power Generation, Industrial and Commercial, Agricultural and Irrigation, and Domestic Self-supplied), is estimated as 169.3 gallons per capita per day (gpcd), with total annual withdrawal of 1,480.3 millions of gallons per day (mgd), 69% of which is withdrawn from Lake Michigan, 17% from groundwater sources, and 14% from rivers.

Absent a commitment to ongoing formal planning and implementation of the current and future regional water plans, maintaining the status quo in northeastern Illinois could result in an increase in water demand ranging from 36% under the CT scenario to 64% under the MRI scenario. Only with active intervention (i.e., LRI scenario) might the region keep overall water demand relatively flat (7.24% growth over 45 years) while population increases as much as 38% by 2050. The LRI scenario is different from the CT scenario across most factors that affect water demand. The Water Plan explores distribution of population growth (discussed in relation to land use planning), water conservation, and future water prices. Of particular note in the Demand Report's analysis are groundwater and inland surface water dependent communities, where demand will continue to grow considerably in the absence of an especially aggressive commitment to conservation.

In an effort to link climate change to regional water supply planning, the Demand Report uses climate model output to examine water withdrawals under five different climate change scenarios. Under the worst-case scenario, a warmer and drier climate could require an additional 229 MGD or ~12% increase in demand across all water-use sectors excluding power generation above and beyond the increase in demand by 2050 associated with the CT scenario. Drought in Illinois has not historically been found to negatively impact public water supplies in northeastern Illinois primarily because the majority of the region relies on a relatively drought-resistance water source, Lake Michigan. The Demand Report considers drought conditions as those occurring during the drought of 2005, which was the

11th driest on record in the state. During this time, demand was found to be 8% higher across all water-use sectors as compared to baseline demand. The RWSPG recommends (see Chapter 5 for more) that drought preparedness for northeastern Illinois be addressed by CMAP providing assistance in the preparation and implementation of regional drought plans.

Regional Water Supplies

Water supplies in the region are provided by Lake Michigan, inland surface water (Fox River and Kankakee River), and groundwater sources. The majority of the region's water use comes from Lake Michigan water allocations to about 200 communities, including the City of Chicago. Governed by a U.S. Supreme Court Consent Decree that limits Illinois' withdrawal to 3,200 cubic feet/second or about 2.1 billion gallons/day, Lake Michigan water availability is adequate to the year 2030 with some additional potential — 50 to 75 MGD — to serve new communities that currently use groundwater. The permit system and allocation of Lake Michigan water is administered by the IDNR, with certain conservation measures required as a condition of permit.

Groundwater within the deep-bedrock aquifer and shallow aquifer system beneath the Fox River Basin was assessed by the Illinois State Water Survey (ISWS). Their report, *Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois* (referred to hereafter as the Groundwater Report) applies the regional water-demand scenarios to the groundwater resources described above to indicate likely impacts over time.

The Groundwater Report finds drawdown interference commonplace throughout the deep-bedrock aquifer due to regional withdrawals exceeding the recharge rate. Drawdown is greater in the deep-bedrock aquifer than in the shallow aquifers in response to differing replacement water availability. Drawdown in the Ancell and Ironton-Galesville Units in southeastern Kane County and northern Will County suggest high potential for adverse impacts by 2050: decreasing well yields, increasing pumping expenses, increases in salinity, and increased concentrations of radium, barium and arsenic. The southwestern part of the region appears to be most at risk given that, for this particular area, the models predict these impacts across all demand scenarios including the LRI. The ISWS concludes, "Model results suggest the deep bedrock aquifers cannot be counted on (indefinitely) to meet all future demand scenarios across the entire 11-county area. "There is time in the short term to pursue alternative sources (e.g. Fox River or Lake Michigan water) and demand management.

Shallow aquifer drawdown appears to be most significant in northeastern Kane County and southeastern McHenry County in response to pumping by Algonquin, Carpentersville, East Dundee, Lake in the Hills, and Crystal Lake. The next most vulnerable areas are located within a north-south corridor along the Fox River linking South Elgin, St. Charles, Geneva, and Batavia in Kane County, and Woodstock in McHenry County. The vicinity of Plano (Kendall County) and Marengo (McHenry County) also appear to be vulnerable by 2050. The most immediate and problematic consequences are likely to be greater drawdown interference, additional streamflow capture, and attendant degradation of local surface water quality. In the long term, it is conceivable that inadequate local water supplies will limit growth and development opportunities in some parts of the region without utilizing new sources of water. It will be prudent, therefore, for these communities to consider options that go beyond demand management.

The ISWS has determined that the Fox River could provide as much as 50% of new water demands in Kane and Kendall counties, which is equivalent to an additional 40 to 45 MGD. The Kankakee River has not yet undergone a similar study, but is utilized less than the Fox despite a higher (low) flow.

Integrating Land-Use and Water Supply Planning

While demand-management strategies have potential to play a very important role in the region and are addressed later in this summary, plan recommendations also involve strategies addressing the manner in which the region accommodates future growth through land-use decisions and future investments. Land-use decisions affect water resources in three major areas: aquifer-recharge capacity, per capita water demand, and infrastructure investments. Aquifer-recharge capacity is affected by the location and extent of impervious surfaces: parking lots, sidewalks, rooftops, driveways and roads that block infiltration and recharge and result in increased stormwater runoff.

Regarding per capita water demand, the 2009 report prepared by Southern Illinois University Carbondale, *Residential Water Use in Northeastern Illinois*, finds that higher per capita residential water use rates tend to be found in affluent communities with low housing densities and homes with residential landscapes. The same study finds that lower per capita rates tend to be found in communities with average or low income, higher water prices, and higher housing densities.

Additional infrastructure costs may be incurred by water systems serving lower density housing areas located far from water system service centers. The recommended strategies addressing land-use decisions that foster more effective water-supply planning include: maximizing reinvestment — growth within and contiguous to existing communities and service areas rather than the urban/rural fringe; optimizing community-appropriate densities to ensure cost efficiencies in water and wastewater infrastructure construction and maintenance; providing transportation options to encourage compact devel-

opment; promotion of conservation design principles and practices; and preservation of open lands for the many associated quality-of-life benefits, protection of sensitive aquifer-recharge areas, and for land application of wastewater effluent as well.

Recommended strategies address water availability and quality by leveraging existing regional planning processes, institutions, and programs where possible to achieve greater integration of land-use planning and water-resource planning and management. A regional approach includes the utilization of: the Local Planning Technical Assistance Act, Water Revolving Funds, Developments of Regional Importance (DRI) Process, ***GO TO 2040*** Plan, and Section 208 Planning as potential tools that could help to align future land- and water-use planning. In addition, the protection of Sensitive Aquifer Recharge Areas (SARA), Stormwater Retention using green infrastructure, and application of Conservation Design Principles are emphasized for the region.

In recognition of the heterogeneity of the region, the plan provides recommendations at various levels organized by chief water source: Lake Michigan, Inland Rivers, and Wells/Groundwater Sources. Of particular importance is the potential to reduce the 26% average debit against the Illinois diversion of Lake Michigan that is attributed to stormwater runoff from the 673 square mile diverted-watershed; the area where water now flows to the Mississippi River by way of the Chicago River. Reducing this component of the Illinois diversion could make additional water available for domestic pumpage; allowing for new Lake Michigan permittees and thus, reducing withdrawals from the deep-bedrock aquifer.

Watershed planning is recommended for the entire region and is especially important for communities whose primary water source is an inland river. The RWSPG recommends that IDNR revise guidance to incent design applications that include water-resource features for Open Space Land Acquisition and Development (OSLAD) Program funds; and the Land and Water Conservation Funds (LWCF) program should add ranking criteria for areas identified in watershed plans or in the Green Infrastructure Vision as being critical for water quality protection (see Chapter 3 for more). On a regional scale, the RWSPG recommends that ***GO TO 2040*** address the retention of open space. Additionally, CMAP will encourage communities to include the conservation of open space within their planning efforts. The RWSPG additionally recommends that counties participate in watershed planning efforts and actively support plan implementation; modify zoning and subdivision codes to include the conservation of open space and natural areas identified in watershed plans; and establish overlay zones where best management practices (BMP) are required for lands identified as critical to source-water quality protection when land conservation through acquisition or easements is not an available option.

Water Quality and Quantity

The Water Plan acknowledges the intertwined nature of water quality and quantity in the region. The quality of drinking water provided by public-water suppliers is regulated by the U.S. Environmental Protection Agency (U.S. EPA), most notably via the Safe Drinking Water Act (SDWA), which authorizes the U. S. EPA to set national health-based standards to protect against contaminants that may be found in drinking water. U.S. EPA also has a process for evaluating unregulated contaminants which are known or are anticipated to occur in public-water systems. The quality of raw source water, however, is the shared responsibility of regional stakeholders. Thus, several regional water quality issues are discussed in the Water Plan, including contaminants such as chloride; nutrients (i.e., nitrogen and phosphorous); and pharmaceuticals and personal care products. Related recommendations concern wetlands protection, and instream-flow. Two additional benefits streams, aquatic ecosystem health and economic development, are specifically of concern to the RWSPG.

There are four primary strategies recommended by the Water Plan to ensure water availability to sustain aquatic ecosystems. The first addresses chloride contamination and recommends that those responsible for winter-highway maintenance and private-well owners adopt practices that collectively result in decreased chloride reaching groundwater and surface waters. Second, achieve better control of nonpoint-source pollution and nutrient removal from wastewater effluent and through best management practices aimed at agriculture practices, sanitary districts and municipal wastewater treatment plants, and municipal governments throughout the planning region. Third, develop and implement a study to monitor and improve understanding of the relationship between the hydrology of wetlands and groundwater levels as affected by local/regional pumping. Such information could also serve to inform the two State Surveys as they fulfill their review obligation of "the proposed point of (new well) withdrawal's effect upon other users of the water" as outlined in the Water Use Act of 1983. Fourth, the RWSPG recommends (see Chapter 3 for more) that Biologically Significant Streams (BSS) within the region receive the priority monitoring and study necessary to improve understanding of the relationship between natural streamflow, biological integrity, and shallow groundwater withdrawals. Study results can then be tested for applicability throughout the region where shallow groundwater pumping occurs to identify at-risk streams and develop strategies to avoid or minimize impacts.

Demand Management and Other Water-Saving Strategies

To ensure water availability for economic development and regional prosperity, the primary strategy chosen by the RWSPG in this first planning cycle is water-demand management. Four broad water-use management techniques explored in the Water Plan include water-use conservation, water-rate structures, graywater, and wastewater reuse. Each management technique is outlined in the plan and followed with an integrated set of detailed recommendations aimed at the various levels of decision-making and/or implementation responsibility: state, regional planning agency, county government, and public water supplier.

There are 13 locally appropriate conservation measures extensively addressed in the Water Plan, including conservation coordinator, high-efficiency toilets, water waste prohibition, metering, system water audits leak detection and repair, residential plumbing retrofits, programs for commercial and industrial accounts, high-efficiency clothes washers, large landscape programs, residential water surveys, wholesale agency assistance programs, public information, and school education. Potential region-wide water savings were calculated for nine of these measures, based on two-tiers of implementation, low conservation (10% adoption rate) and high conservation (50% adoption rate). The calculated water savings potential of both the low- and high-conservation programs is in addition to the contribution of passive conservation that is embedded within the CT scenario.

The LRI scenario assumes that the region implements the low-conservation program at a minimum. Measured against the CT scenario, implementation of the low-conservation program translates into meeting 38% of increased demand expected through 2030, while implementation of the high-conservation program translates into meeting 133% of total demand expected at 2030. Water savings as measured against a MRI scenario will be lower: low conservation could meet 23% of demand through 2030, and high conservation, 78%. The suite of water conservation measures therefore has strong potential to make a considerable contribution to meeting incremental demand between 2005 and 2030. In effect, water savings from conservation has the potential to provide an important new supply of water, but only if the political will and other support factors exist to follow through with plan recommendations.

Several conservation measures are notable when evaluating water savings on a regional scale. Following a low-conservation program, high efficiency toilets account for 19% of water savings, followed by water-waste prohibitions (16%), with the other seven measures together comprising the remaining 65% of water savings. Toilets are the largest indoor residential water user, accounting for nearly 30% of total indoor use. Complete toilet replacement is recommended in lieu of toilet retrofits because a new and more efficient toilet is a permanent solution with a greater guarantee of water savings. Water-waste prohibition consists of enforceable measures that are designed to prevent specific wasteful water-use activities including residential irrigation, nonrecirculation systems, and customer-leak repair. Most water-waste prohibition ordinances are enforced through a system of citations and fines. With wider participation in a conservation movement — the high-conservation program — toilet replacement with High Efficiency Toilets (HET) account for 28% of the water savings, followed by water-waste prohibitions (22%), with the other seven measures together comprising the remaining 50% of water savings.

Regional water savings estimates of particular water conservation strategies do not necessarily translate into local effectiveness, but serve as a guideline to understand how conservation can impact water supply and demand in the region. More detailed water savings information will be captured at the local level through the implementation of these measures as part of a water conservation program. However, it is acknowledged that water conservation has associated costs as well as benefits. To this point, energy savings have also been calculated for two of the water-use conservation measures (clothes washers and showerheads) to estimate secondary resource benefits. Additionally conservation financing options such as partnerships, loan programs, and full-cost pricing are included to address water conservation costs. Ideally this information would serve to assist local entities and public water suppliers who will ultimately decide whether to pursue conservation in lieu of or in conjunction with other supply strategies.

As a result of supplementary studies and additional research, including *Residential Water Use in Northeastern Illinois* and CMAP's Survey of Water Utilities (2008) and Household Water Use Survey (2008), the plan identifies four local factors that should be considered to target conservation efforts at the local level and produce the most notable impacts in demand reduction. The four local factors include: communities with a median-home value of $500,000 or greater, houses built before 1994, utilities with substantial water loss, and utilities with a peak demand that is 80% or higher than peak-system capacity. For each of the four local factors, complimentary water-use conservation measures were also identified from the plan. Assuming that a median-home value of $500,000 or greater equates to a larger lot size with a larger requirement for irrigation, programs that include landscaping with native vegetation, rain sensors, and water reuse for landscaping, among others are suggested. Plumbing retrofits, high-efficiency toilets and clothes washers will be more effective strategies in communities with larger portions of pre-1994 housing stock, as

system water audits and leak detection and repair will be more effectively used in utilities experiencing substantial water loss.

The Alliance for Water Efficiency recently developed a Conservation Tracking Tool that provides a means for public-water suppliers to analyze the benefits, costs, and water savings potential of numerous conservation measures. The benefits of implementing an overall water-conservation program will be greater for communities that are approaching or at peak capacity and who are potentially able to avoid capacity expansion and infrastructure-capital costs as a result of implementing a new demand-management program. Integral to use of the Conservation Tracking Tool and other resources is having a designated conservation coordinator who will be responsible for managing, implementing, and maintaining a comprehensive water-conservation program on behalf of their community. The RWSPG recommends that public-water suppliers in the northeastern region designate a staff person to serve as the conservation coordinator, with CMAP providing technical assistance, including a model-water-conservation ordinance (see Chapter 4 for more).

In addition to the conservation coordinator, success of regional and local conservation measures will involve concurrent implementation of information and education programs. Public information programs can support technological approaches to water conservation, increase public acceptance of rate increases necessary to fund conservation programming and infrastructure investment, and can create greater awareness of the importance of conservation. The purpose of a public information program (PIP) is to increase the public's awareness regarding the value of water and to promote more efficient water use. For example, public-water suppliers can evaluate their billing structure and frequency to provide more detailed and timely water-use information to the customer. The purpose of a school-education program is to reach the youngest water users in order to increase awareness of the value of water so that lifelong water-conservation behavior is created. These programs will benefit from, if not require, regional coordination. Strategies recommended by the RWSPG for public information and education include state-level funding and coordination; regional development of appropriate materials; and local support of state and regional initiatives.

Water Rate Structures, Graywater and Wastewater Reuse

An effective public information and outreach campaign that imparts an understanding of the value of water can also garner support for full cost of water provision, thereby encouraging efficient use of water resources. Water pricing is increasingly becoming a tool for managing demand, with certain pricing options carrying more of an incentive for customers to use water efficiently. The Demand Report shows that attaining a regional LRI Scenario will require a 2.5% annual increase in real water prices. Price increases are generally more effective in encouraging conservation where the use of water is discretionary or seasonal, such as residential outdoor use. The RWSPG recommends that IDNR and its Office of Water Resouces (OWR) encourage permitees to assess the feasibility of adopting seasonal water pricing; and that CMAP provide information on full-cost pricing, assist public-water suppliers throughout the region that are interested implementing conservation-oriented rate structures, and develop and share information on pricing of new water connections and infrastructure investment to help inform planning processes. On a local level, water-rate structures should be considered as part of a comprehensive water-conservation program (see Chapter 4 for more).

Another approach to water conservation that is becoming more popular elsewhere in the country is graywater. Graywater is water from laundry machines, bathtubs, showers, and bath sinks. The reuse of graywater for toilet flushing (primarily) and outdoor irrigation purposes (potentially) could conserve a large amount of potable water and energy. The RWSPG recommends that the State of Illinois establish regulations permitting graywater-reuse systems, provide general education materials to the public about graywater use, and create a graywater tax credit for homeowners who install a graywater-reuse system. CMAP can create a model ordinance for adoption by county/local government to guide local implementation of graywater-reuse systems for which counties can specify performance-based standards, and provide general education materials to the public about graywater use.

Reclaimed wastewater can also replace some use of potable water to free up potable water for other higher-value uses. CMAP undertook an assessment of wastewater reuse potential, concluding that currently existing centralized treatment plants and turf irrigation are the most likely opportunities for wastewater reuse in the region. The RWSPG recommends that Illinois Environmental Protection Agency (IEPA) develop comprehensive rules for reuse, and, as the state develops nutrient standards to protect surface-water quality, irrigation with reclaimed wastewater be encouraged. CMAP should provide technical assistance, encourage wastewater-reuse opportunities through the Section 208 or Areawide Water Quality Management Planning process, and explore setting wastewater-reuse goals for the region within the next planning cycle. Counties can provide

additional incentives for reclaimed water system installation and consider reclaimed water for large landscape irrigation at public institutions. On a local level, public wastewater treatment facilities can consider wastewater reuse and/or land application as a potential alternative to upgrading treatment facilities to meet state antidegradation requirements and/or more stringent effluent-water-quality standards.

Water Management in the 21st Century

Throughout the planning process, the need to address the interrelated monitoring, data collection, and funding needs of the region necessary to continue effective planning became clear. The RWSPG recommends (see Chapter 5 for more) that the state fund the ISWS to conduct impact analysis of new withdrawals on groundwater supplies as required by the Water Use Act of 1983; that ISWS provide updated well-withdrawal data and impacts to counties and to CMAP annually to facilitate comprehensive water supply planning efforts. In addition, the RWSPG recommends study of the relationship between shallow groundwater pumping and groundwater contributions to the baseflow of headwater streams.

Additional recommendations include expansion of the shallow-aquifer study beyond the Fox River Basin; establish a shallow aquifer well network throughout the 11-county region, similar to the McHenry County network to aid in water management; establish a water quality and quantity monitoring network for the deep-bedrock aquifer; explore a means of collecting data on water used for irrigation and self-supplied water; explore new-model simulations that could include optimization of shallow aquifer withdrawal scenarios in combination with new Fox River withdrawals; optimization of deep-aquifer withdrawals; Kankakee River withdrawal simulations; and validation of current and future model output. Intergovernmental agreements should be considered among counties and municipalities that establish water withdrawal standards in accordance with projected growth, e.g., communities commit to specific withdrawal limits based on their future populations and with knowledge from ISWS on groundwater supplies for the purpose of water resources management as provided for in 50 Illinois Compiled Statutes (ILCS) 805/4, Local Land Resource Management Plans. Lastly and per a Demand Report recommendation, CMAP should collect a variety of data from public-water suppliers to add value to those data reported to the Illinois Water Inventory Program (IWIP) maintained by ISWS and enhance regional understanding of water use. Such data should be publicly available, but collection will nonetheless require the cooperation of water suppliers.

More fundamentally, the RWSPG recommends that, either through new legislation or amended legislation, the Governor and General Assembly should make an annual appropriation to a state/regional water supply planning program directed by IDNR. In addition, CMAP should study and develop cost estimates for the regional planning agency, in coordination with a regional deliberative body, to ensure an ongoing regional planning effort and implement the regional agency's portion of water plan recommendations; and study and develop, in concert with others, the cost of implementing other plan recommendations. In this regard, this plan recommends that a continuous process of regional water supply/demand planning should be implemented and regional water supply plans should be updated on a five-year cycle.

Conclusion

This initial phase of planning does not address all possible issues, some of which can be explored in planning cycles that follow. Regional water planning will likely need time to mature in order to discover the utility, if not the imperative, of sustainability and other planning models and a more comprehensive or holistic approach to managing various aspects of the hydrologic cycle. While there is great interest in implementing this regional plan, there is also the recognition of the iterative nature of water-resource planning. Thus, the next five-year planning cycle, commencing in February 2010, will aim to address the ongoing need for refinement in the many areas under current consideration. In the meantime, it behooves all parties to maintain an ongoing planning effort to include at a minimum, a forum of discussion for the evolving water planning and management landscape. What remains to be seen is which parties choose to participate productively in that discussion and thus, shape the future that will undoubtedly feature new water-use circumstances and challenges to be resolved. In the interim, the Water Plan presents an opportunity for those decision makers in the region who wish to lead.

Chapter 1
Introduction

This document fulfills Executive Order (EO) 2006-1 issued by the Governor of Illinois in January 2006. EO 2006-1 calls for a comprehensive program for state and regional water supply planning and management, a strategic plan for the program's implementation, and development of Regional Water Supply Plans in two Priority Water Quantity Planning Areas. The 11 counties of northeastern Illinois represent one of those two priority planning areas, and the plan that follows captures the work performed during the last four years.

The report is divided into five chapters plus appendices. Chapter 1 provides the reader with information necessary for understanding past events that lead to today's planning activities. Background information is also provided on the regional planning body and process that led to development of this plan. Chapter 2 explores the institutional framework for planning/management and a host of issues that collectively provide context for plan recommendations. Those recommendations follow in Chapters 3 and 4. Where the former explores the relatedness between land-use decisions and water resources, the latter offers demand management and other strategies for managing water demand and augmenting supplies. Chapter 5 provides ideas related to alternate or additional institutional mechanisms for water management moving forward. The chapter also includes discussion of drought preparedness, funding, monitoring and data collection, and closes with a look towards some of the issues to be addressed during the next planning cycle.

The reader is also advised to review two documents that served to inform the planning process: 1) Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050, and 2) Regional Groundwater Modeling for Water Supply Planning in Northeast Illinois. These two reports contribute significantly to this document and contain valuable water-related information. Full reference information for these documents is provided in footnotes below.

Background

State Planning

Water supply planning in the state of Illinois has a long history, to which the Illinois State Water Survey (ISWS) has contributed greatly since its founding in 1895.[1] Planning activity has often been initiated by a governor's directive or executive order. Governor Otto Kerner, Jr., for example, launched such an effort in 1965 and the resultant 1967 plan, *Water for Illinois – A Plan of Action*, offered among its recommendations a regional approach and structure for water resources management.[2]

In 1980, Governor James R. Thompson appointed a task force to produce a new state water plan. The Illinois State Water Plan Task Force formed five regional advisory councils, addressed problems of statewide importance, and has provided a coordination role among state agencies ever since.[3] Both the Illinois State Water Plan Task Force and the Illinois Drought Response Task Force, a group of state agency representatives that are convened by the Governor as needed, are managed through the Illinois Department of Natural Resources (IDNR), Office of Water Resources (OWR), Division of Program Management.[4]

With the dawn of the 21st century, Governor George H. Ryan established a Governor's Water Resources Advisory Council (WRAC) in 2000 to study water resource usage, including water usage by peaker-power plants. (The WRAC was somewhat short lived as it was subsequently abolished by Governor Blagojevich in his plans to reduce state spending and close an estimated $5 million budget shortfall for fiscal years 2003 and 2004.) Governor Ryan followed with EO 2002-5[5] that invoked the Illinois Groundwater Protection Act, 415 ILCS 55/4, and the Interagency Coordinating Committee on Groundwater (ICCG) to designate a subcommittee to develop an integrated groundwater and surface water resources agenda and assessment report. The Subcommittee on Integrated Water Planning and Management issued their report in December 2002.[6] Their report featured the 12 consensus principles developed by the WRAC, which are as follows:

1. Better science and more funding for science is needed.
2. A system for identifying water resource problem areas is needed.
3. Water resource problem areas should not be too large; could be based on ground or surface water sources or both; should be based on supply and demand; a drop below sustainable yield should be a criteria; pollution could be a criteria.
4. Need to see details of how such areas will be identified both short-term, based on existing information, and long-term, as better data become available.
5. Emphasize regional water management authorities—boundary should have some relationship to scale of the water resource (watershed and/or aquifer boundary).
6. State's role: for later resolution; should support, provide science, establish or appoint regional authorities.
7. Is there a role for water authorities established under the Water Authorities Act?
8. Phased approach to implementation would be received better by a broader group of interests.
9. Immediately begin pilot programs in "willing" areas; pilot programs should be site-based, located in problem areas.
10. Sunsets should be established for #8 and #9.

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1 Derek Winstanley, Nani G. Bhowmik, Stanley A. Changdon, and Mark E. Peden. 2002. History of the Illinois State Water Survey, pp. 121-132 in J.R. Rogers and A.J. Fredrich (ed.), Proceedings and Invited Papers for the ASCE 150th Anniversary (1852-2002), November 3-7, 2002, Washington, D.C., ASCE, Reston, VA.

2 Developed by the Illinois Technical Advisory Committee on Water Resources, Springfield, IL, 1967, as cited in Water Quantity Issues Facing Illinois; a paper presented by Derek Winstanley to the 2002 Illinois Environmental Conference of the Illinois State Bar Association, Chicago, August 16, 2002.

3 Derek Winstanley, 2008. A brief history of water-supply planning in Illinois (draft). Unpublished manuscript.

4 Illinois Department of Natural Resources. Office of Water Resources – Division of Program Development. See http://www.dnr.state.il.us/owr/programdev.htm.

5 Executive Order for the Interagency Coordinating Committee on Groundwater to Establish a Water Quantity Planning Program. Executive Order Number 5 (2002). Executive Department, State of Illinois, Springfield. April 22, 2002.

6 Report to the Interagency Coordinating Committee on Groundwater from the Subcommittee on Integrated Water Planning and Management With Recommendations Pursuant to Executive Order Number 5, 2002. December 20, 2002.

11. There should be an ongoing role for the Water Resources Advisory Committee in developing the details associated with establishing regional water management authorities.
12. Both groundwater and surface water should be considered.

Together with the Groundwater Advisory Council, the ICCG was directed to use the subcommittee's six-point agenda[7] and report, including the principles enumerated above, to establish a water-quantity planning procedure for the State. It is against this historical backdrop that Governor Rod Blagojevich issued EO 2006-1.

Regional Planning

Planning for the regional water supplies of northeastern Illinois dates back to 1966 when the Northeastern Illinois Planning Commission (NIPC) published Technical Report No. 4: *The Water Resource in Northeastern Illinois: Planning its Use*.[8] That report was updated in 1974 with Technical Report No. 8: *Regional Water Supply Report*. Report No. 8 features several principle findings and strategy statements that continue to resonate today.

More recently, representatives from four planning agencies in Illinois, Indiana, and Wisconsin signed the Wingspread Multi-State Regional Accord in 2002. The Wingspread Accord was an agreement between NIPC, Southeastern Wisconsin Regional Planning Commission, Northwestern Indiana Regional Planning Commission, and the Chicago Area Transportation Study to cooperate and coordinate more closely on matters concerning regional interdependence. In addition to promoting integrated regional planning and economic development in an expanded spatial context, the Accord spawned the Southern Lake Michigan Regional Water Supply Consortium (SLMRWSC). The mission of the SLMRWSC is to advance a more comprehensive regional approach to sustainable water supply planning and management. Consortium activity has tapered off considerably since the "Straddling the Divide" conference held in February 2005, but has the potential to revive itself through the Wingspread Accord at any time.

In 2002, NIPC adopted the *Strategic Plan for Water Resource Management (*referred to hereafter as the Strategic Plan*)*. This plan presented the work of over 100 experts from the region who served on an advisory committee and three task forces: stormwater and flooding; water quality; and water supply. Several of the recommended water-supply strategies featured in the Strategic Plan have either been partially implemented or remain viable today.

The Kane County Water Supply Study has also played an important role in the current regional planning initiative, though at the subregional-scale.[9] Spurred by concern that rapid population growth could strain local water supplies, particularly groundwater, the countywide effort involved the ISWS and State Geological Survey in a study of shallow groundwater, deep groundwater, and the Fox River. Beginning in 2002, the multiple-year study led to new knowledge of the hydrogeology of Kane County, making it one of the best understood in the nation currently.

Of consequence to the region, the Kane County study provides a science-based and data-rich foundation for a much improved understanding of the deep-bedrock aquifer (i.e., Ancell Unit, Ironton-Galesville Unit, and Mt. Simon Unit) that lies beneath the entire 11-county planning region. Additionally, the study provided an enhanced understanding of the shallow aquifer

7 *Ibid.* The six-point agenda states: 1) By March 1, 2003 formally establish an interim water quantity planning and management process and develop a draft strategic plan for water quantity planning and management statewide. 2) By April 1, 2003 provide agency and public review of the draft strategic plan for water quantity planning and management, modify as necessary, develop an implementation plan, seek necessary funding, and begin implementation on July 1, 2003. 3) Strengthen the scientific basis for planning and management by funding needed scientific studies that answer the following questions: (see report). 4) Develop a package of financial and technical support for and encourage the formation of regional water management corsortia in Priority Water Quantity Planning areas which can be identified using existing information. 5) Compile available information and make it useful and easily accessible. 6) Implement a phased approach in establishing a sound scientific basis and an administrative framework for water quantity management.

8 Northeastern Illinois Metropolitan Area Planning Commission's *The Water Resource in Northeastern Illinois: Planning its Use*. Technical Report No. 4. Prepared by John R. Sheaffer, Project Director and Arthur J. Zeizel, Asst. Project Director. June, 1966.

9 Strategy for Developing a Sustainable Water Supply Plan for Kane County. 2007. See http://www.co.kane.il.us/priorityPlaces/docs/Strategy_for_Developing_a_Sustainable_Water_Supply_Plan_for_Kane_County.pdf.

system (i.e., Quaternary Unit and Shallow-Bedrock Aquifer) beneath the Fox River, and new knowledge of Fox River water accounting (i.e., effects of discharges and withdrawals on the spatial and temporal characteristics of flow). Thus, the State Surveys were prepared by this study (and previous work) to address the broader regional impacts of ongoing and/or increased groundwater withdrawals. A new understanding of the impacts of increased Fox River water withdrawals and discharges on low flow was also achieved.

Other actors in the region have also been vocal about the need for a more substantive program for addressing regional water needs.[10] Most recently, in the midst of a drought that started in 2005, Governor Rod Blagojevich issued EO 2006-1[11] enumerating the following actions to be executed:

> Consistent with the authority granted to the Department of Natural Resources under the Rivers, Lakes, and Streams Act, 615 ILCS 5/5 et seq. and the Level of Lake Michigan Act, 615 ILCS 50/1 et seq., the authority of the Department of Natural Resources' Office of Water Resources under 20 ILCS 801/5-5, the Office of Water Resources, in coordination with the State Water Survey, shall:
>
> 1. Define a comprehensive program for state and regional water supply planning and management and develop a strategic plan for its implementation consistent with existing laws, regulations and property rights;
> 2. Provide for public review of the draft strategic plan for a water supply planning and management program;
> 3. Establish a scientific basis and an administrative framework for implementing state and regional water supply planning and management;
> 4. Develop a package of financial and technical support for, and encouragement of, locally based regional water supply planning committees. These committees, whether existing or new entities, shall be organized for participation in the development and approval of regional plans in the Priority Water Quantity Planning Areas;
> 5. By December 31, 2006, ensure that Regional Water Quantity Plans are in process for at least two Priority Water Quantity Planning Areas.

One such Priority Water Quantity Planning Area is the 11-county northeastern Illinois region (Figure 1). During the summer of 2006, the IDNR OWR, approached the Chicago Metropolitan Agency for Planning (CMAP) with a request to lead the new planning effort in northeastern Illinois. CMAP agreed and followed with a scope-of-work document that was ultimately incorporated into a three-year contract.[12] The scope-of-work included an agreement to 1) create and facilitate the work of a new planning body and to develop a regional water supply plan, 2) study regional water demand, 3) conduct outreach and education, and 4) provide project management and act as fiscal agent.

10 Troubled Waters: Meeting Future Water Needs in Illinois. Campaign for Sensible Growth, Metropolitan Planning Council, and Openlands Project. Undated.

11 2006-1: Executive Order for the Development of State and Regional Water-Supply Plans. Issued by Governor Rod R. Blagojevich: January 9, 2006.

12 See http://www.cmap.illinois.gov/watersupply/default.aspx?ekmensel=c580fa7b_8_18_3314_3.

Northeastern Illinois Regional Water Supply Planning Group

CMAP's commitment to orchestrate the regional planning process included the creation of a new planning entity that was to be both diverse and representative of key stakeholder groups in the region. In addition to input from planners throughout the region and best professional judgment, the State of Texas model for stakeholder representation was also considered during development of the structure and composition of a regional planning body.[13] In November 2006, an Open Forum was held in Oak Brook, Illinois to publicly launch the regional planning initiative. The afternoon session organized people into seven interest groups that were identified for representation on the regional planning body. Each group was facilitated to discuss and reveal those issues that were most important to them. This information served as a useful starting point for matters that the emerging planning process could be sensitive to and address as appropriate.

The following month, seven nonelected-official groups were reconvened at the offices of CMAP for purposes of selecting delegates to represent their constituencies. For county government delegates, county board chairs received a letter from CMAP asking that either they appoint themselves or another board member to represent the interests of county government on the emerging planning body.[14] Delegates to represent municipal government/municipal water suppliers were appointed by the appropriate Council of Government (COG). Upon completion of this process, the Northeastern Illinois Regional Water Supply Planning Group (RWSPG) was formed to be the representative body for deliberation of issues, ideas, and plan recommendations. Thus, CMAP and regional partners met a requirement of EO 2006-1 that a plan would be "in process" by the end of 2006.

The RWSPG is designed to be composed of thirty-five delegates. Delegates represent the following stakeholder-interest groups:

1. Academia and public interest in regional planning (2)
2. Agriculture (2)
3. Business, industry, and power (2)
4. Conservation and resource management (2)
5. County government (11)
6. Environmental advocacy (2)
7. Municipal government and municipal water suppliers (10)
8. Real estate and development (2)
9. Wastewater treatment and nonmunicipal water suppliers (2)

Most stakeholder groups attracted a large and diverse list of participants and it was the job of delegates to communicate regularly with their constituency. Meetings were open to the general public and typically included a sizable and diverse audience.

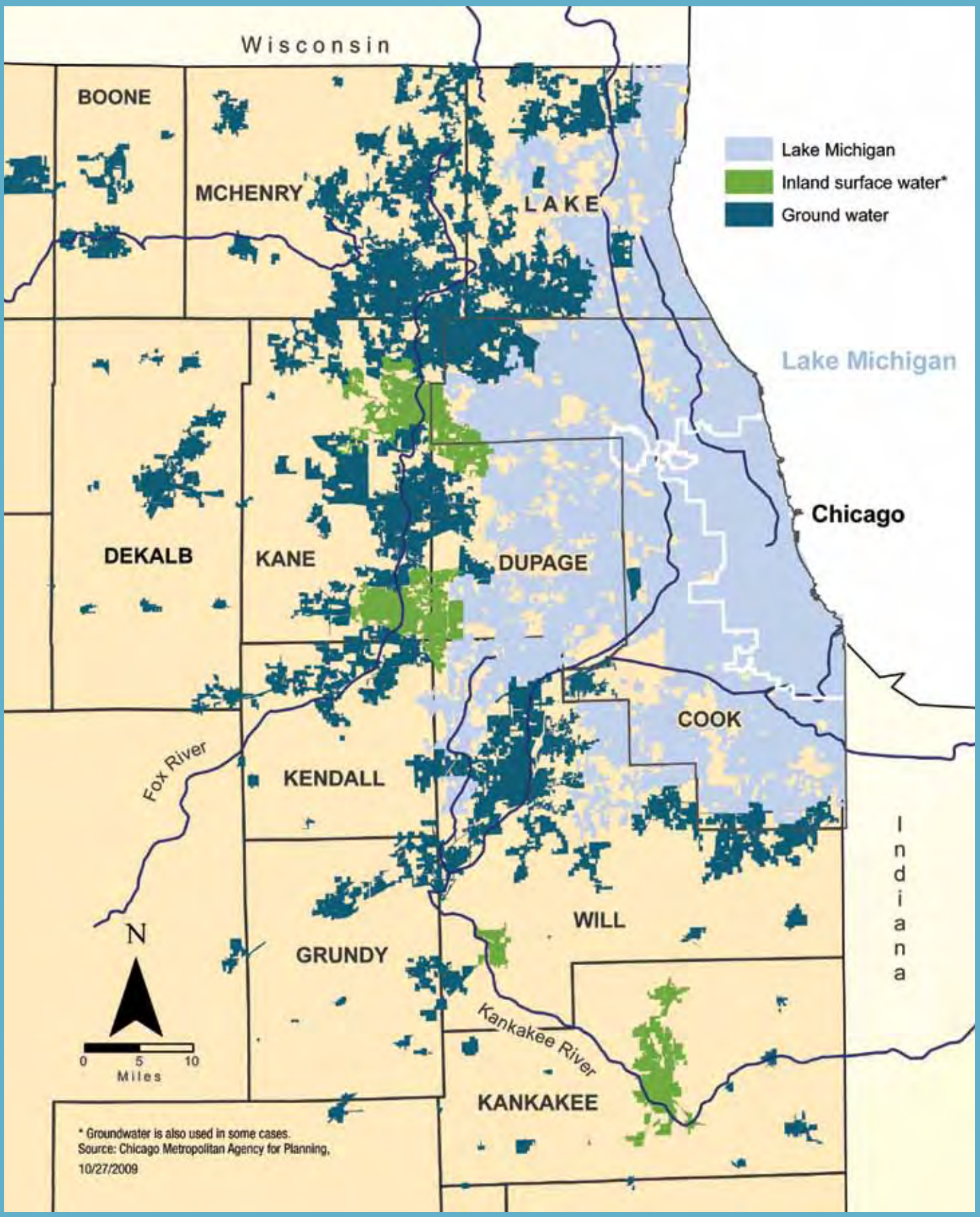
The RWSPG developed Operational Guidelines[15] and has generally met each month beginning in January 2007 and continuing through January 2010 while taking a summer break during the month of August. The RWSPG goes about its business using a modified-consensus decision making process. Group membership and attendance can be found in Appendix A. The RWSPG is advisory in nature, but provides an important forum for discussion and an experimental structure for regional-scale decision making.

13 See Texas Water Code — Section 16.053. Regional Water Plans.

14 The seat for Cook County Government remained open as a representative was never appointed.

15 Operational Guidelines: Regional Water Supply Planning Group of Northeastern Illinois. May 23, 2008. See http://www.cmap.illinois.gov/WorkArea/showcontent.aspx?id=9644.

Figure 1: Source of public water supply by municipality in 11-county planning region



Purpose

EO 2006-1 acknowledges "increasing demands on Illinois' water resources" along with "impacts of drought" as potential sources of conflict among water users and thus, justification for the order to pursue new state and regional water supply planning and management. Any future increase in demand for water within the state can largely be attributed to population growth, the majority of which is taking place in northeastern Illinois.

Population growth in northeastern Illinois has historically been robust. Figure 2 illustrates both the history of population growth and projections to 2050 in the northeastern Illinois water planning region. The graphic indicates that for the 11-county region, population grew 58% during the last half of the 20th century to 8,418,387 persons in 2000. Furthermore, population growth had been projected by NIPC and others to grow 26% from 2000 to 2030 to 10,635,428 persons.[16] Extrapolation of that 30-year population projection to 2050 leads to a possible 36 - 64% growth in water demand[17] to serve as many as 12,113,169 thirsty people at mid-century.

Given the known constraints on water sources in the region, population growth projections suggest that it would be inappropriate to assume that water will always remain relatively abundant as it has in the past. EO 2006-1 expresses an intention, therefore, to avoid adverse impacts to the health of the State's citizens, environment, and economy, and to assess water supplies through a sound planning process to ensure responsible, economically viable, and secure water supply development.

The purpose of the regional planning effort is captured in the adopted mission statement of the RWSPG:

> To consider the future water supply needs of northeastern Illinois and develop plans and programs to guide future use that provide adequate and affordable water for all users, including support for economic development, agriculture, and the protection of our natural ecosystems.

In support of the purpose of this plan, the RWSPG adopted the following goals :

1. Ensure water demand and supply result in equitable availability through drought and non-drought conditions alike.
2. Protect the quality of ground- and surface water supplies.
3. Provide sufficient water availability to sustain aquatic ecosystems and economic development.
4. Inform the people of northeastern Illinois about the importance of water-resource stewardship.
5. Manage withdrawals from water sources to protect long-term productive yields.
6. Foster intergovernmental communication for water conservation and planning.
7. Meet data collection needs so as to continue informed and effective water supply planning.
8. Improve integration of land use and water use planning and management.

16 NIPC projected population for their 6-county planning region following a robust and accepted methodology that includes endorsement from the counties and municipalities involved. To these data were added growth projections for the other 5 counties as developed by the State of Illinois.

17 B. Dziegielewski and F.J. Chowdhury. 2008. Regional Water Demand Scenarios for Northeastern Illinois: 2005-2050. Project Completion Report. Southern Illinois University Carbondale. See http://www.cmap.illinois.gov/WorkArea/showcontent.aspx?id=10294.

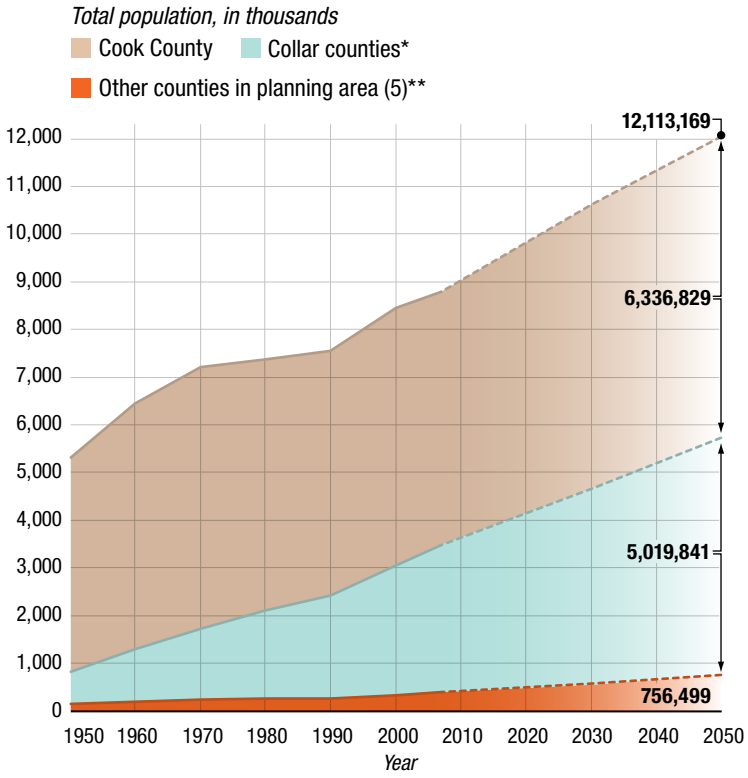
19 S.C. Meyer, H.A. Wehrmann, H.V. Knapp, Y-F Lin, F.E. Glatfelter, D. Winstanley, J.R. Angel, J.F. Thomason, and D.A. Injerd. 2010. Opportunities and Challenges of Meeting Water Demand in Northeastern Illinois. Prepared for the Northeastern Illinois Regional Water Supply Planning Group by the Illinois State Water Survey and Illinois State Geological Survey (Institute of Natural Resource Sustainability, University of Illinois, Urbana-Champaign) and the Illinois Department of Natural Resources, Office of Water Resources. See http://www.isws.illinois.edu/wsp/.

The plan that follows is for a region that has historically been considered water-rich and where issues of scarcity have been rare to nonexistent. Today, new allocations of Lake Michigan water have been established to meet the needs of three-quarters of the regional population to 2030. Elsewhere in the region, however, groundwater withdrawals are raising new concerns. For example, the deep-bedrock aquifer is being mined (i.e., withdrawal rates exceed natural recharge rates), shallow-well withdrawals are known to be reducing natural groundwater discharge to streamflows throughout sections of the Fox River Basin, and changes to deep-bedrock water quality (i.e., elevated concentrations of arsenic, barium, radium, and salinity) are possible before 2050.[19] Thus, the region must carefully examine the impacts of water use, recognize the uneven demand/supply circumstances where they exist, and take steps to resolve or avoid potential water supply and water demand imbalances. Lastly, IDNR made clear to CMAP and the Mahomet Aquifer Consortium (the lead and fiscal agent for the other pilot planning process) that the two pilot processes should not focus on capital projects.

This plan acknowledges potential imbalances and includes recommendations to help in resolving or avoiding them. The plan is the outcome of a three-year planning effort and is fundamentally about maintaining or enhancing economic development, environmental protection, and social equity. The plan brings new focus on the relationship between regional prosperity and dependence on water.

A complete list of recommendations made in this plan can be found in Appendix B.

Figure 2: Population growth and projections in the 11-county northeastern Illinois water planning region



Sources: U.S. Census Bureau; Northeastern Illinois Planning Commission; al Chalabi Group, Ltd.,Chicago Metropolitan Agency for Planning
* DuPage, Kane, Lake, McHenry, Will ** Boone, DeKalb, Grundy, Kankakee, Kendall

5.2 Immeasurable Loss: Modernizing Lake Michigan Water Use, *MPC*

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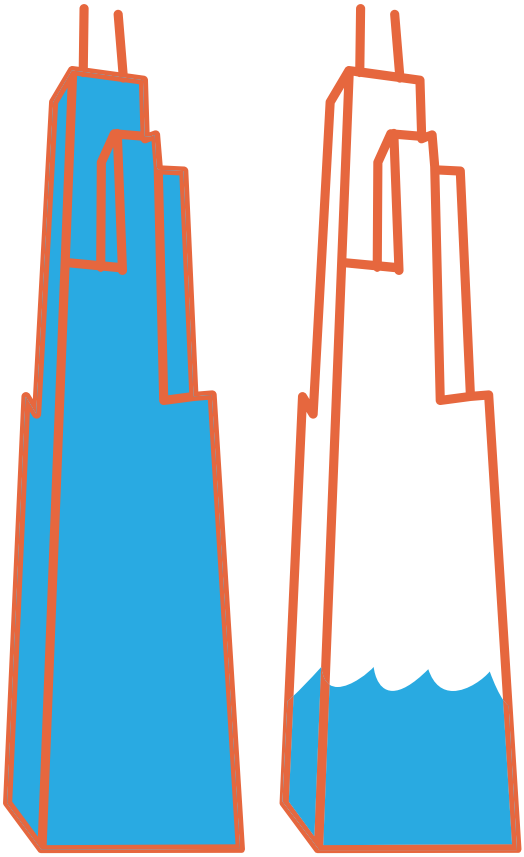
To download the full report, visit metroplanning.org/uploads/cms/documents/mpc_immeasurable_loss_final_web.pdf

Metropolitan Planning Council

IMMEASURABLE LOSS

Modernizing Lake Michigan Water Use



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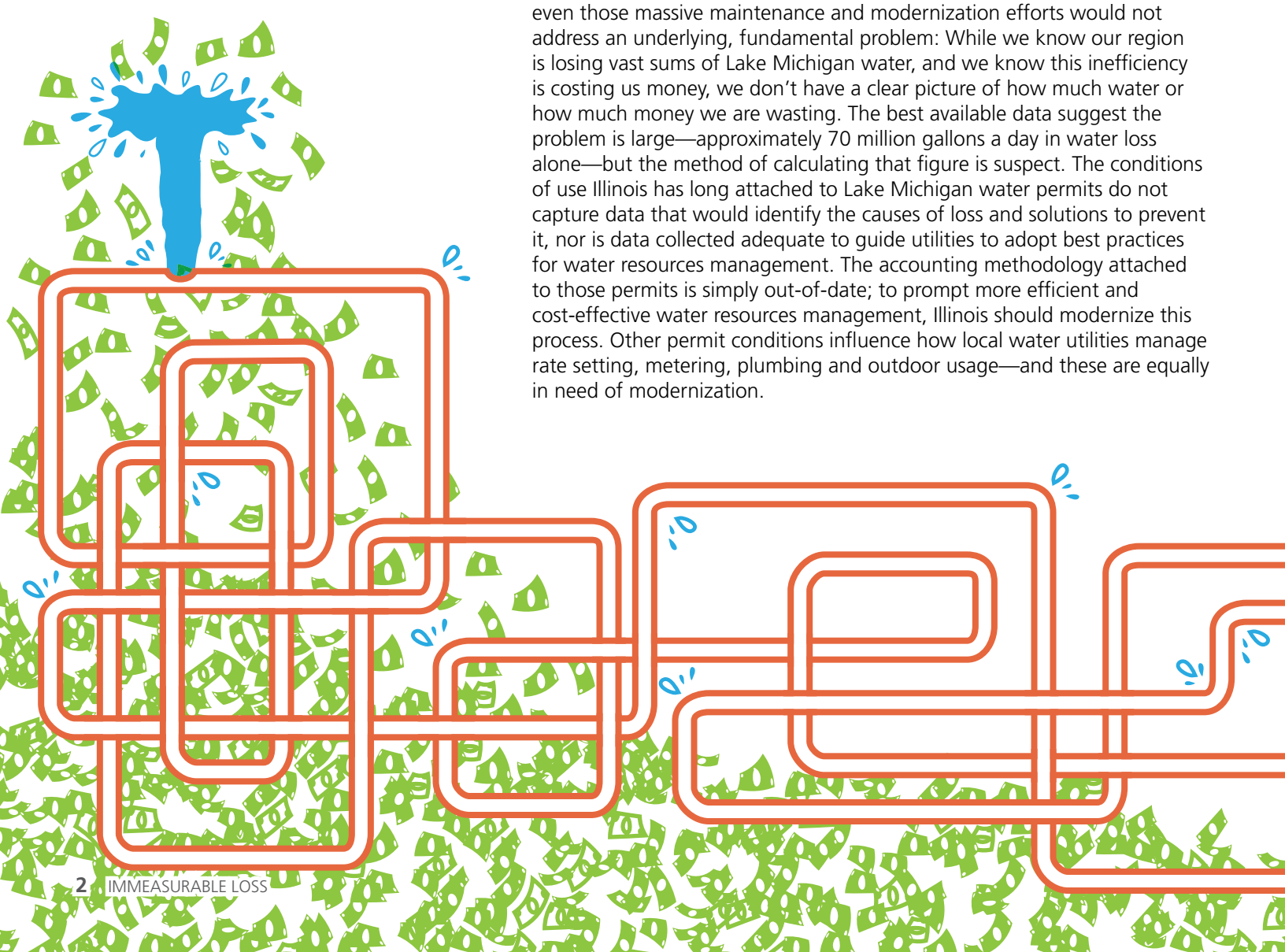
EXECUTIVE SUMMARY

The Chicago area is privileged to be situated on the shores of Lake Michigan, the third largest of the Great Lakes, which altogether account for 20 percent of the world's readily available freshwater. Lake Michigan supports a unique ecosystem, provides a breathtaking natural contrast to Chicago's skyline and the many communities lining its shores, and offers a critical asset—freshwater—that our residents and businesses rely upon to grow and prosper.

However, the presence of this vast Lake too often lends the illusion that our water is limitless. In fact, both the water itself and the public funds required to attain, treat and deliver it are finite. Every day tens of millions of gallons of Lake Michigan water are lost due to leaks, faulty meters or accounting errors, never producing any revenue. Water also goes to waste through inefficient plumbing and excessive outdoor use. Both lost water—which costs money to produce—and wasted water—which was paid for but used unproductively—are a financial burden. Fortunately, the factors that lead to loss and waste are controllable, and the problem is solvable.



If this considerable inefficiency was the whole story, we'd still have quite a challenge to overcome—repairing thousands of miles of pipe, replacing tens of thousands of worn-out meters, upgrading plumbing fixtures—but even those massive maintenance and modernization efforts would not address an underlying, fundamental problem: While we know our region is losing vast sums of Lake Michigan water, and we know this inefficiency is costing us money, we don't have a clear picture of how much water or how much money we are wasting. The best available data suggest the problem is large—approximately 70 million gallons a day in water loss alone—but the method of calculating that figure is suspect. The conditions of use Illinois has long attached to Lake Michigan water permits do not capture data that would identify the causes of loss and solutions to prevent it, nor is data collected adequate to guide utilities to adopt best practices for water resources management. The accounting methodology attached to those permits is simply out-of-date; to prompt more efficient and cost-effective water resources management, Illinois should modernize this process. Other permit conditions influence how local water utilities manage rate setting, metering, plumbing and outdoor usage—and these are equally in need of modernization.

Fortunately, in early 2013, the Ill. Dept. of Natural Resources (IDNR)—which manages the permits and usage conditions described above—began circulating a proposed series of modernization measures. Metropolitan Planning Council (MPC) supports the majority of those measures; this paper describes why they are necessary, how the region will benefit and areas where we believe IDNR should revise its proposals. *Immeasurable Loss* explores what we know and what we don't know about our management of Lake Michigan water so local and state elected officials, water resource professionals, utility managers and other stakeholders can review IDNR's proposals with as much information as possible. Ultimately, IDNR's proposals and MPC's recommendations will position northeastern Illinois to make more productive and cost-effective use of its Lake Michigan water by reducing loss and waste—of both water and scarce public dollars.

MPC's proposed solutions, laid out in detail in this report and summarized below, fall under five action areas:

Solution #1
Improve the existing accounting system, while exploring a new approach

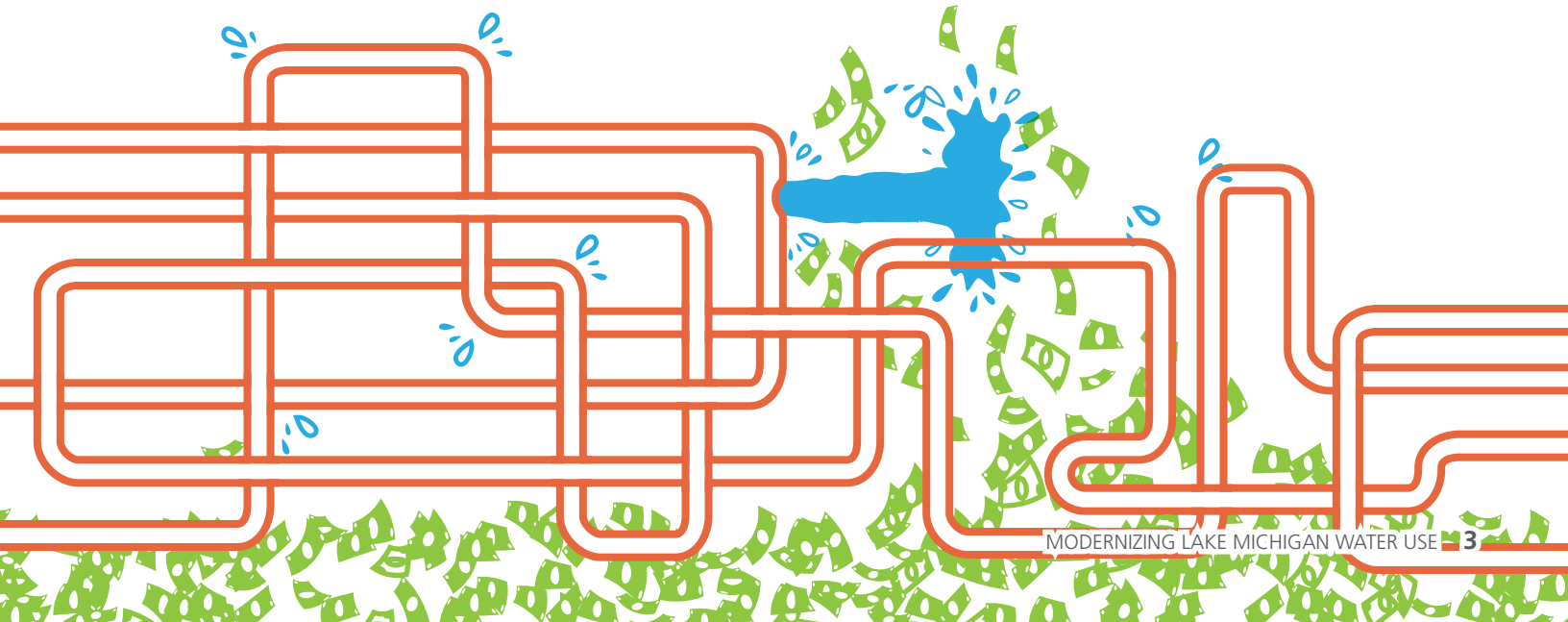
In the near-term, IDNR should implement its proposal to eliminate the Maximum Unavoidable Leakage exemption. Over the next three years, IDNR and its permittees should begin to explore the possible benefits of a more thorough auditing process, the American Water Works Association's M36 methodology.

What will it achieve? This change will improve the quality of information IDNR and permittees have to make decisions about how best to manage our Lake Michigan water.

Solution #2
Encourage communities to set water rates based on cost and use comprehensive metering

Water utilities—both public and investor-owned—should adopt full-cost pricing in order to generate sufficient revenues for high-quality water management now and in the future. In the near-term, IDNR should recommend use of full-cost pricing and provide guidance to permittees on cost accounting and rate setting. IDNR should require a shift to full-cost pricing over the next 10 years. In order to ensure accurate accounting, IDNR and permittees should move toward comprehensive, advanced metering. IDNR should also require completion of metering plans for all permittees not currently universally metered.

What will it achieve? Water resource managers will generate sufficient revenue from system users to operate, maintain and invest in high-quality water systems.



Solution #3
Require permittees to adopt modern plumbing standards

IDNR should move ahead with its proposal to require permittees to adopt more modern plumbing codes, requiring the use of water-efficient WaterSense plumbing fixtures for new installations. Further, IDNR should recommend permittees adopt local codes modeled after the forthcoming Illinois Plumbing Code Green Supplement from the Ill. Dept. of Public Health, or more frequently revised model codes from multiple national professional organizations. Finally, IDNR should coordinate with the Ill. Environmental Protection Agency and Ill. Dept. of Public Health to develop a statewide non-potable water reuse policy that protects public health and water quality while putting available water resources to more productive use.

What will it achieve? Collectively, these reforms will put Illinois on the leading edge of plumbing technology, to ensure the most efficient use of water in homes and businesses.

Solution #4
Strengthen and streamline outdoor water use standards

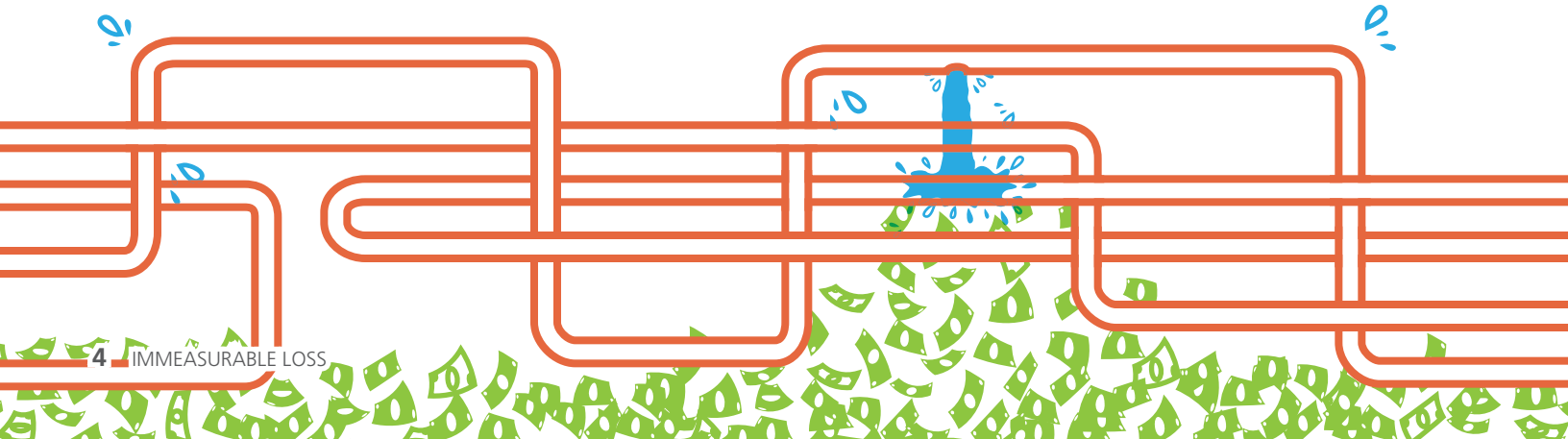
IDNR should implement its proposals to add a sprinkling ordinance to the list of water conservation practices permittees must implement, to modify the sprinkling requirement to add time-of-day and days-per-week restrictions, and to require new/replacement sprinklers to have a WaterSense-labeled irrigation controller. Further, IDNR should look to the Northwest Water Planning Alliance or Chicago Metropolitan Agency for Planning's (CMAP) Model Water Use Conservation Ordinance as regional models for progressive action on discretionary outdoor water use.

What will it achieve? These changes will help reduce permittees' peak demand for water, which in turn will alleviate the consequences of droughts, reduce the need for communities to make capital expansions to their water systems and possibly even allow communities to reduce their requested allocations of Lake Michigan water, freeing up water for other users—and regional growth.

Solution #5
Increase the capacity of IDNR's Office of Water Resources to provide greater support to permittees

IDNR needs to build the capacity of its Lake Michigan management program in order to analyze incoming data, check for possible inaccuracies, work with permittees on controlling water loss, and use every feasible means to manage Illinois' Lake Michigan diversion as efficiently as possible.

What will it achieve? An emboldened IDNR will be able to provide educational resources, technical assistance, data monitoring and other support to permittees, all in the service of improved management.



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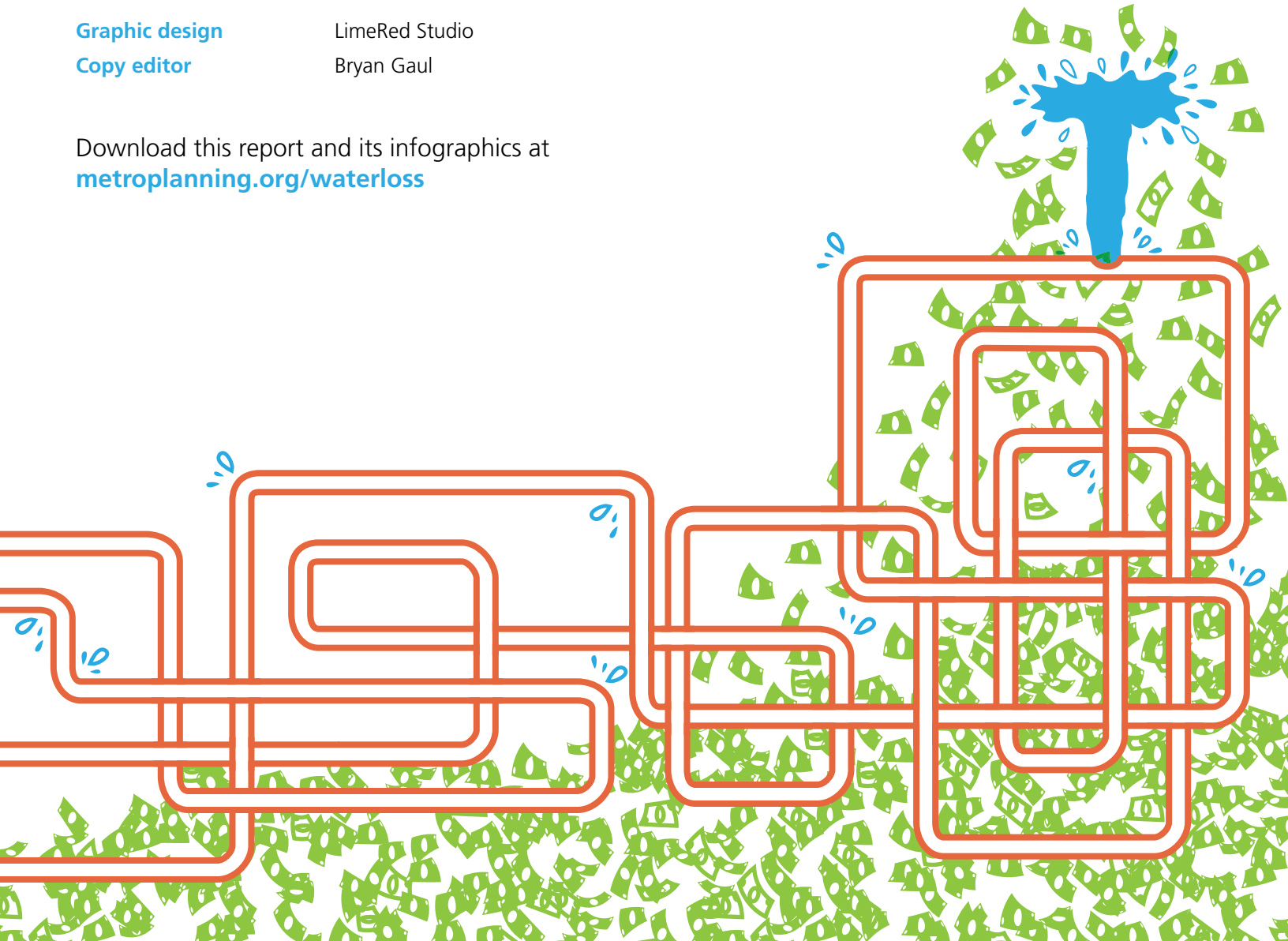

Our Mission

Since 1934, the Metropolitan Planning Council (MPC) has been dedicated to shaping a more sustainable and prosperous greater Chicago region. As an independent, nonprofit, nonpartisan organization, MPC serves communities and residents by developing, promoting and implementing solutions for sound regional growth.

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