

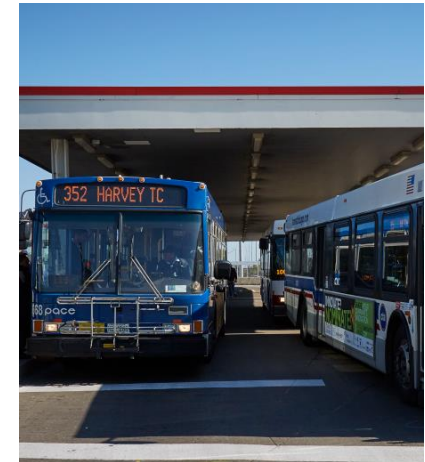


Chicago Metropolitan  
Agency for Planning



# NWPA Water Supply Sustainability Plan: Draft plan and potential water conservation savings

NWPA TAC Meeting  
November 26, 2024



# Draft Plan Feedback

We welcome your input!

**Plan survey:** <https://forms.office.com/g/AHxx0BhkVs>

Open until December 13

Email feedback directly: [kpudlock@cmap.illinois.gov](mailto:kpudlock@cmap.illinois.gov)

# Agenda

Draft Plan overview

Potential water conservation savings

Next steps

# Chapter 1: Introduction

Why does the NWPA need a plan?

The planning process

Organization of the plan

# Why develop a plan?

- Population growth
- Water quantity challenges
- Water quality challenges
- Source switching feasibility
- Advancement in groundwater science

# Project purpose

Roadmap for members seeking voluntary steps toward feasible and effective long-term use of water supply resources.

- **Project partners:** CMAP, Illinois-Indiana Sea Grant, NWPA (Technical Advisory Committee, Executive Committee), Illinois State Water Survey
- **Funding:** Illinois Department of Natural Resources, Office of Water Resources



# Plan objectives

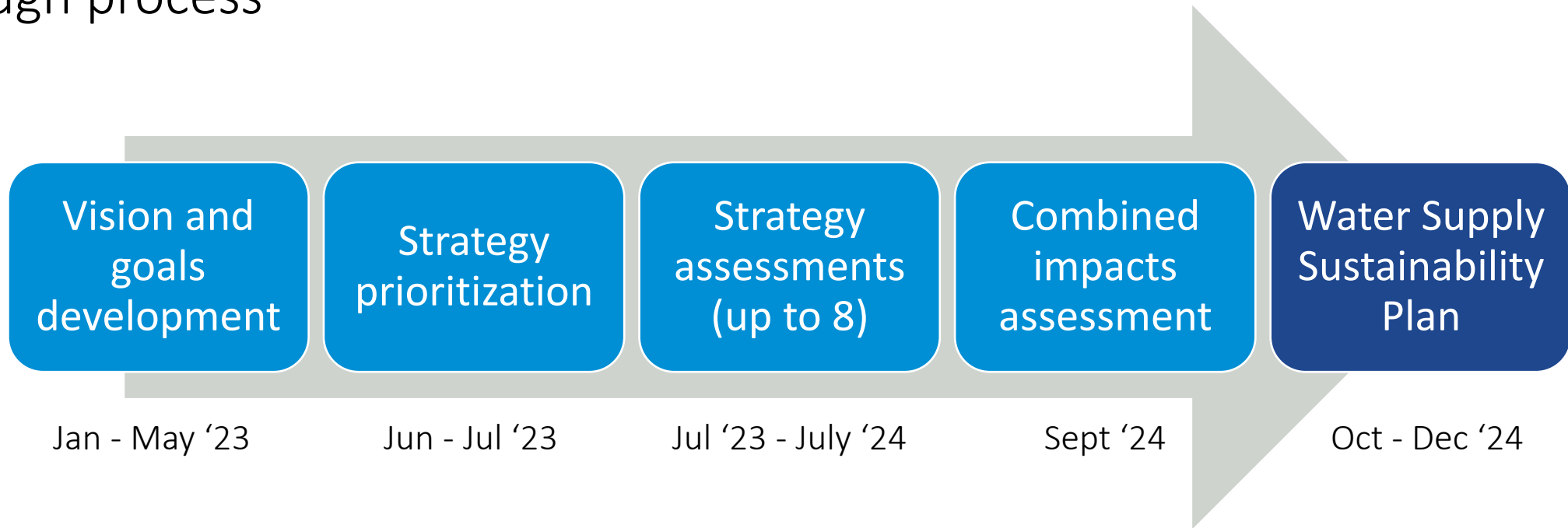
- Establish water supply sustainability goals
- Provide a menu of water conservation strategies and best practices
- Increase awareness of priority strategies and resources
- Encourage communities to create their own water conservation plans



# Planning process

Multi-year planning process (January 2023 – December 2024)

NWPA TAC and EC members review and provide feedback through process





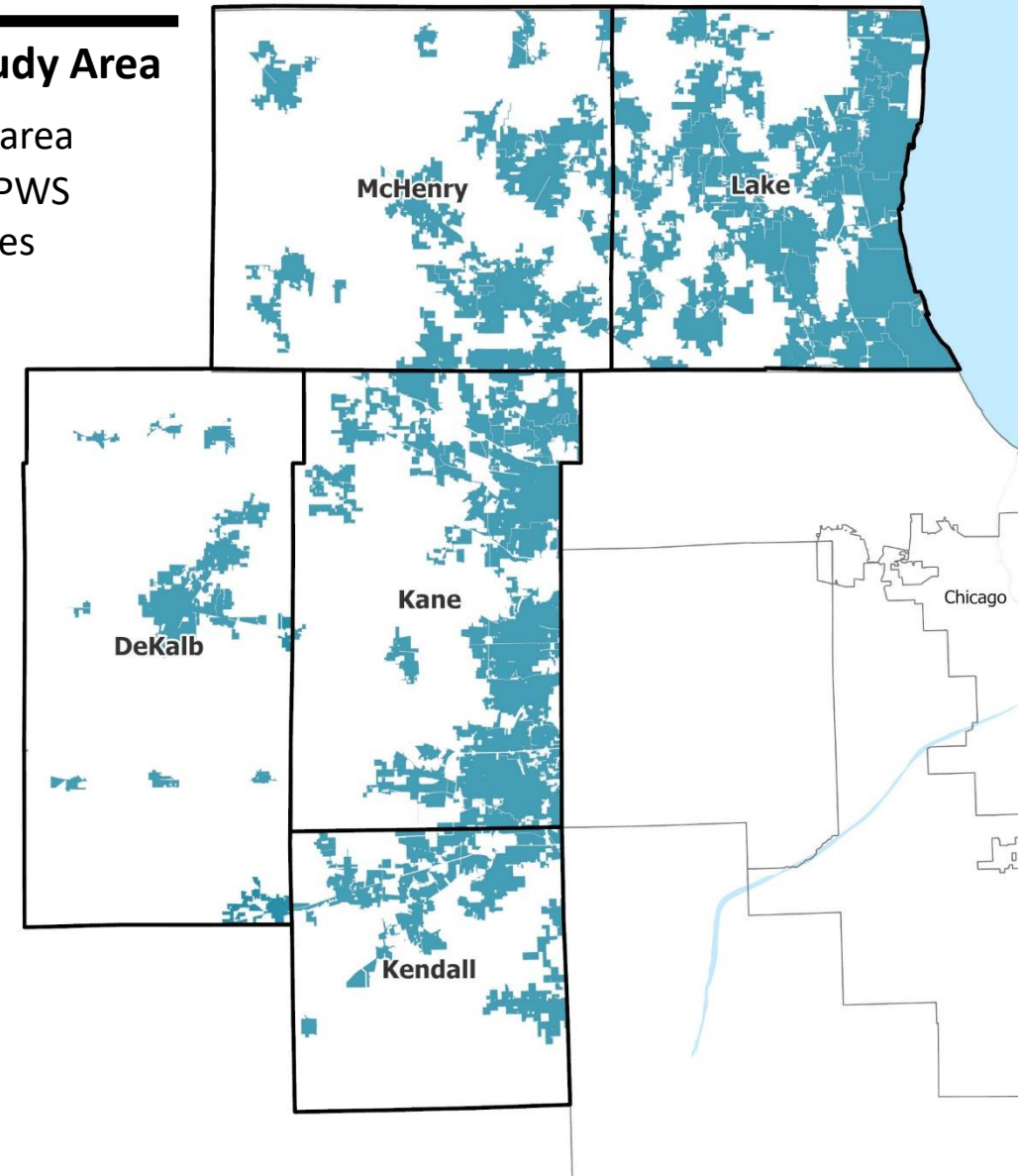
# Plan study area

Communities served by a municipal public water supply (PWS) system\* in DeKalb, Kane, Kendall, Lake, and McHenry Counties

\*Includes NWWPA member and non-member communities

## NWWPA Plan Study Area

- Plan study area
- Municipal PWS communities



# Plan chapters

1. Introduction
2. **NWPA profile** – Study area characteristics, challenges, water supply & demand
3. **Call to action** – Actions needed for sustainability, including benefits of water conservation
4. **Water conservation framework for achieving sustainable supply** – Overview of priority water conservation strategies and their combined savings potential
5. **Water conservation strategies and potential water savings**
6. Appendix

# Chapter 2: NWPA profile

A growing region

Public water supply systems

Water sources

Supply challenges

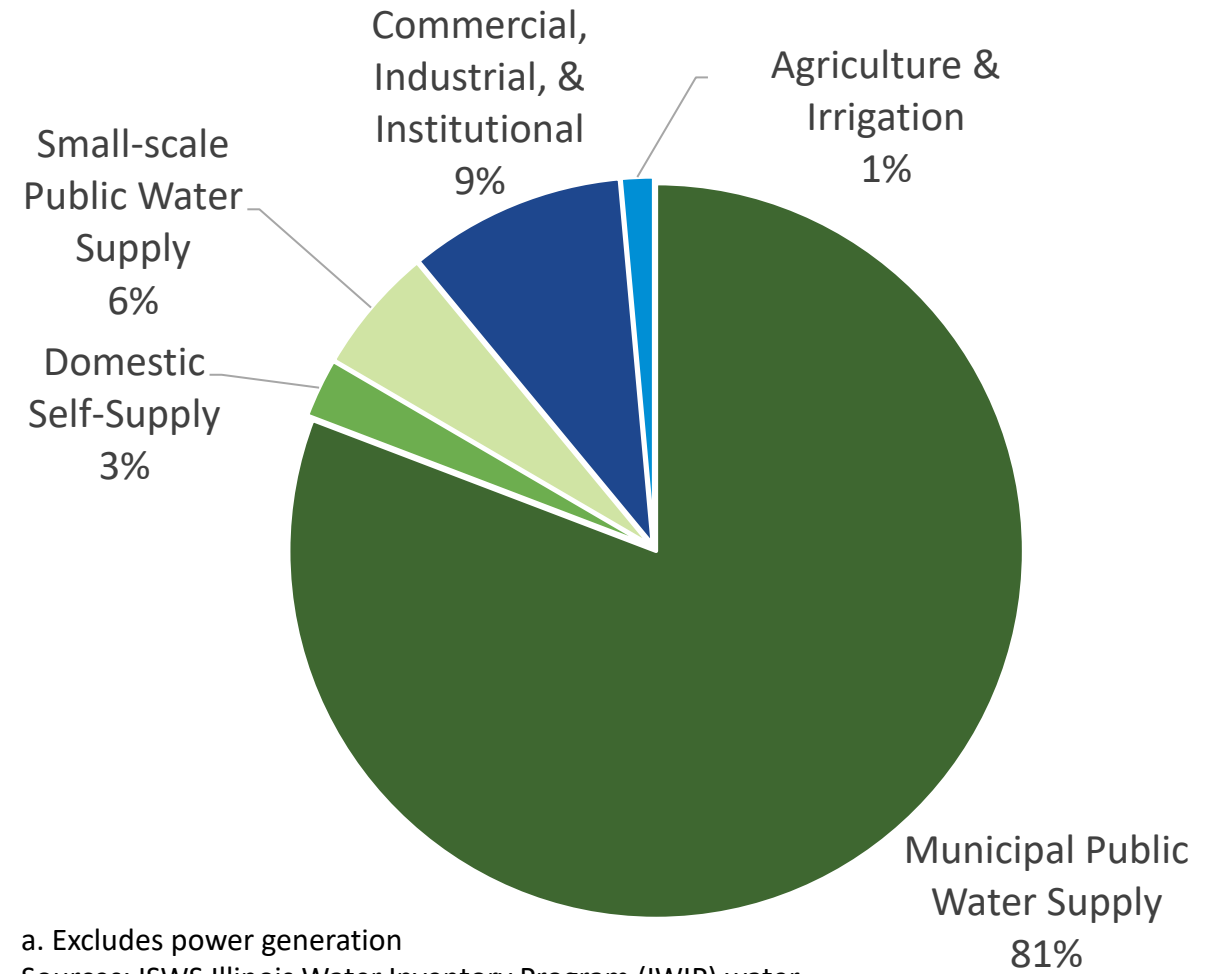
Existing and projected water supply  
and demand

# Target audience

## Municipal PWS communities

- Largest water users
- Positioned to implement and promote water conservation strategies
- Can develop their own water conservation plans

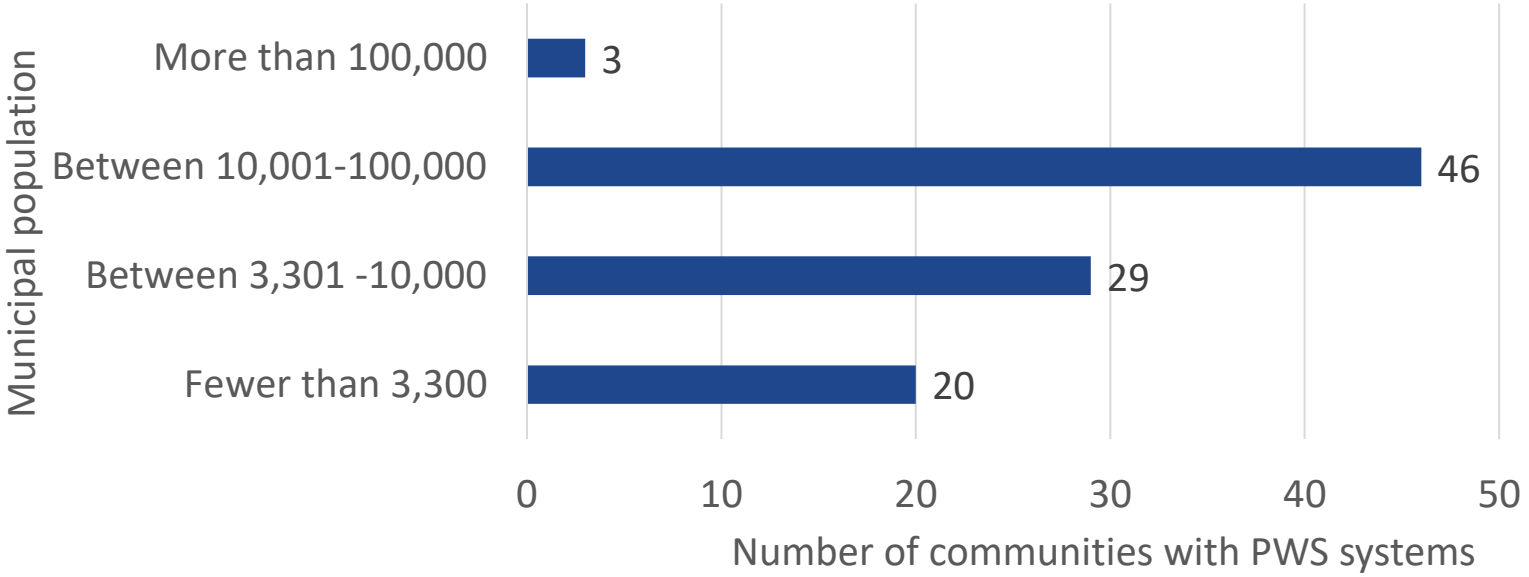
## Share of water use by sector in NWPA study area, 2018<sup>a</sup> - DRAFT



a. Excludes power generation

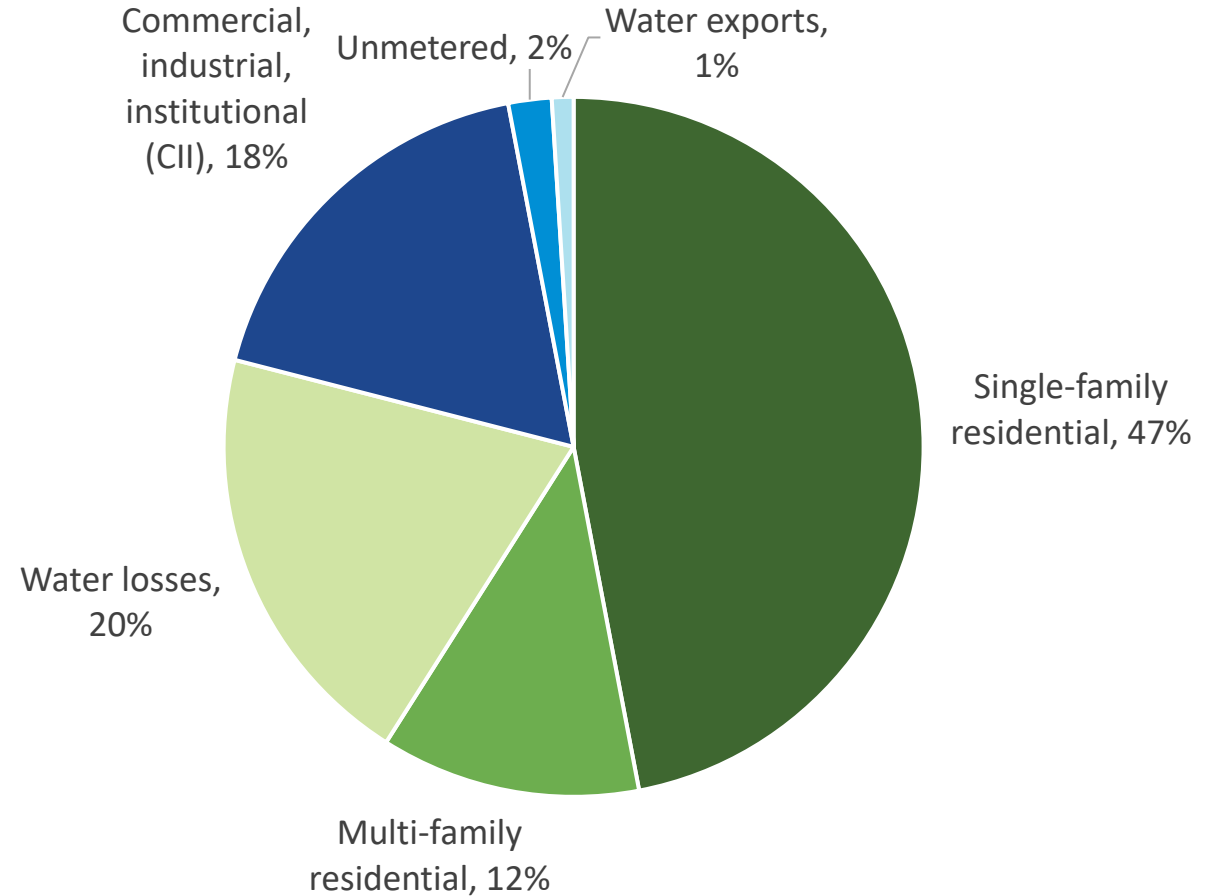
Sources: ISWS Illinois Water Inventory Program (IWIP) water withdrawal data, 2018; USGS National Water Use Information Program (domestic self-supply sector, only)

# Municipal public water suppliers in NWPA 5-county region by population



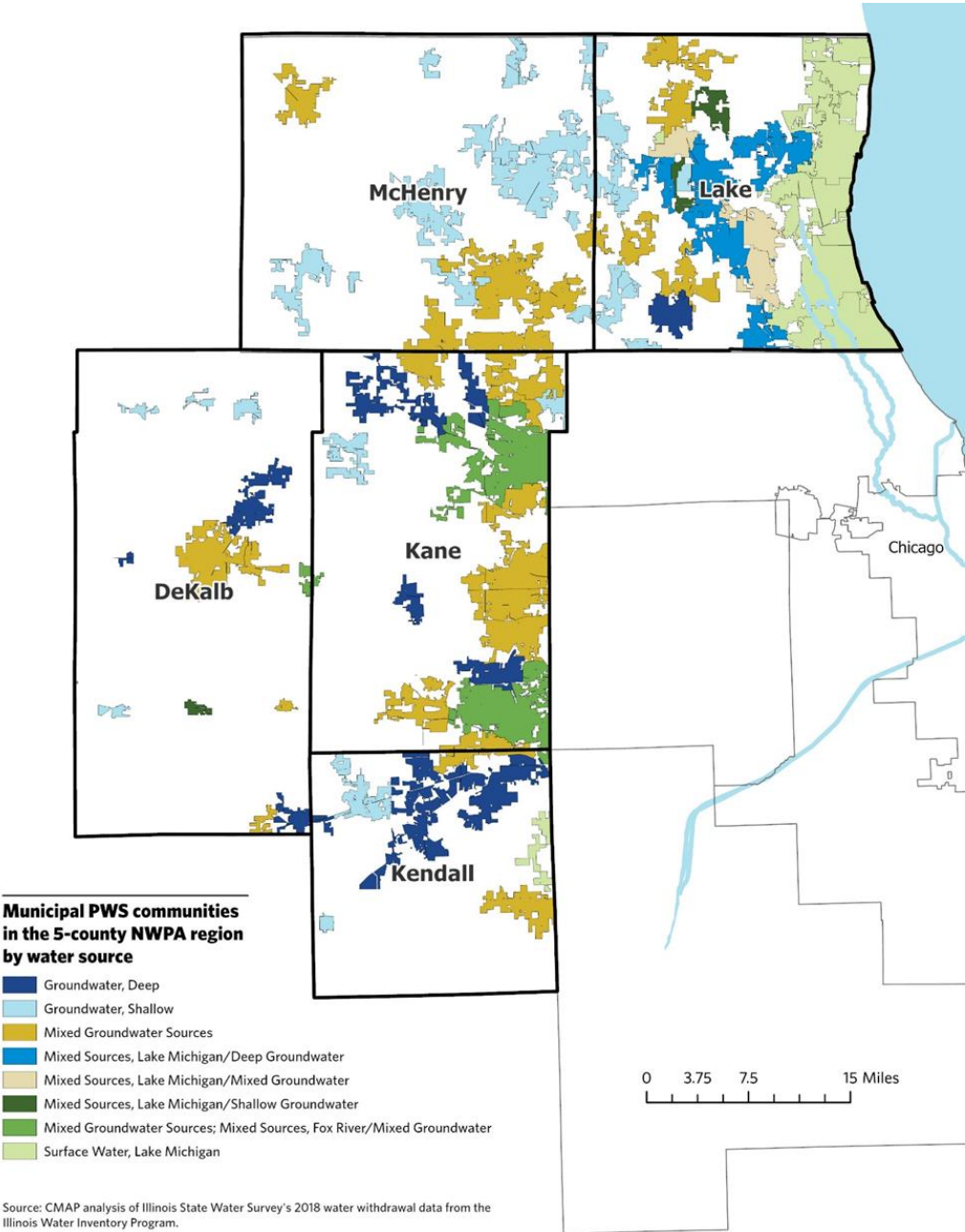
# How do public water supply systems use water?

Public water supply system (PWS) water uses, national averages  
(Source: Vickers, 2020)



# Water Sources

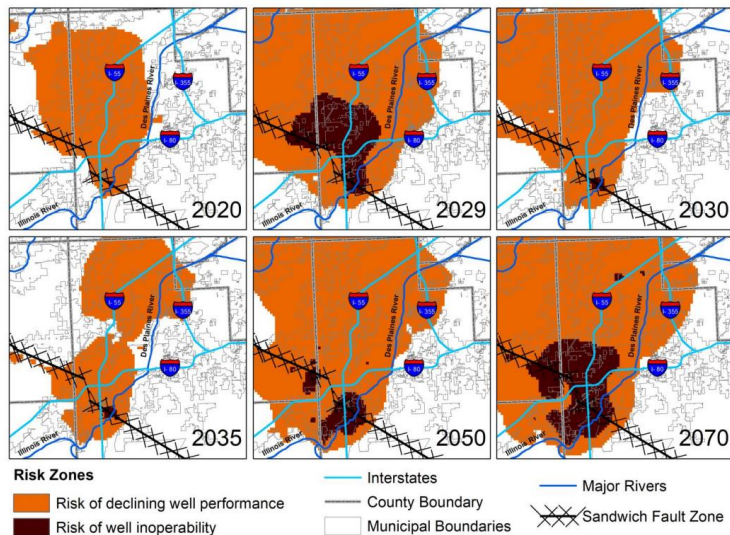
Communities with PWS systems use multiple water sources, primarily shallow and sandstone aquifers, as well as the Fox River and Lake Michigan



# Supply challenges

## Deep sandstone

- Excessive drawdown
- Increased pumping expenses
- Well inoperability



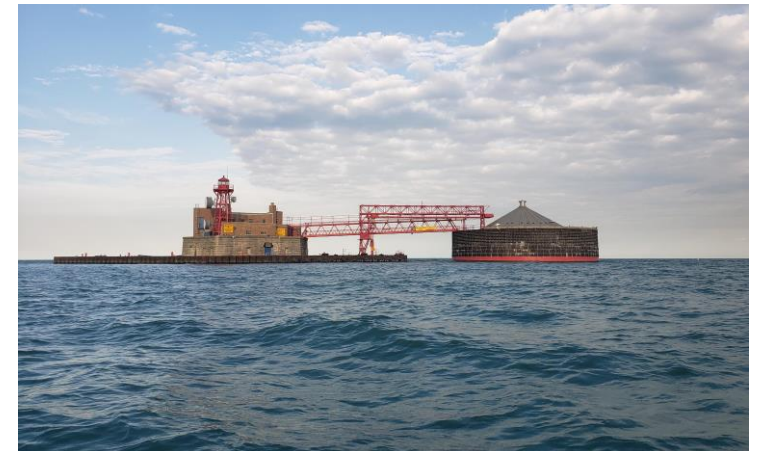
## Shallow aquifer & Fox River

- Increasing chloride, total dissolved solids, PFAs trends
- Well interference
- Backup supply needed to switch to Fox



## Lake Michigan

- Expensive capital and operating costs
- Time-consuming process
- Significant regional coordination





# Existing supply and demand

## Illinois State Water Survey water supply (sustainable yield) estimates

- Intended to guide state planning and facilitate regional discussions
- Provided by county, source, and sector across the state of Illinois
- Held constant across forecasted years, 2020-2070

See ISWS Illinois Water Budget Vista for more information:

<https://experience.arcgis.com/experience/6a481d66193640ccaf1d0f1194d3813e/page/Page/?views=About>

## CMAP 2024 update to regional water demand forecast

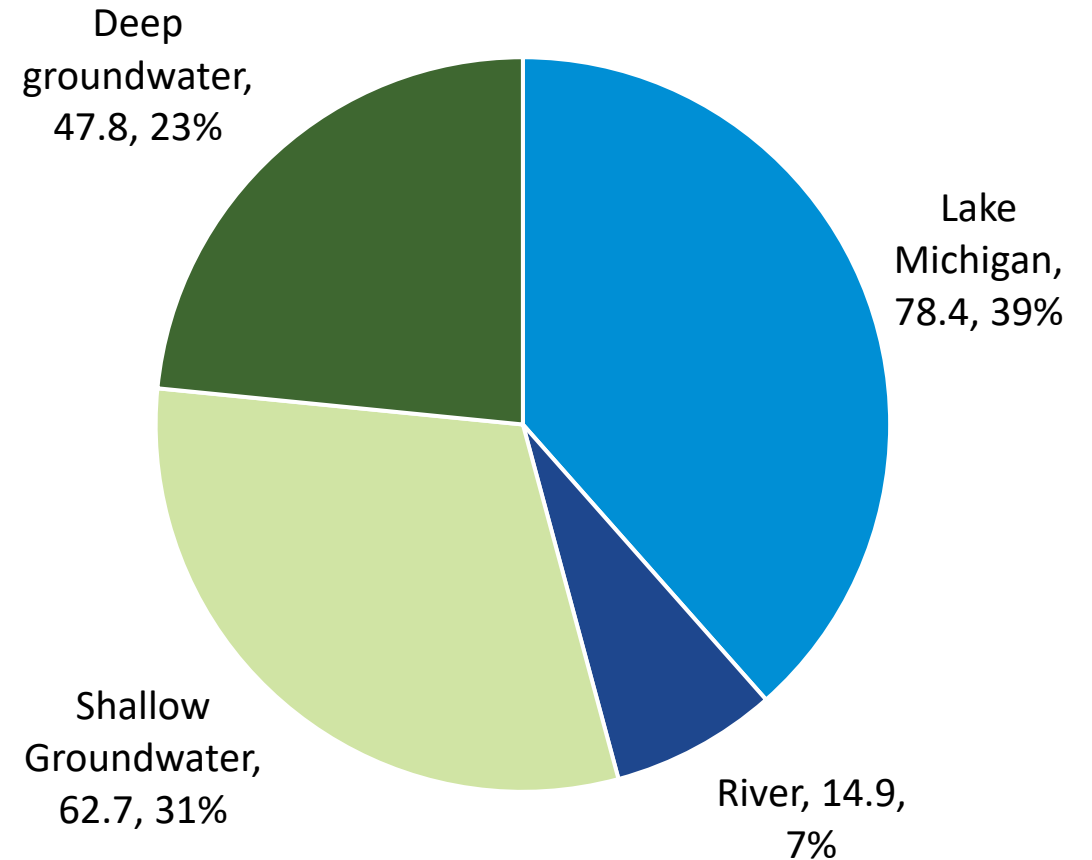
- Based on analysis of ISWS IWIP's 2018 facility withdrawal data
- Intended to guide regional and local planning and coordination
- Provided by county, source, and sector across the CMAP's seven-county region
- DeKalb estimates are only for municipal PWS

# NWPA water supply by source

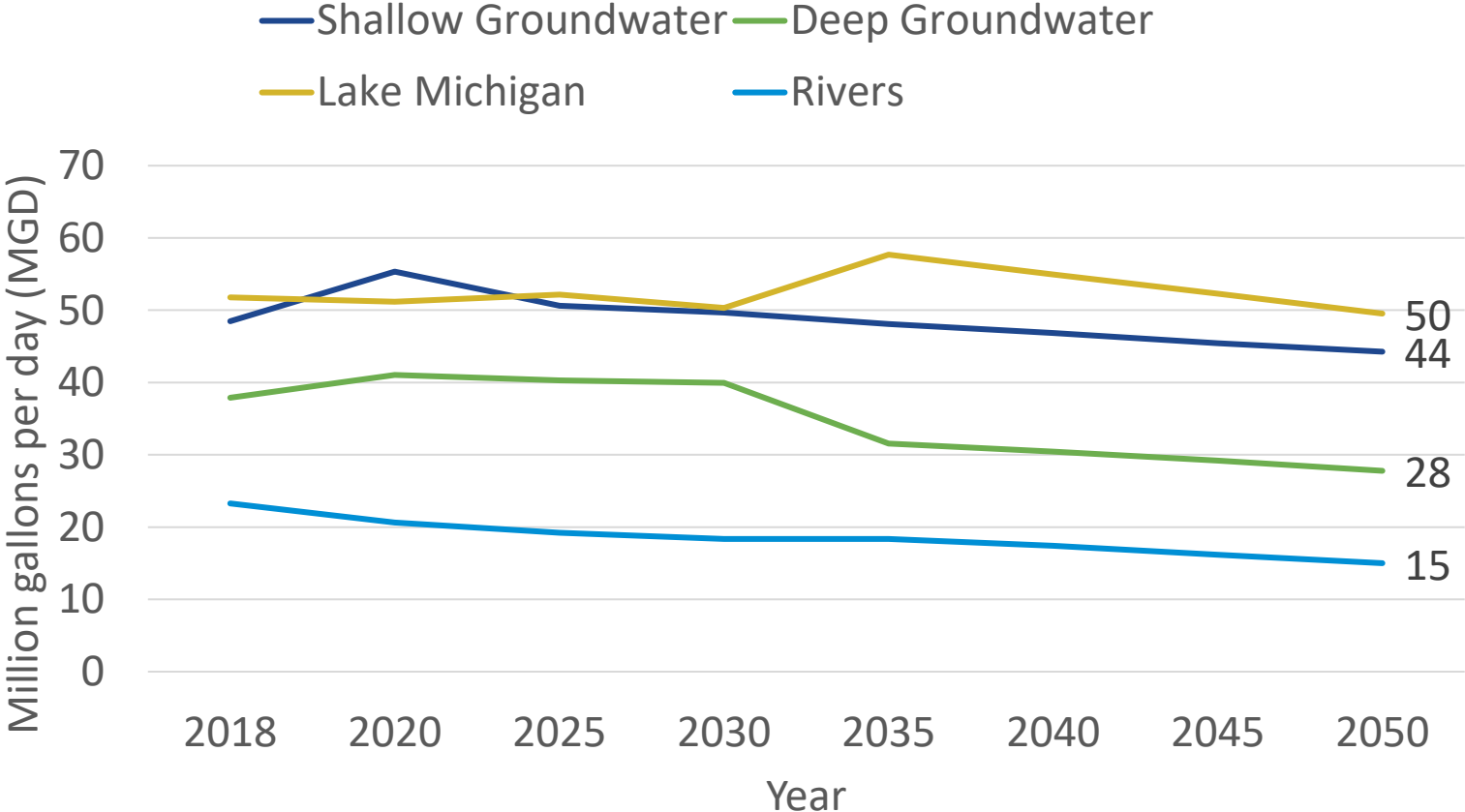
## 203.8 MGD estimated supply

(DeKalb, Kane, Kendall, Lake, and McHenry Counties across all water sectors)

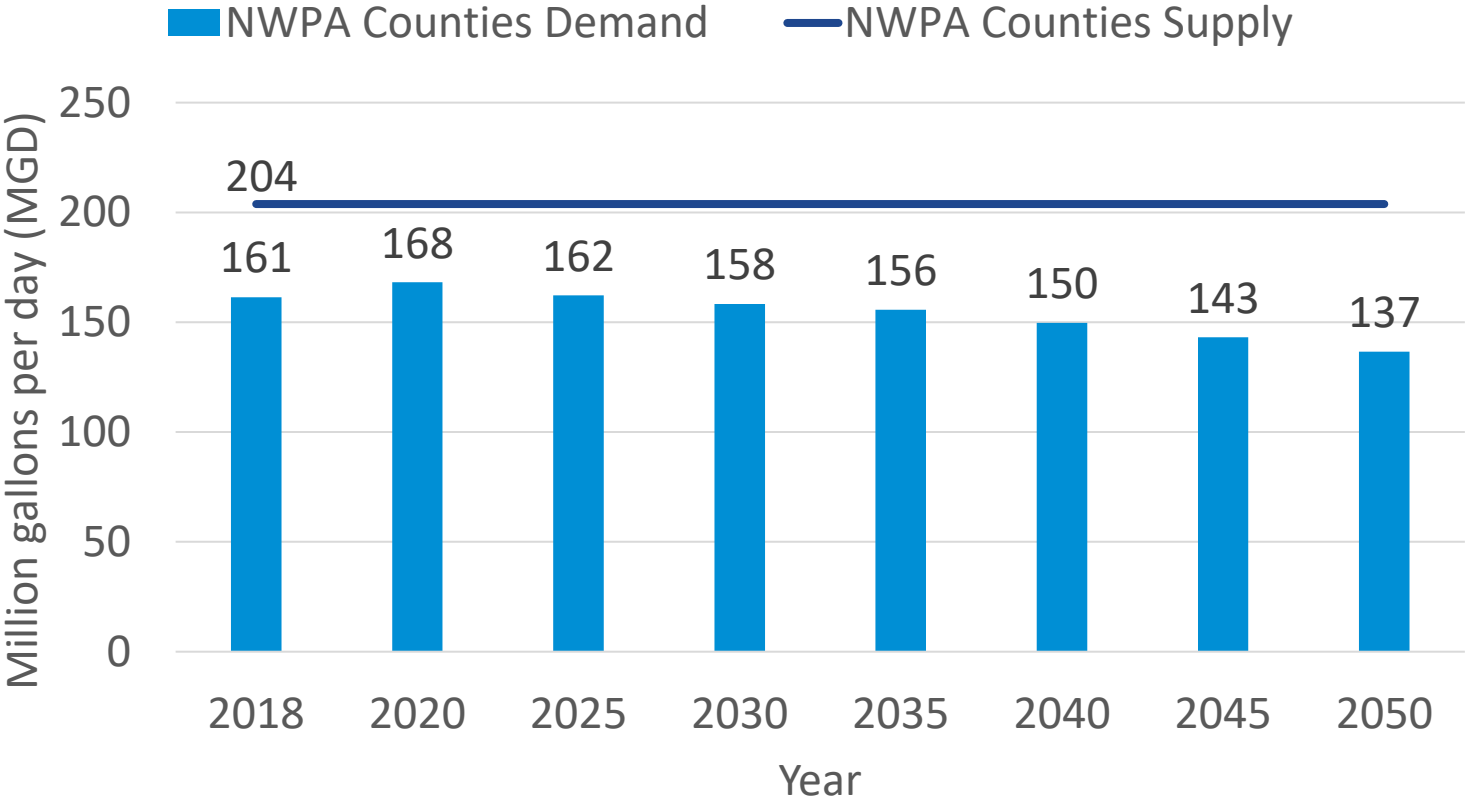
Share of NWPA water supply by source and millions of gallons per day (MGD)



# NWPA water demand forecast by source - DRAFT



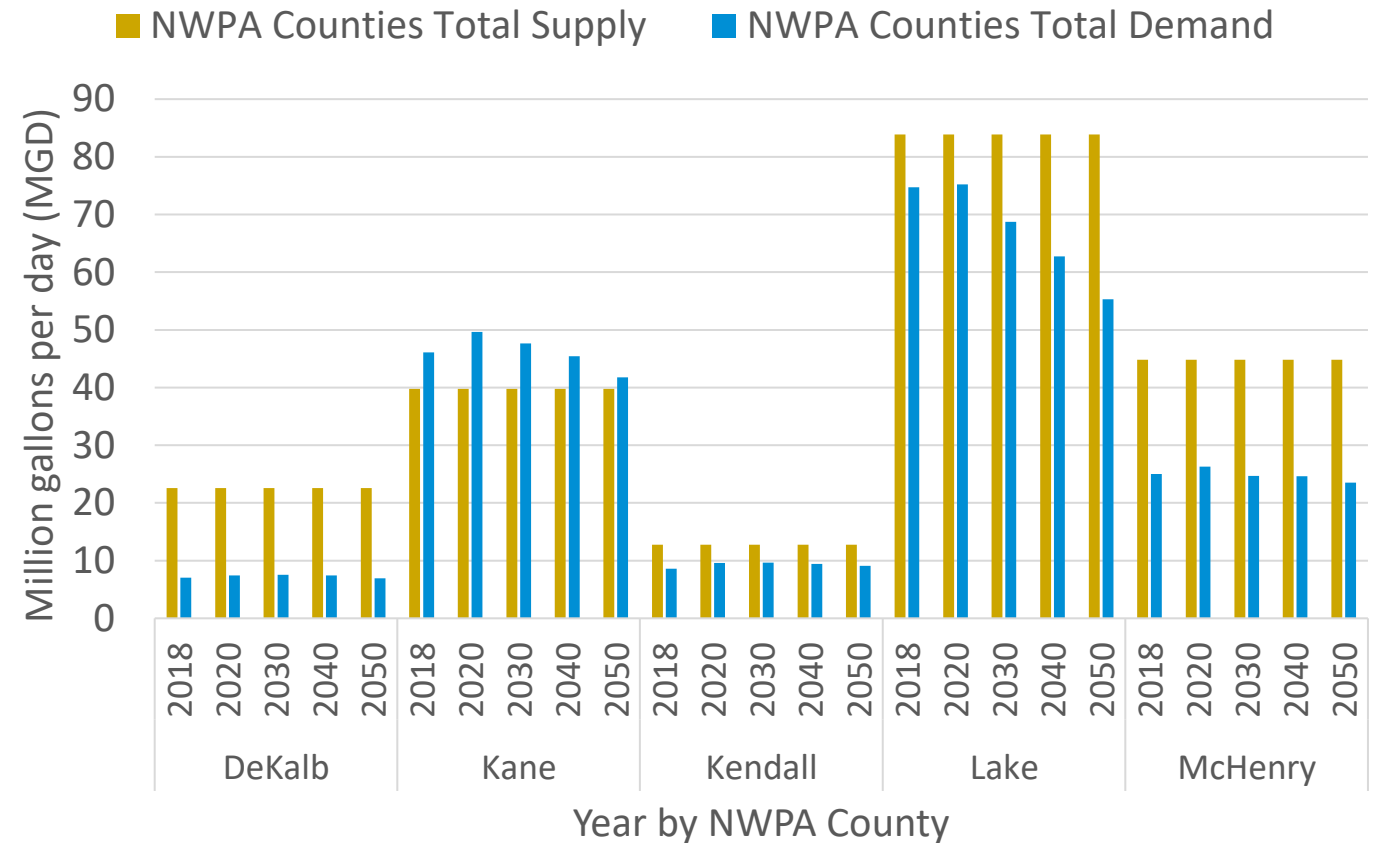
# Existing and projected supply and demand - DRAFT



# Existing and projected supply and demand

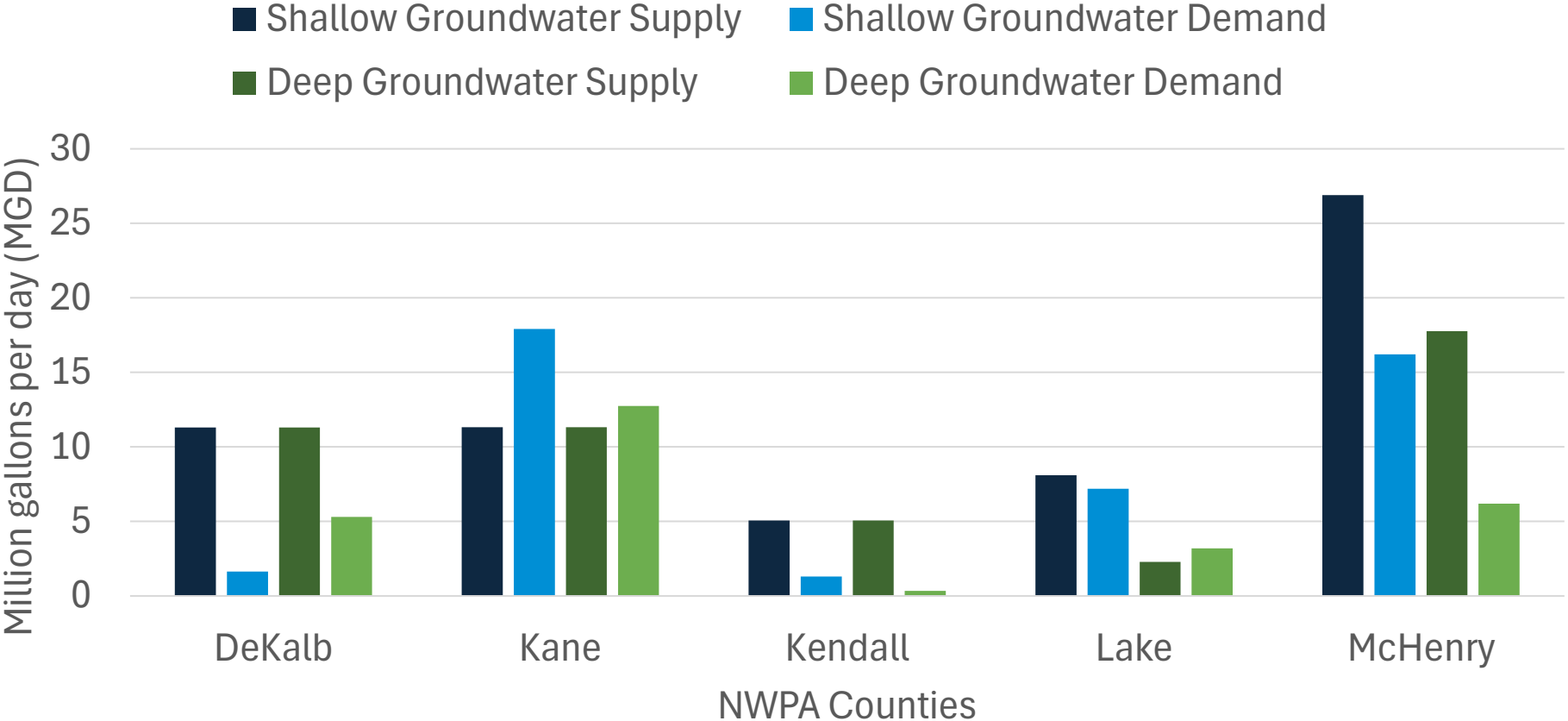
Local conditions may differ from regional estimates

Comparison of water supply and demand in 5-county NWPA, historic (2018) and projected (2018-2050) - DRAFT



Source: Illinois State Water Survey, 2024 (supply); Draft CMAP Water Demand Forecast, 2024.

# Projected water supply and demand by county in 2050 - DRAFT



# Questions or comments?

# Chapter 3: Call to action

Achieving water supply sustainability

Benefits of water conservation



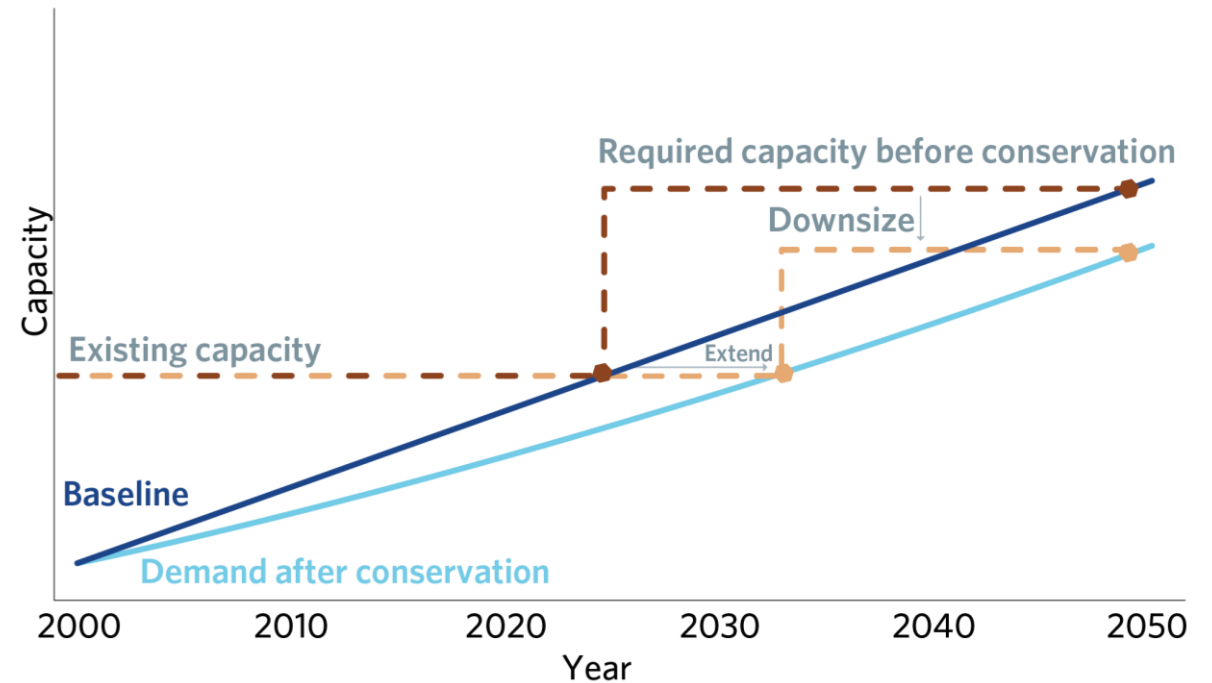
# Achieving water supply sustainability

1. Examine local water supply and demand
2. Identify system assets and challenges (conduct audits)
3. Evaluate water pricing
4. Assess water conservation (and develop a plan)
5. Protect source water and water quality
6. Consider alternative sources of supply

# Benefits of water conservation

- Minimize local supply and quality constraints
- Manage peak demand
- Delay and minimize expensive infrastructure investments
- Water-energy cost savings

Example of extending or downsizing a capital facility, peak demand/capacity in million gallons per day



Source: American Water Works Association, 2006. Water Conservation Programs – A Planning Manual. AWWA Manual M52, First Edition, page 75

# Questions or comments?

# Chapter 4: Water conservation framework for achieving sustainable water supplies

Vision and goals

Priority water conservation  
strategies

# Plan Vision

"The NWPA water supply sustainability plan will serve as a roadmap for members seeking to take voluntary steps toward feasible and effective long-term use of water supply resources."

## ***NWPA Mission Statement:***

The NWPA, formed by intergovernmental agreement, seeks to collaboratively plan for and steward our shared river and groundwater resources to ensure a sustainable water supply for the people, economy, environment, and future generations.

## ***NWPA Vision Statement:***

The NWPA area will have dependable supplies of water for generations to come.

*Source: Northwest Water Planning Alliance  
2020-2024 Strategic Plan*

# Water supply sustainability goals

1 Deep groundwater



Water withdrawals from the sandstone will be managed at a rate that extends and sustains the life of the deep aquifers and gives NWPA communities experiencing adverse dewatering impacts adequate time to explore other options.

2 Shallow groundwater



NWPA communities and households will withdraw from shallow aquifers at rates that help the source remain safe, affordable, and sufficient water supply while supporting healthy aquatic ecosystems.

3 Fox River



The Fox River will continue to sustain aquatic ecosystems and serve as an affordable, safe, and reliable water supply for NWPA communities currently using it or seeking it as an alternative source with a dedicated backup supply.

4 Lake Michigan



NWPA communities will help ensure that those needing an alternative water source can seek access to a sufficient and safe water supply within the legal limits of Illinois' Lake Michigan allocation.

# Priority water conservation strategies



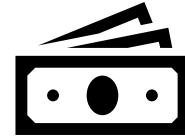
*\*Incorporated into all strategies through savings estimates based on low and high levels of strategy participation*

# Implementation approaches

Levers and tools communities can use to implement water conservation strategies and measures



Technical assistance



Financial incentives



Voluntary programs



Local policies



Information and education



# Questions or comments?

# Chapter 5: Water conservation strategies and potential water savings

## Priority strategies

1. Residential retrofits
2. Outdoor landscape efficiency
3. Water efficiency in new development
4. Water loss control
5. Commercial, institutional, and industrial water conservation programming

## Additional water conservation best practices

# Water Savings

Assessment Process

---

Strategy Description

---

Refined Baseline

---

Level of Implementation

---

Water Savings

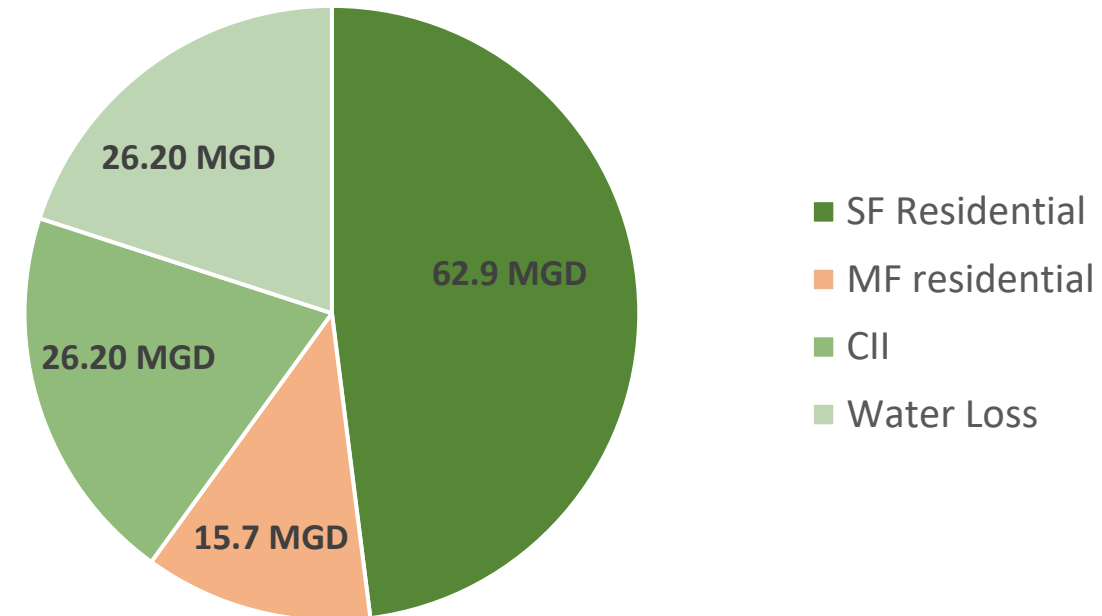
---

# Water Savings

## Selected Strategies

- Residential Sector - Single Family
  - Residential retrofits
  - Residential landscaping
  - Residential development standards
- Water system
  - Water loss control
- Commercial, Industrial and Institutional (CII) Sector
  - Water Sense at Work

NWPA PWS Water Use by Sectors in base year (2018), based on national averages



Note: pink = not included in the assessment

# Water Savings

## Overarching assumptions

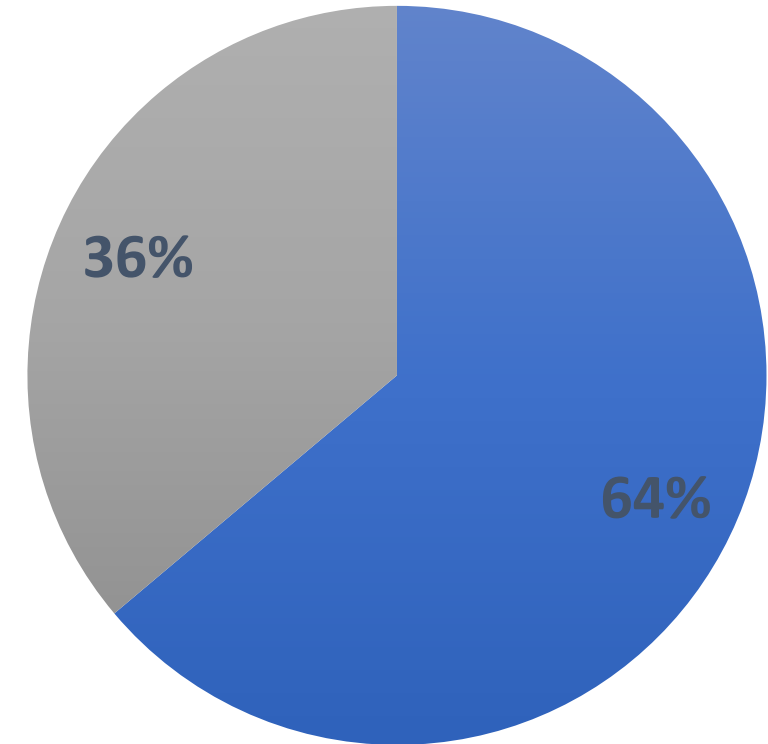
- Only the Public Water Supply (PWS) Sector and their customers included in the analysis
- Multi-Family water use sector is omitted
- All assumptions made by CMAP in processing IWIP data, socio-economic forecast, UrbanSim data, water demand forecast apply
- National averages used in place of local data
- Point-in-time estimates for Base Year
  - 2018 water withdrawals
  - 2010 land use

# Water Savings

## Overarching assumptions, cont.

- Estimated savings are in addition to passive savings
- Conservation program participation rate scenarios consistent with [Water 2050](#).
  - low conservation 10% program participation
  - high conservation 50% program participation.
- Impossible to cover all assumptions and method, see technical appendix to the plan.

Public Water Supply (PWS) Water Use in the NWPA Region in MGD (reference forecast, 2050)



■ Baseline Water Demand ■ Passive Water Savings

# Residential retrofits

# Residential Retrofits – Strategy Description

- target existing single-family households within NWPA communities served by a community water supplier
- include toilet, showerheads, and faucet residential indoor water end-uses
- include the following water conservation measures: replacement of existing toilets, showerheads, and faucets with WaterSense device

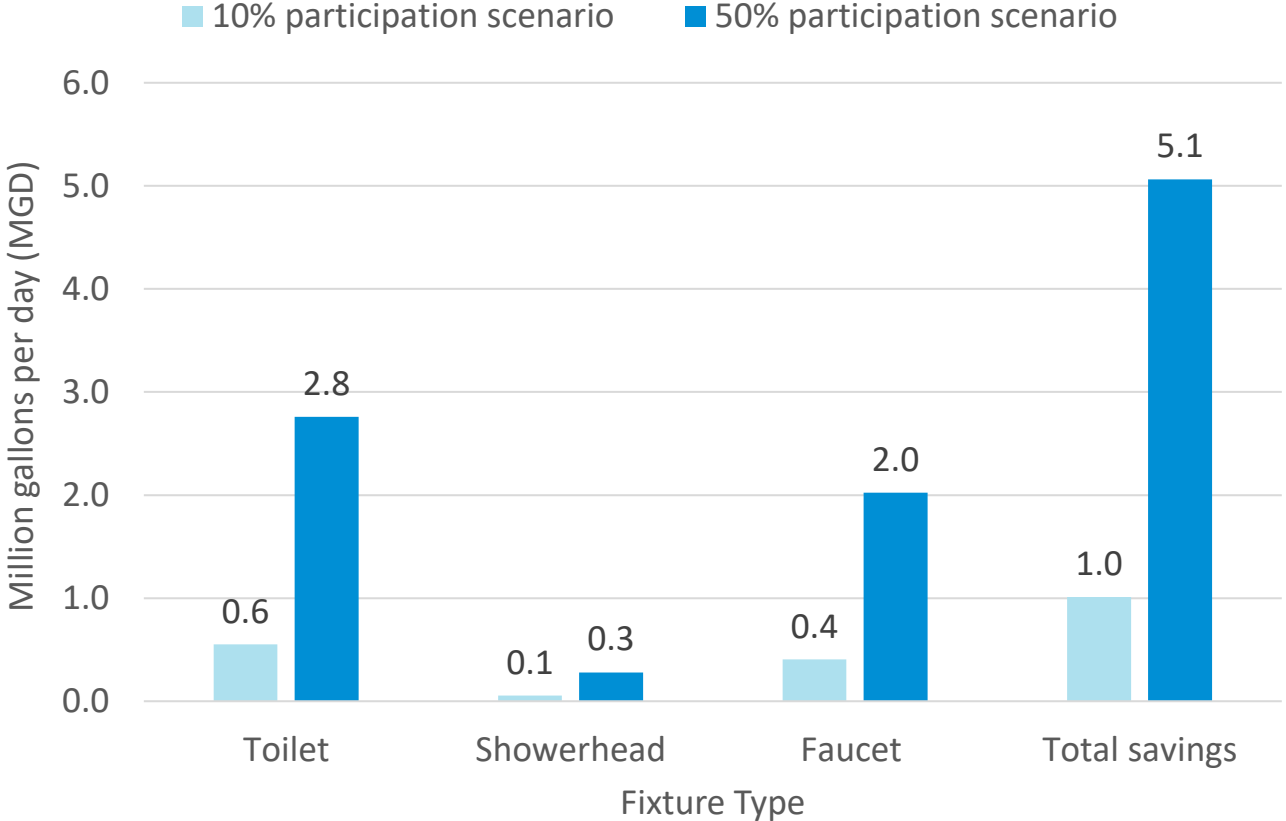


# Potential water savings - DRAFT

Low conservation (10%):  
1.01 MGD

High conservation (50%):  
5.06 MGD

Residential retrofit water savings estimates by fixture - DRAFT



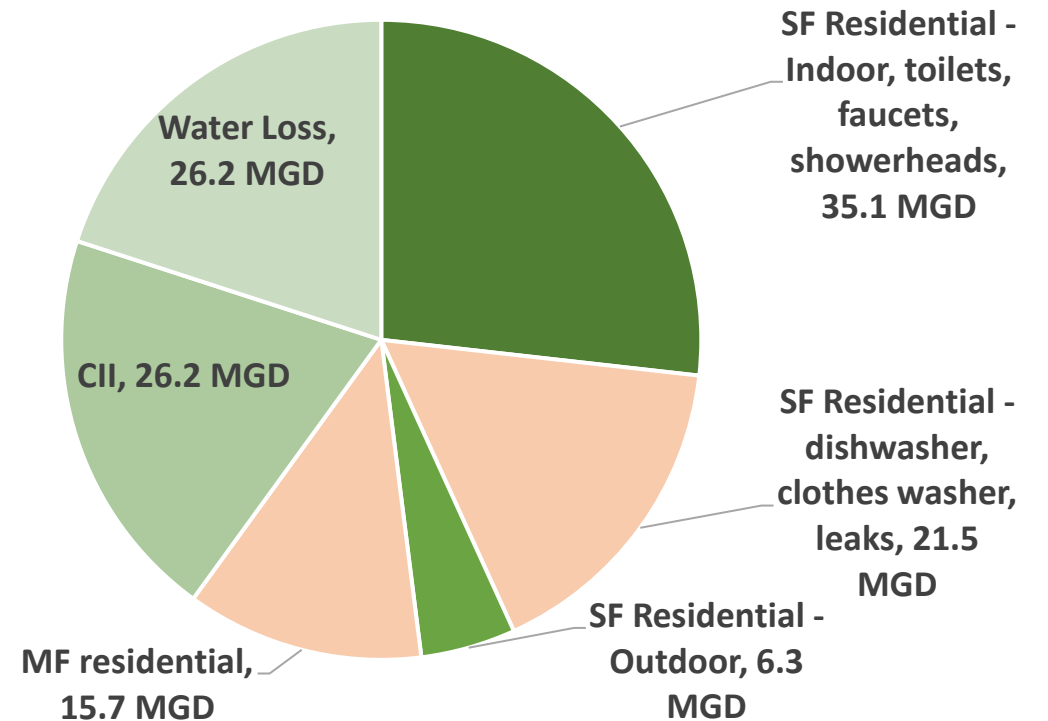
# Residential Retrofits

## Base year water use

- Base year target water use
  - Indoor water use – 90% of total
  - Targeted End uses – 62% of total indoor = 35.1 MGD

Note: pink = not included in the assessment

NWPA PWS Water Use, Residential Sub-sector and End Use, in base year (2018) based on national averages



\*2007 is the year US EPA WaterSense efficiency standards were enacted.

The number of houses built before 2007 estimated from US Census data and CMAP's building data from the land use model used in the regional socioeconomic forecast.

2019 Plumbing Manufactures International (PMI) U.S. WaterSense Market Penetration Study

# Residential Retrofits

## Level of Implementation

- Level of Implementation\*
  - Only houses built before 2007 eligible
  - National WaterSense market penetration rates apply
    - Toilets - 16.8%
    - Showerheads - 45.4%
    - Faucets = 40.1%
  - Device analysis

\*2007 is the year US EPA WaterSense efficiency standards were enacted.

The number of houses built before 2007 estimated from US Census data and CMAP's building data from the land use model used in the regional socioeconomic forecast.

2019 Plumbing Manufacturers International (PMI) U.S. WaterSense Market Penetration Study

Variable	Toilet	Showerhead	Faucet
Average flow rate of toilets being replaced	2.44 gpf	2.25 gpm	2.0 gpm
Flow rate of retrofit	1.28 gpf	2.0 gpm	1.2 gpm
Duration assumption	N/A	8 minutes per shower	8.10 minutes
Daily use assumption	5.5 flush per person per day	0.7 showers per person per day	N/A
Number of occupants per household	2.6	2.6	2.6
	$[(2.44 \text{ gpf} - 1.28 \text{ gpf}) * 5.5 \text{ flushes/person} * 2.6 \text{ people/house} = 16.6 \text{ gallons saved per household per day}$	$[(2.25 \text{ gpm} - 2.0 \text{ gpm}) * 8 \text{ min shower} * 0.7 \text{ showers per day} * 2.6 \text{ people/house} = 2.5 \text{ gallons saved per household per day}$	$[(2.0 \text{ gpm} - 1.2 \text{ gpm}) * 8.10 \text{ min} * 2.6 \text{ people/house} = 16.8 \text{ gallons saved per household per day}$

# Residential outdoor landscape

# Residential Outdoor Landscape – Strategy Description

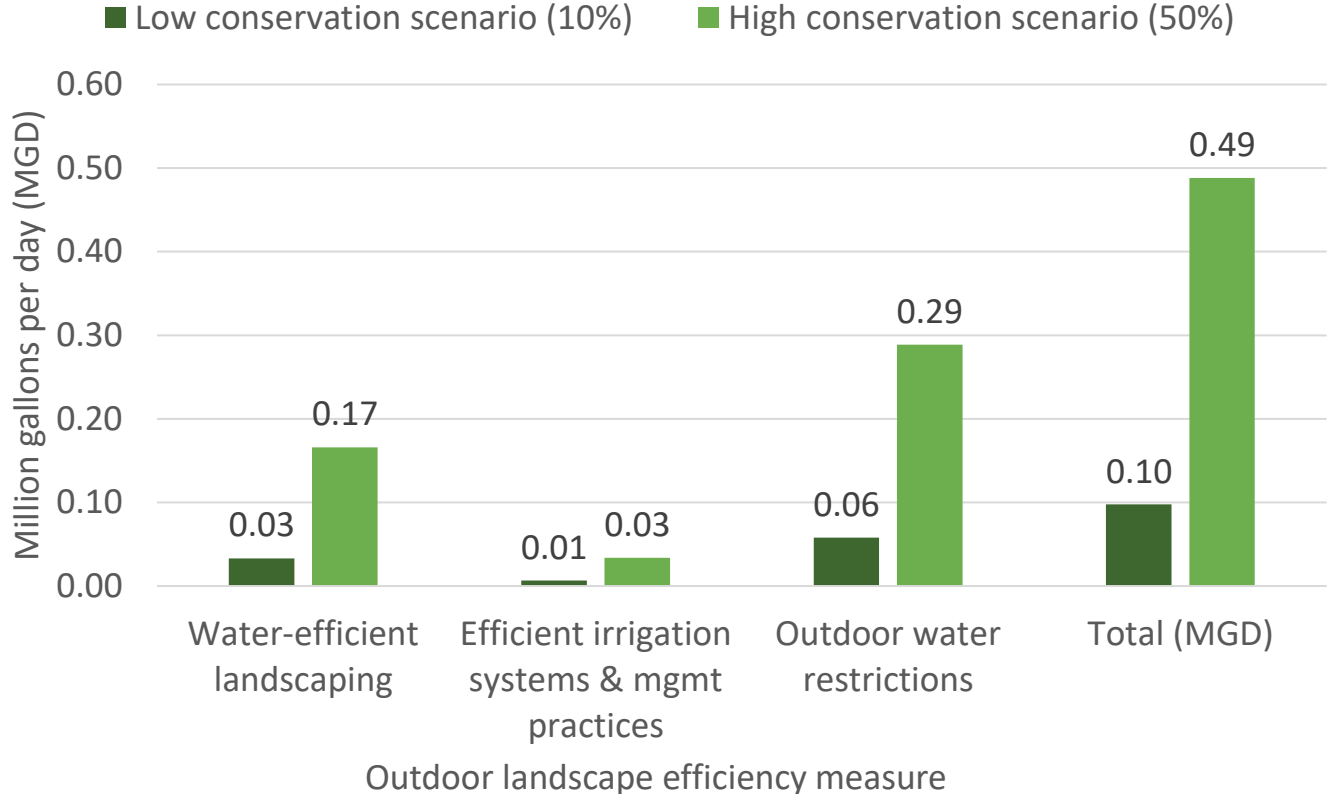
- target existing single-family households within NWPA communities served by a community water supplier
- include residential landscape water end-uses
- include the following water conservation measures:
  - a. landscape design (water-efficient landscapes);
  - b. hardware improvements (efficient irrigation systems and management practices and
  - c. policy (watering restrictions)

# Potential water savings - DRAFT

Low conservation (10%):  
0.10 MGD

High conservation (50%):  
0.49 MGD

## Residential outdoor landscape efficiency water savings estimates by efficiency measure - DRAFT

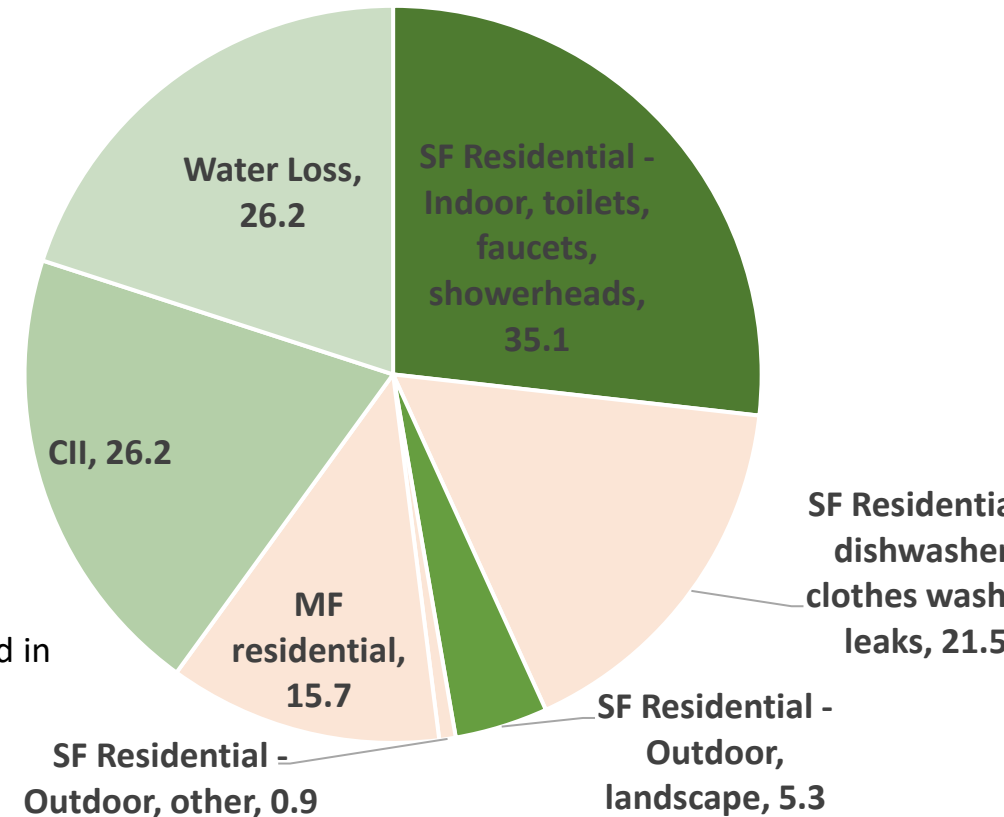


# Residential Outdoor Landscape

## Base year water use

- Base year target water use
    - Outdoor water use – 10% of total
    - Targeted End uses – 85% of total outdoor
- = 5.3 MGD

NWPA PWS Water Use, Residential Sub-sector and End Use, in base year (2018) based on national averages



Note: pink = not included in the assessment

\* Green et al found that 10% of yards were 'water wise'. J.C. Green, et al., Patterns of water-wise residential landscaping in a drought-prone city, Journal of Urban Ecology, Volume 10, Issue 1, 2024.



# Residential Outdoor Landscape Level of Implementation

- Level of Implementation
  - Market penetration rate 10%\*  
= 4.8 MGD

\* Green et al found that 10% of yards were 'water wise'. J.C. Green, et al., Patterns of water-wise residential landscaping in a drought-prone city, Journal of Urban Ecology, Volume 10, Issue 1, 2024.

Landscape design (water-efficient landscapes)	6.9%	Healthy Landscape Assessment Program (City of Guelph, Ontario) City of Guelph, practices included plant selection, financial assistance (discounted plants), rain garden, plant establishment, and mulching practices.
Policy (watering restrictions).	12.0%	Aurora and Algonquin saw reductions in outdoor water use approximately 20%; however, national assessments find voluntary restriction savings of 4 - 12%
Hardware improvements (efficient irrigation systems and management practices)	1.4%	20% of residences have in ground irrigation systems, existing market penetration is 10%, so these savings are applicable to 18% of people. So 18% of the total can save 8%*, the percent of the total is 1.4% savings)
Total	20.3%	

8% is based on an average of the lower end of savings in the literature from performing landscape irrigation audits and following through with corrective actions(Vickers, 2001; Vickers 2020).

# Water efficiency in new development

# Residential New Development – Strategy Description

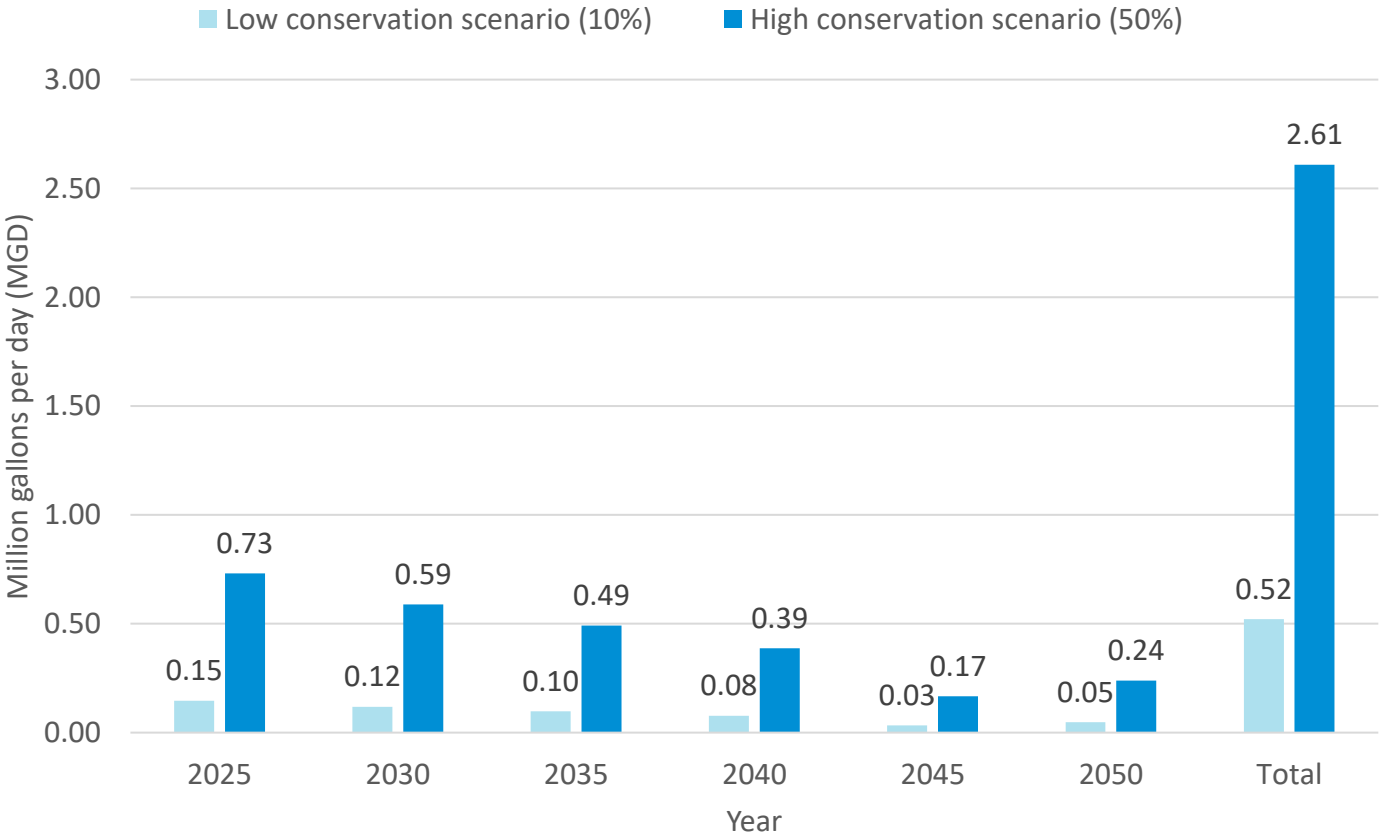
- target new single-family households within NWPA communities served by a public community water supplier. New development refers to homes built between 2020 and 2050.
- includes all residential water end-uses, mandatory (leaks, toilets, faucets, showerheads) plus other end uses necessary to meet targeted goal.
- includes all residential water conservation measures.
  - Incorporating elements of the EPA's WaterSense- labeled homes program into residential development standards for the construction of new homes.

# Potential water savings - DRAFT

Low conservation (10%):  
0.52 MGD

High conservation (50%):  
2.61 MGD

Water-efficient new residential water savings estimates - DRAFT

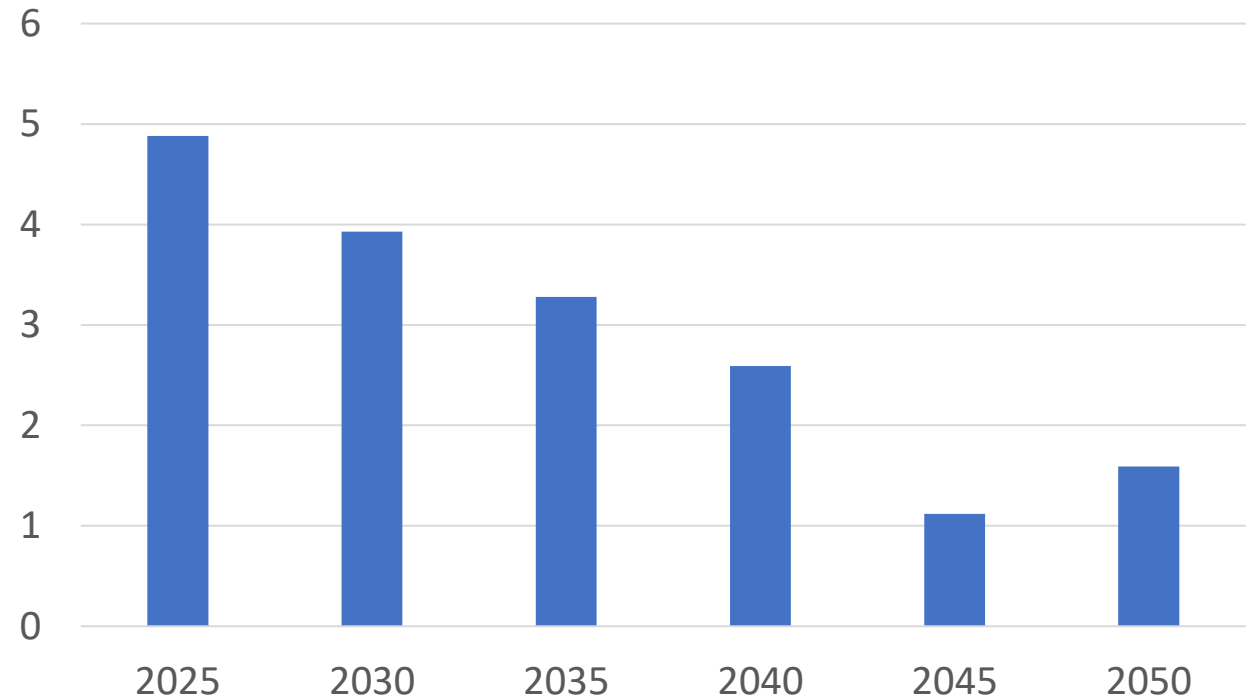


# Residential New Development

## Base year water use & Level of Implementation

- New Development
  - UrbanSim data for Kane, Kendall, Lake and McHenry counties
  - Population weights used to estimate DeKalb
  - Total estimated 102,919 new single-family units
- Target water use
  - Forecasted GPCD used to estimate water use associated with new development
  - 17.4 MGD

Estimated SF New Development Water Use  
by year, MGD



# Residential New Development Level of Implementation

- Level of Implementation
  - Market penetration rate 0%
- Savings rate of 30%

## WaterSense® labeled homes are designed to use less water!



### FREE OF LEAKS

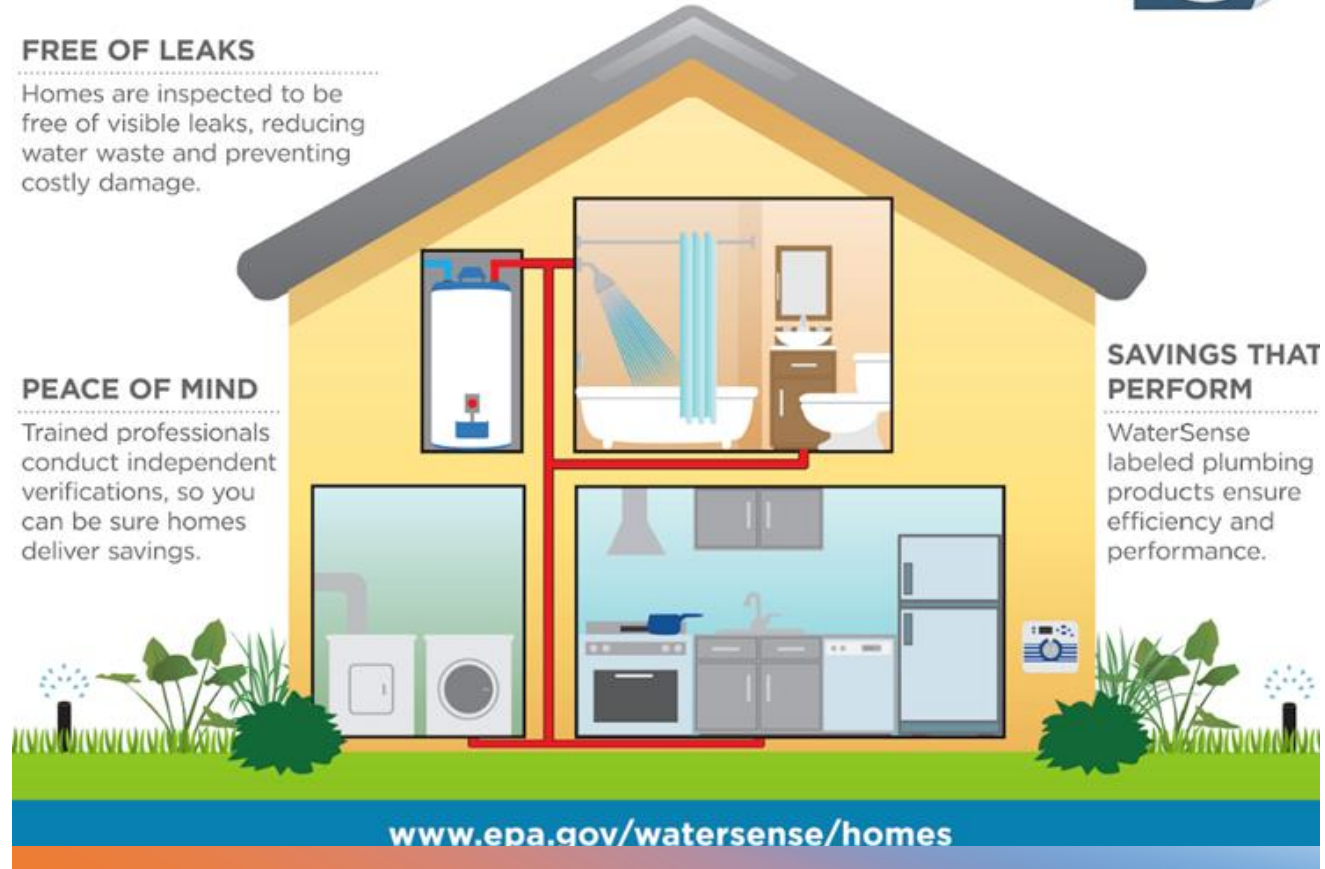
Homes are inspected to be free of visible leaks, reducing water waste and preventing costly damage.

### PEACE OF MIND

Trained professionals conduct independent verifications, so you can be sure homes deliver savings.

### SAVINGS THAT PERFORM

WaterSense labeled plumbing products ensure efficiency and performance.



# Water loss control



# Water Loss – Strategy Description

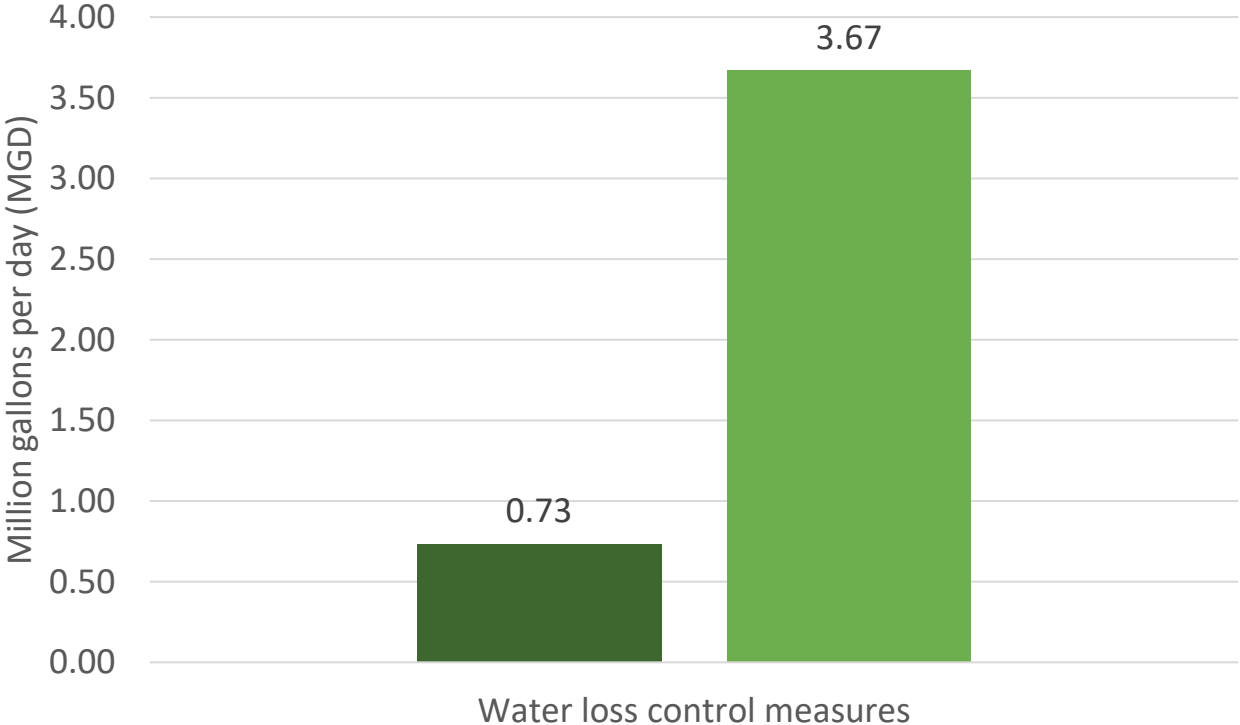
- target NWPAs community water supply (CWS) communities.
- include the portion of CWS water withdrawals attributable to water loss
- include the following water conservation measures:
  - water audits
  - leak detection and repair
  - loss prevention programs

# Potential water savings - DRAFT

Low conservation (10%):  
0.73 MGD

High conservation (50%):  
3.67 MGD

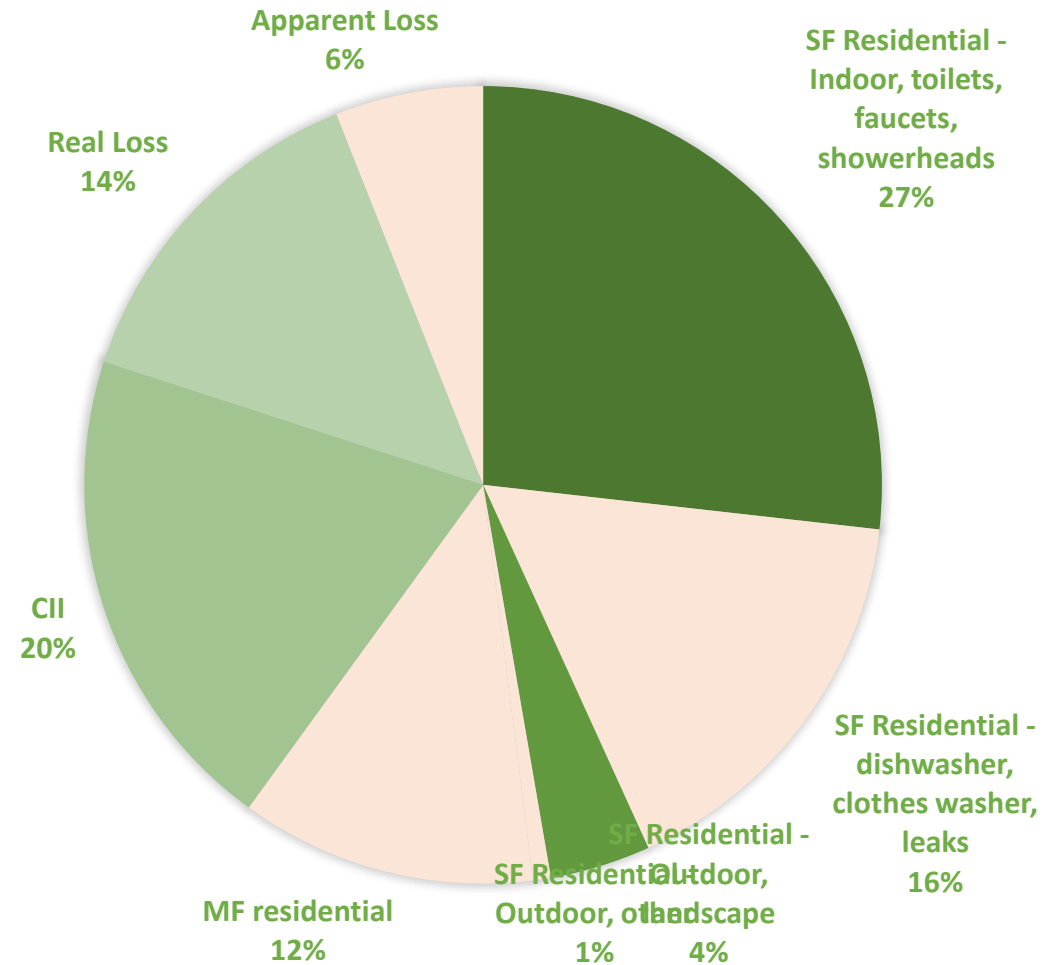
Water loss control water savings estimates - DRAFT



# Water Loss

## Base year water use

- Base year target water use
  - 20% of total = 26.2 MGD
  - 70% leakage/30% apparent loss profile = 18.34 MGD



Note: pink = not included in the assessment

# Water Loss

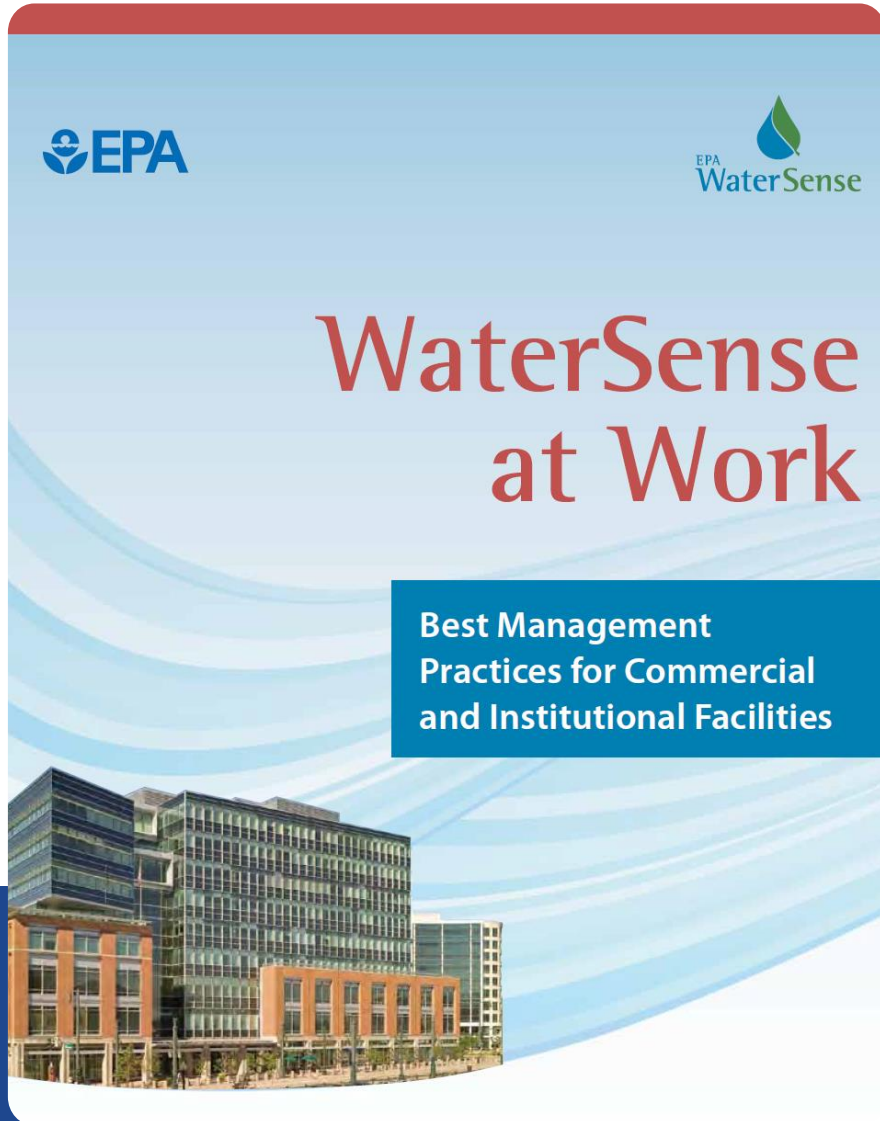
## Level of Implementation

- Level of Implementation
  - Market penetration rate 0%
- Water loss control savings rate of 40%

# Non-residential Commercial, Industrial, Institutional (CII)

# Non-Residential/CII – Strategy Description

- target both existing and new non-residential facilities within NWRPA communities served by a community water supplier.
- Non-residential water customers served by a community water suppliers include commercial, institutional, and industrial (CII) water use sectors.
- target the following non-residential sub-sectors:
  - Offices
  - Hospitals
  - Hospitality (including hotels and restaurants)
  - Educational, including schools
  - Retail, including grocery
  - Industrial



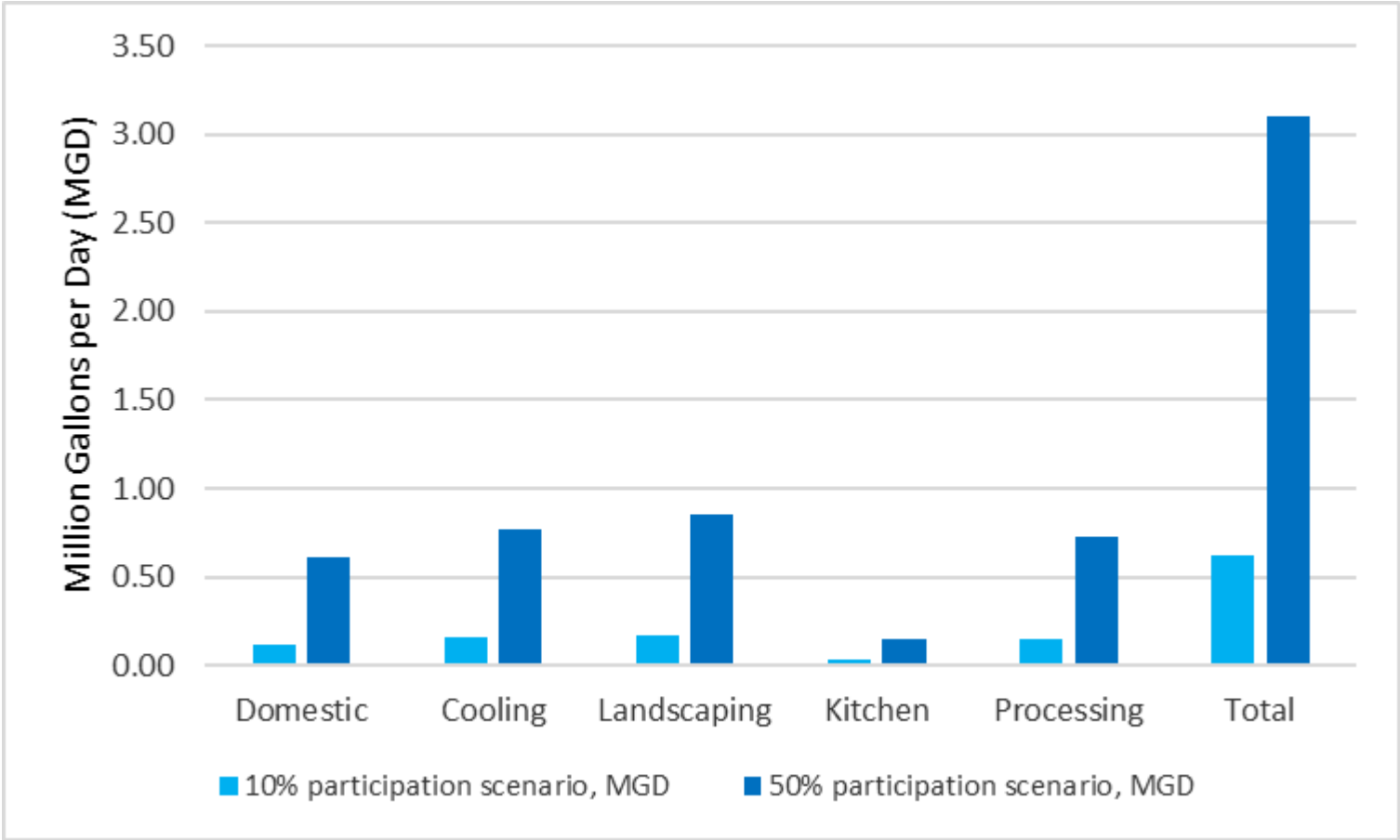
- Target the highest end uses of water (based on national averages) within the targeted sub-sectors above, including:
  - Domestic
  - Cooling
  - Landscaping
  - Kitchen
  - Processing
- Include implementation of water conservation measures included in programs like US EPA's WaterSense at Work across commercial, institutional, and industrial facilities.

# Potential water savings - DRAFT

Low conservation (10%):  
0.6 MGD

High conservation (50%):  
3.1 MGD

CII water conservation programming savings estimates - DRAFT





# CII: Base year water use

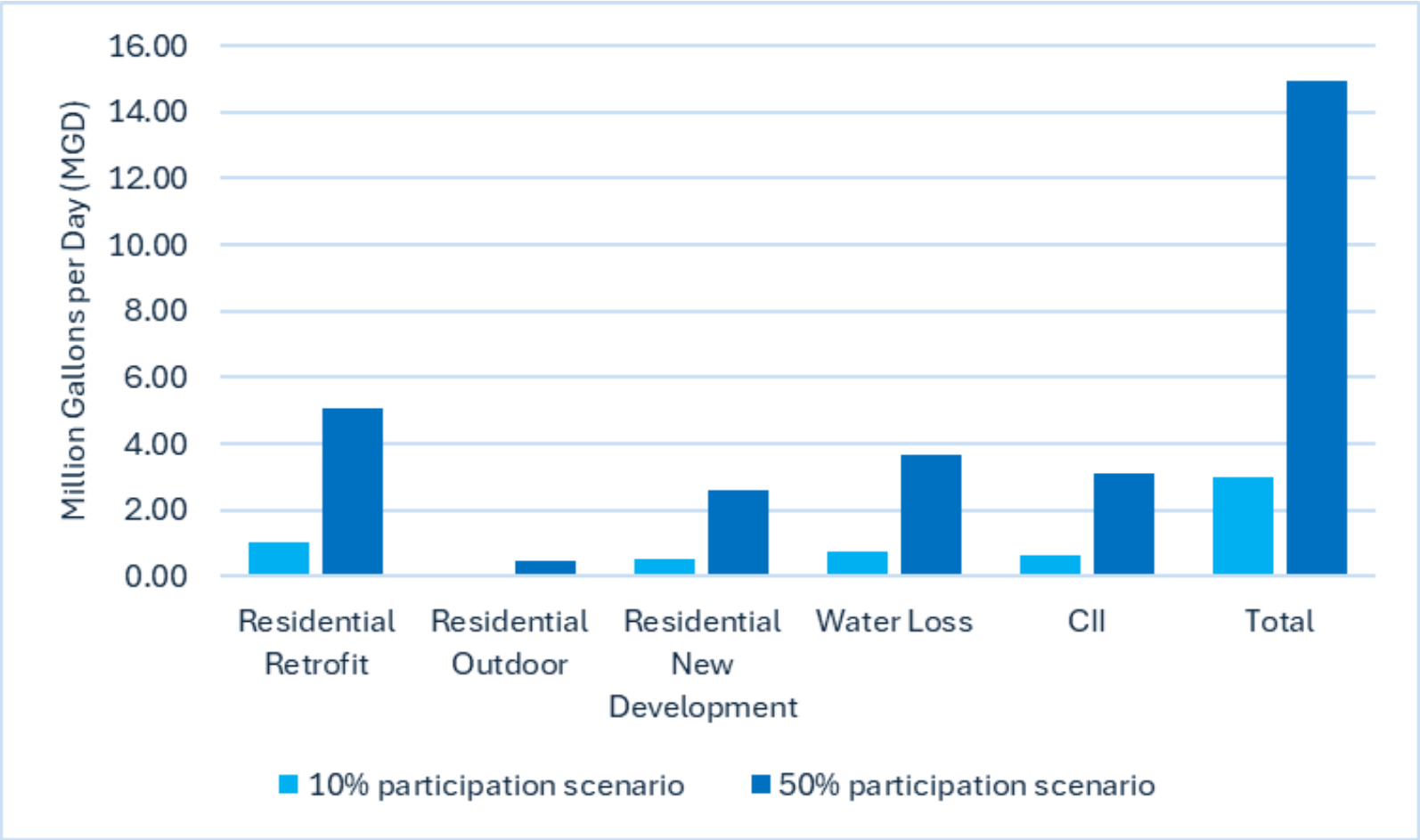
- Base year target water use
  - Existing
    - 20% of total = 26.2 MGD
    - All sub-sectors included
    - Only largest end uses included = 24.46 MGD
  - New
    - projected 2,012 closures, assumed to be captured in passive conservation trend
- Level of Implementation
  - Market penetration rate 0%

# CII: level of implementation

- Level of Implementation
  - Market penetration rate 0%
- The following water savings were assumed to apply:
  - Domestic/restroom and kitchen/dishwashing: 20%
  - heating/cooling: 26%
  - landscaping: 25%
  - Processing 35%

# Combined savings

# DRAFT Combined water conservation savings



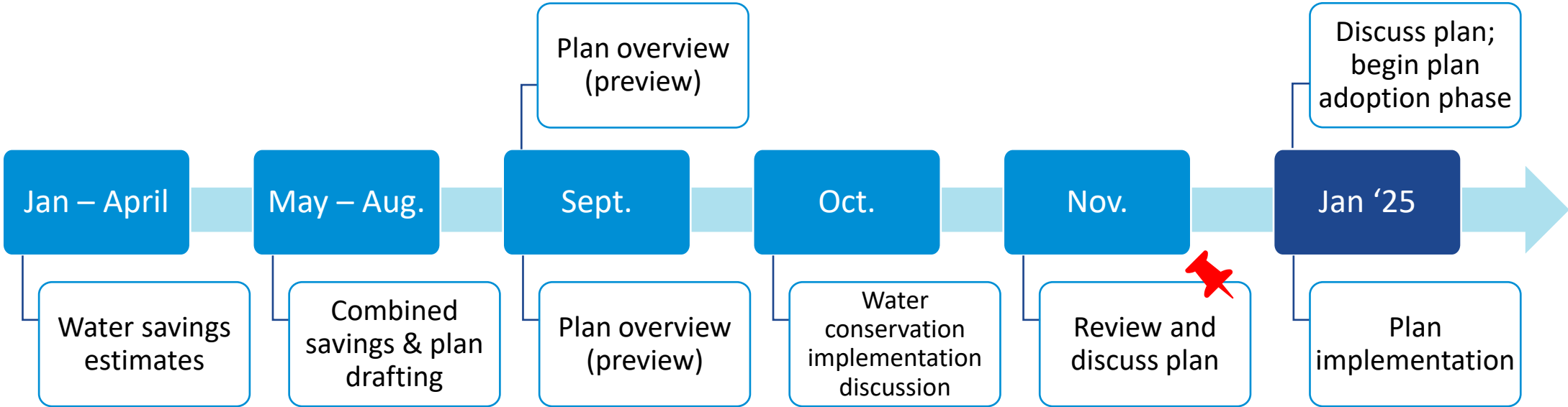
- Low Conservation – represents a 2% conservation program goal
- High Conservation – represents a 10% conservation program goal

# Questions and comments?

# Next steps

# NWPA Water Supply Sustainability Plan 2024 Timeline

## Executive Committee meetings (top)



## Technical Advisory Committee meetings (bottom)

# Draft Plan Feedback

We welcome your input!

**Plan survey:** <https://forms.office.com/g/AHxx0BhkVs>

Open until December 13

Email feedback directly: [kpudlock@cmap.illinois.gov](mailto:kpudlock@cmap.illinois.gov)





Chicago Metropolitan  
Agency for Planning

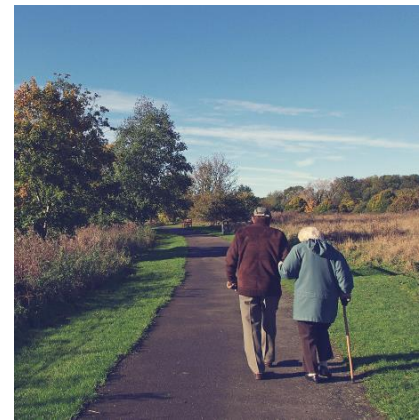
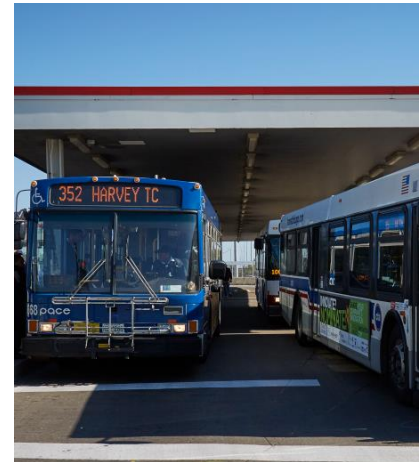


# Thank you

**Kelsey Pudlock**  
[kpudlock@cmap.Illinois.gov](mailto:kpudlock@cmap.Illinois.gov)

**Margaret Schneemann**  
[mschneemann@cmap.Illinois.gov](mailto:mschneemann@cmap.Illinois.gov)

[@cmapillinois](https://twitter.com/cmapillinois) |    



# NWPA TAC 2025 meeting dates

Fourth Thursday of every month

- First meeting of the year: January 28, 2025
- In-person meeting at Elgin Center: April 22, 2025
- No meeting: August 2025 (summer break)
- In-person meeting at Elgin Center : October 28, 2025
- No meeting: December 2025 (winter break)