

# *The Water Reuse Support System: Codes, Standards and Information Sharing*

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# Water reuse in Minnesota

- Clean Water Fund water reuse project
- What is water reuse?
- Drivers for reuse in Minnesota
- Minnesota reuse projects
- Reuse regulations & codes
- Moving forward with the support system

# Support for water reuse

- Minnesota Water Sustainability Framework
  - Calls for state agencies to plan for water reuse
  - MPCA and MDH to set appropriate standards for water reuse applications



# Support for water reuse

“Update plumbing codes and treatment standards to allow for safe and practical water reuse”



# Clean Water Fund Water Reuse Project

- (1) a comprehensive assessment of regulatory and non-regulatory approaches for ensuring safe and sustainable water reuse
- (2) recommendations for practices and policy for water reuse in Minnesota



# Clean Water Fund Water Reuse



**Water Resources Center**

UNIVERSITY OF MINNESOTA  
**Driven to Discover<sup>SM</sup>**

**MDH** Minnesota  
Department of Health



**Minnesota Pollution  
Control Agency**





# Water reuse project objectives

- Define successful implementation of reuse in Minnesota
- Identify current conditions that support successful reuse and identify barriers and solutions to barriers
- Develop recommendations for safe, sustainable water reuse practices and policies



# Water reuse (harvesting and use, alternate sources, one water)

## Sources

- Rainwater harvest
- Graywater
- Stormwater
- Reclaimed wastewater
  
- Foundation water
- Agricultural water
- Filter backwash
- Industrial

## End uses

- Nonpotable water
  - Toilet flushing
  - Vehicle washing
  - Decorative fountains
  - Irrigation
  - Cooling towers
  - Industrial processes
- Aquifer recharge
  - Infiltration
  - Direct injection
- Potable water



# Drivers for water reuse in Minnesota

- Water quantity
- Water quality
- Sustainable economic growth
- Environmental stewardship
- Awareness





# Current reuse in Minnesota

- Reclaimed municipal wastewater
  - Shakopee Mdewakanton Sioux Community: treated wastewater discharge to wetlands, downstream ponded areas provide irrigation
  - Golf course irrigation
  - Agricultural irrigation of non-food crops
  - Energy plant cooling



# Current reuse in Minnesota

- Stormwater harvesting and use
  - Target Field
  - St. Anthony Village
  - Oneka Ridge Golf Course
  - Centerville ballfield irrigation
  - 17<sup>th</sup> Avenue residence hall



# Current reuse in Minnesota

- Rainwater harvesting
  - St. Louis County Garage Duluth
  - CHS Field: St. Paul Lowertown Ballpark
  - Cottage Grove City Hall
  - Schaar's Bluff Gathering Center
  - Residential



# Current reuse in Minnesota

- Other sources
  - Lake Vermilion State Park graywater reuse
  - Goldn' Plump process water reuse
  - Other industries



So....

What is possible with reuse in  
Minnesota?

*Almost anything!*

What is easy with reuse in Minnesota?

*Almost nothing!*

# Barriers to water reuse

Cost

Operation &  
Maintenance

Regulatory/Code  
Issues

Lack of Design  
Standards

Contractor  
Unfamiliarity

Lack of Water  
Quality  
Standards

Public  
Perception

Public Health  
Concerns



# Agency roles and responsibilities

- MDH: Safe Drinking Water Act: protecting source to tap; well code; public health standards
- DNR: Water appropriation permits for water use (> 10,000 gallons per day / 1 million gallons per year); ecosystem protection, water supply planning and conservation
- DLI: In-building and drainage oversight through Plumbing Code; Plumbing Board reviews variances
- MPCA: Clean Water Act: water quality standards; wastewater permitting; stormwater permitting





# Water reuse regulatory challenges

- No national regulations
  - Many guidance documents or codes available that often times conflict with one another
  - No base federal funding
- Not enough public health and resource risk data
- Reuse crosses many jurisdictional lines
- Competing priorities-relatively low number of requests
- Other conservation efforts not maximized



# Current state of reuse regulations

- Need variances for most applications
- Approval may vary depending on location (delegated authorities)
- Water appropriation permit and reporting process discourages some applicants
- Concern over potential health and resource risks
- Concern over future regulation



# Current state of reuse regulations

- No comprehensive tracking of stormwater reuse
- No oversight and monitoring of existing systems
- Expertise not always in area of authority (e.g. MPCA knows wastewater, but graywater reuse falls under plumbing code)

# Reuse criteria for reclaimed wastewater

Minimum Treatment	Reuse Permit Limits	Types of Reuse
<b>Disinfected Tertiary</b> Secondary, filtration, disinfection	2.2 MPN/100mL Total Coliform 2 NTU daily average; 10 NTU daily maximum turbidity	Edible food crops Irrigation of golf courses, etc. Toilet flushing Decorative fountains Cooling towers
<b>Disinfected Secondary</b> <b>23</b> Secondary, disinfection	23 MPN/100 mL Total Coliform	Roadway landscaping Nursery stock Cleaning roads Industrial boiler feed
<b>Disinfected Secondary</b> <b>200</b> Secondary, disinfection	200 MPN/100 mL Fecal Coliform	Fodder, fiber and seed crops Non food bearing trees

# “Fit for purpose”

- Any level of water quality can be achieved depending upon the use of the reclaimed water
- Treating for the end use is a cost-effective and resource efficient strategy





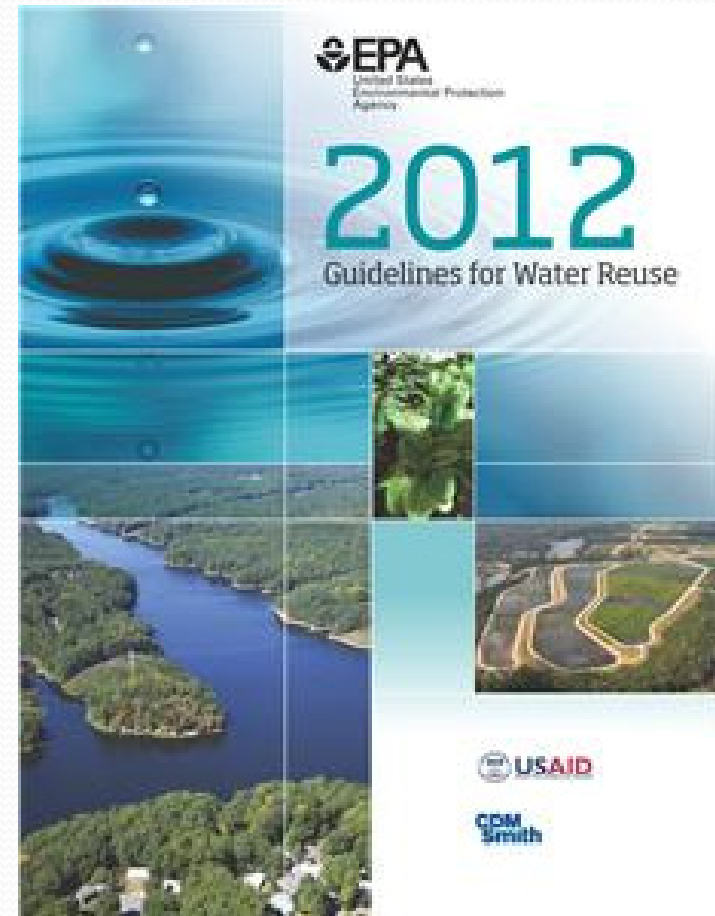
# Rainwater catchment systems

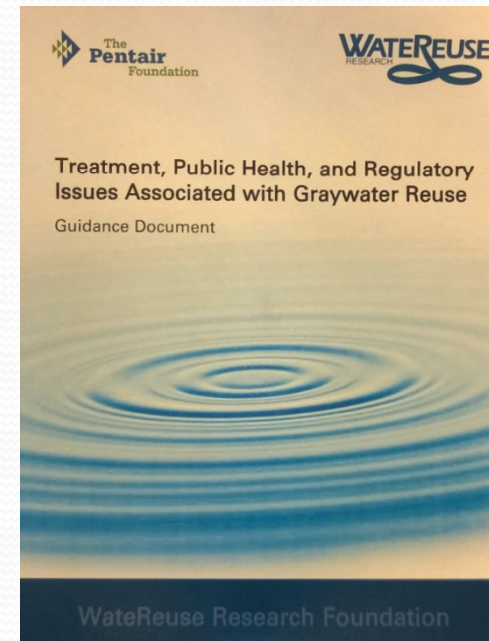
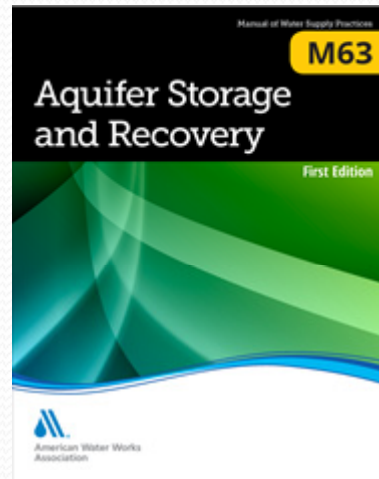
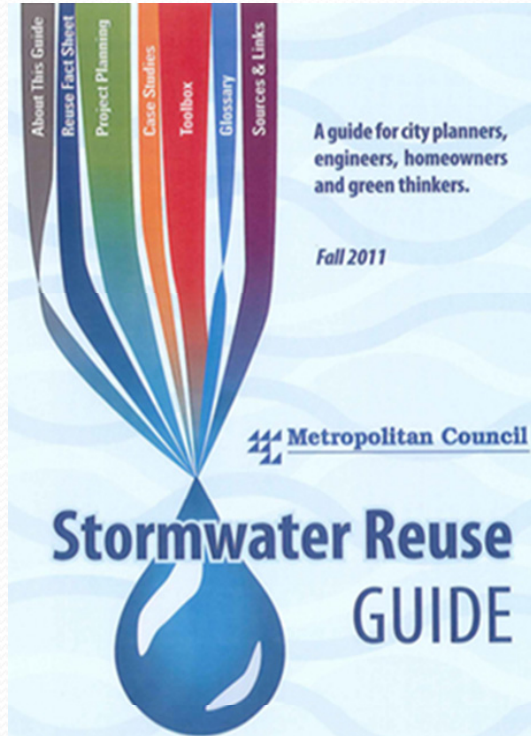
- New Minnesota Plumbing Code, based on Uniform Plumbing Code, went into effect January 2016
  - Version currently adopted includes Chapter 17 on Nonpotable Rainwater Catchment Systems
  - Amended to include water quality and treatment requirements, and to be reviewed by DLI

# National reuse guidance

Treated municipal wastewater

- EPA-Guidelines only
- Several guidance manuals and hundreds of research projects from the WaterReuse Association and WaterReuse Research Foundation









# Regulation and guidance summary

- Complex – needs consolidation and integration
- A lot of research/information/guidance available
- Some missing pieces
- Need to decide how it all applies to Minnesota

# Potential public health risk

- Legionella and other acute microbial exposure
- Irrigation outbreaks
- Cross connections
- Chemical contaminants
- Aquifer recharge and storage: arsenic mobilization



News Feature | January 8, 2016



## Elephants Will Not Drink Recycled Water In Denver



By Sara Jerome  
@sarmje

Recycled water is coming under scrutiny in Denver, where a major consumer is narrowing its use of this resource.

"The Denver Zoo has decided to stop feeding recycled water to elephants, rhinos and tapirs in its 'crown jewel' exhibit, the Toyota Elephant Passage," Westword recently reported.

The city has a substantial recycled water program, according to the report:

*Denver Water's program provides wastewater that's been sufficiently treated for irrigation purposes at a fraction of the cost of potable water. Since its plant opened in 2004, numerous parks, schools and private entities, including golf courses and the Denver Country Club, have signed up for irrigation with water from the utility's 'purple pipe.'*

But recently, the program has come under the scrutiny of some local residents, who are blaming recycled water for a recent die-off of trees in Washington Park.





# Risk Assessment

A starting point

- Determine the potential microbial risk posed to human health from certain storm water and rainwater reuse practices, specifically in Minnesota's environment
- Two example scenarios of non-potable water reuse are being examined: 1) Irrigation of an athletic field near a school with storm water 2) Toilet flushing with harvested rainwater in a public building
- Will still need to decide on what risk is “acceptable”

# Public Health Collaborative





# Technical Guidance for Public Health Standards for Onsite Water Systems

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## **Goal:**

Establish a set of guidelines that can be used by public officials in developing onsite water reuse programs.

## **Will Address:**

- Water Quality Parameters
- Monitoring Parameters
- End Uses of the Treated Water
- Operational requirements and Permitting
  
- **Final report due in April, 2016**



# Defining successful reuse

- Integration of governance
- Integration into infrastructure and services
- Quantified benefit to water resources
- Reuse is common practice
- Safe, sustainable, and sanitary systems
- Economically beneficial
- Clear regulatory pathway



# Integration of governance

- Integration into agency/entity regulation systems
- Agencies work together to simplify process
- Water users “credited;” reuse is accounted for



# Integration into infrastructure and services

- Integrated with existing infrastructure
- Integrated with utilities
  - Water volume and quality
  - Economic factors
- Cross-connection control






# Quantified benefit to water resources

- Benefits identified and quantified; relative to energy use/cost
- Reduced demand on groundwater aquifers
- Reuse implemented where feasible – economically, environmentally, protective of public health



# Reuse is common practice

- Water reuse is more the norm
- Treated drinking water is not always used for non-potable purposes
- Water reuse has moved past the “pioneer” phase
- Education and incentives are used to mainstream the practitioners in their design
- Public acceptance



# Safe, sustainable, and sanitary systems

- Systems are maintained long-term; capital/fiscal planning, responsible management entity, long-range planning
- Public health concerns addressed
- Public agree on acceptable risk relative to benefits
- Sustainable and beneficial
- Efficient, integrated systems; saves water, energy and money



# Economically feasible

- Water is assigned its true value
- Economically feasible so it becomes standard practice in design
- Full, integrated cost/benefit analysis can be performed; clear path for decision making



# Clear regulatory pathway

- Standardized approval process; understandable to everyone
- Systems are in place to guide operation and maintenance of reuse systems
- Systems are monitored and regularly tested
- Support network is in place
- Research continues and recommendations are communicated

# Resources Needed

Financial  
Resources/Incentives

Design Standards

Technical Assistance

Examples of  
successful  
ordinances/rules

Information on  
Treatment Options

Case Studies

Peer Experiences

Applicable Water  
Quality Standards



# Opportunities for input

- Stakeholder advisory group to review recommendations
- Meetings
- Surveys
- Public comment periods
- Freshwater Society Workshop
- Email: [health.water.reuse.mn@state.mn.us](mailto:health.water.reuse.mn@state.mn.us)
- GovDelivery bulletins coming soon!

# Find us on the MDH Clean Water Fund page

The screenshot shows the MDH Minnesota Department of Health website. The header includes the MDH logo and navigation links for HOME, TOPICS, and ABOUT US. A search bar is located on the right. The main content area features a sidebar with navigation links, a central article titled 'Water Reuse Clean Water Fund', and a right-hand sidebar with social sharing and additional resources.

**MDH Minnesota Department of Health**

HOME TOPICS ABOUT US

**Clean Water Fund: Source Water Protection**

- CWF Source Water Protection Home
- Planning
- Grants
- Special Projects

**MDH Legacy Initiatives**

- Clean Water Fund Home
- Contaminants of Emerging Concern
- County Well Index Enhancement
- Groundwater Virus Monitoring Study
- Private Well Protection Arsenic Study
- Sealing Unused Drinking Water Wells
- Source Water Protection Planning and Grants

**Related Topics**

- Minnesota Well Index
- Drinking Water Protection
- Source Water Protection
- Health Risk Assessment

## Water Reuse Clean Water Fund

Water reuse will be an increasingly important part of managing our water resources as demands on our water supplies continue to grow due to population increases, urbanization, climate change, and changes in water use. There are scattered examples of reclaiming municipal wastewater, stormwater, and graywater systems in Minnesota. However, those interested in reuse often run into regulatory roadblocks, technical challenges, or lacking and inconsistent regulations and standard practices.

### Interagency Effort

An interagency effort to develop recommendations for best practices and policies for water reuse in Minnesota is underway. Recommendations will include both regulatory and non-regulatory approaches to successful implementation of water reuse. Recommendations will be published early summer of 2017.


Interagency efforts include two components to ensure that water reuse can be safely and sustainably implemented in Minnesota.

**Research** – to evaluate current regulations, practices, and barriers, and to quantify and determine acceptable health risks associated with water reuse applications

**Stakeholder Engagement** – to share perspectives on opportunities and barriers to reuse, and provide guidance and feedback on policy and best practice recommendations

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CLEAN WATER LAND & LEGACY AMENDMENT

Check out the Key Water Information Catalogue

**Questions?**  
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Questions?