#### **APPENDIX B**

# Campus Groundwater Conservation Planning (CGCP)

Task Force Meeting #1 Monday, February 27<sup>th</sup>, 2017 10:00 AM – 12:00 PM





- Introductions (10 minutes)
- CGCP Overview (20 minutes)
- Research Summary (10 minutes)
- Task Force Discussion: Approach for CGCP Protocol Development (70 minutes)
  - Find consensus on general structure and process
- Next Steps and Meeting Schedule (10 minutes)

## Agenda

- Name
- Organization
- Role
- Favorite pastime



Mitch

### Introductions

- FY 2016 CWF AIG 3-year grant concludes 12/31/18
- \$250,000 project
  - \$200,000 CWF AIG
  - \$50,000 SWCD match
  - Match requirements
    - 25% match provided by member districts

# CWF Accelerated Implementation Grant

- Implementing BMPs to conserve groundwater (reduce and/or supplement use) and encourage infiltration where it is appropriate
- Position SWCDs state-wide to do this in a cost-effective manner

## Overall Resource Objectives

- Provide groundwater planning protocols to member districts for large-acreage, public campuses
  - Focus on public schools, hospitals, and government facilities
  - Rank BMPs based on cost-effectiveness
- Train Metro SWCD staff on protocol
- Complete up to 11 CGCPs
- Develop training module
- Train facility managers
- Make protocol available to SWCDs state-wide

### Project Goals

- Fiscal agent Scott Soil and Water Conservation District
- Host Anoka Conservation District
- Participants
  - Level 1 Anoka, Isanti, Ramsey, Scott, Sherburne, and Washington SWCDs
  - Level 2 10 Metro SWCDs and Hennepin County Environmental Services
- Partners Task Force Members

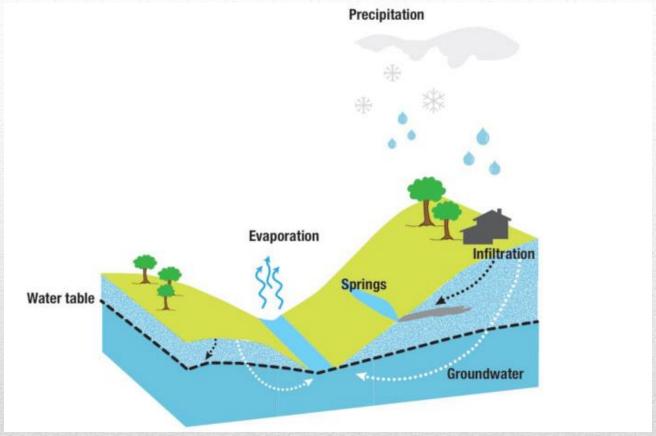
### Member Structure

- Level 1 CGCP Protocol Development
  - Actively participate in taskforce
  - Develop CGCP protocols
  - Literature review of BMPs
  - Develop training modules for SWCD staff and facility managers
  - Training of Level 2 participants and campus facility managers
- Level 2 CGCP Implementation
  - Identify and recruit campus participation
  - Complete at least one CGCP including final report
  - Reporting documentation provided to Host
- Taskforce
  - Active participation in taskforce but does not assist with CGCP protocol work product development
    - MCD member
    - Non-MCD member

## Participant Levels

- January 2017 Establish taskforce
- February-June 2017 Develop protocol
- July 2017 Report describing protocol
- August-December 2017 Staff training on protocol, identify and recruit campus participation, develop facilities manager training module
- January-August 2018 Complete up to 11 CGCPs, facility manager training
- September-December 2018 Compile findings into comprehensive report

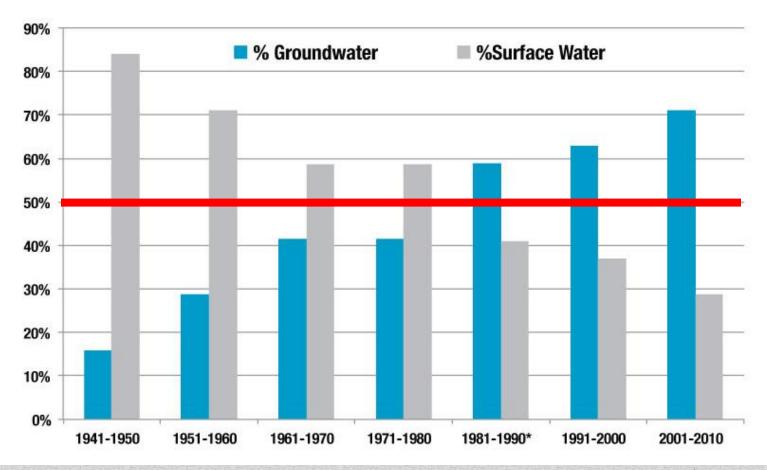
### Anticipated Timeline



# Groundwater Importance

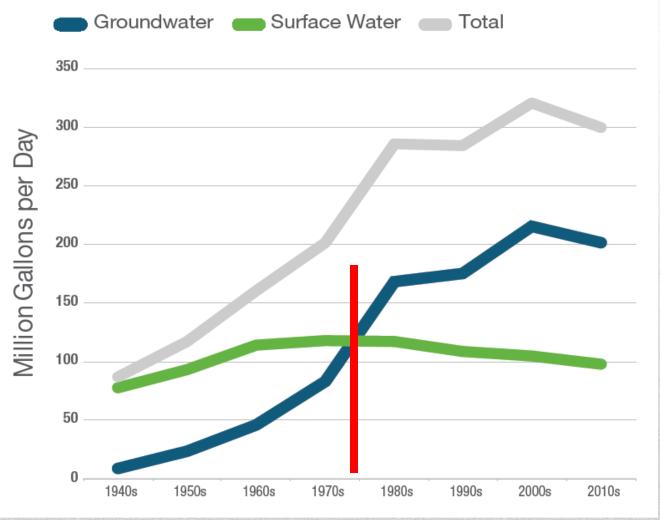
Source: Metropolitan Council

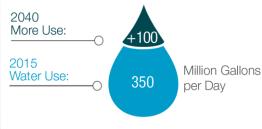
### Municipal Water Use in Seven-County Twin Cities Metro Area



Source: Metropolitan Council

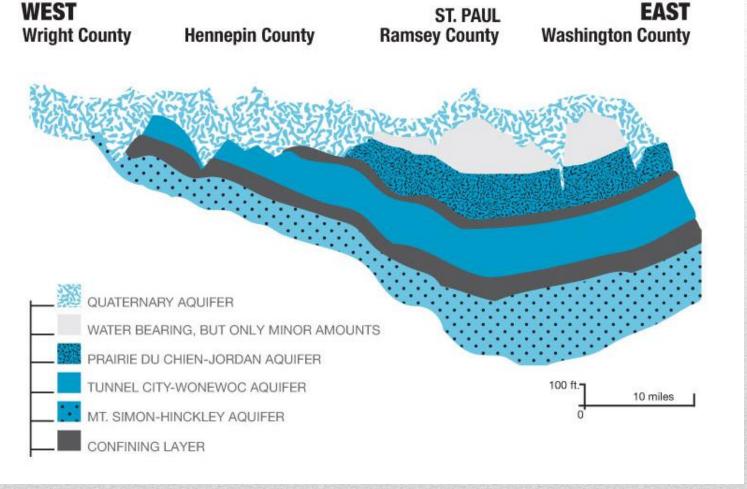
#### Now we use more groundwater compared to river water





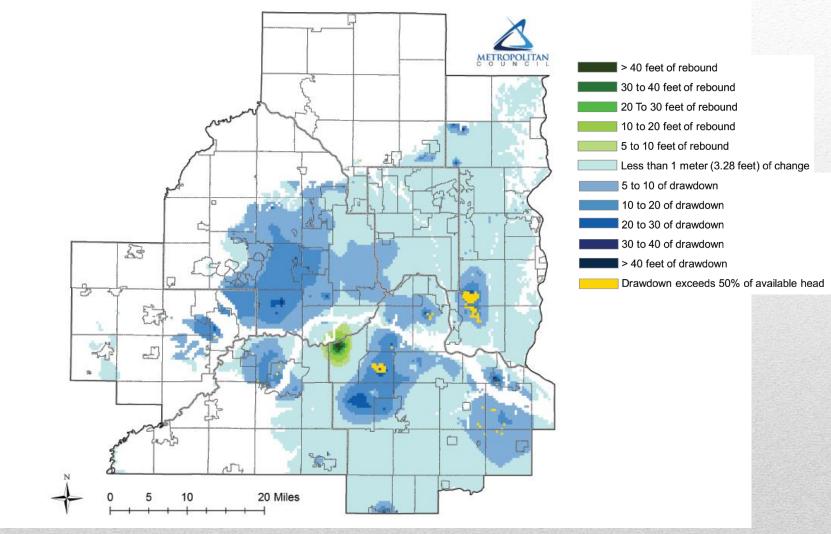
Source: 2017 MAWSAC Report to the MN Legislature

### **Aquifers of the Twin Cities Metro Area**



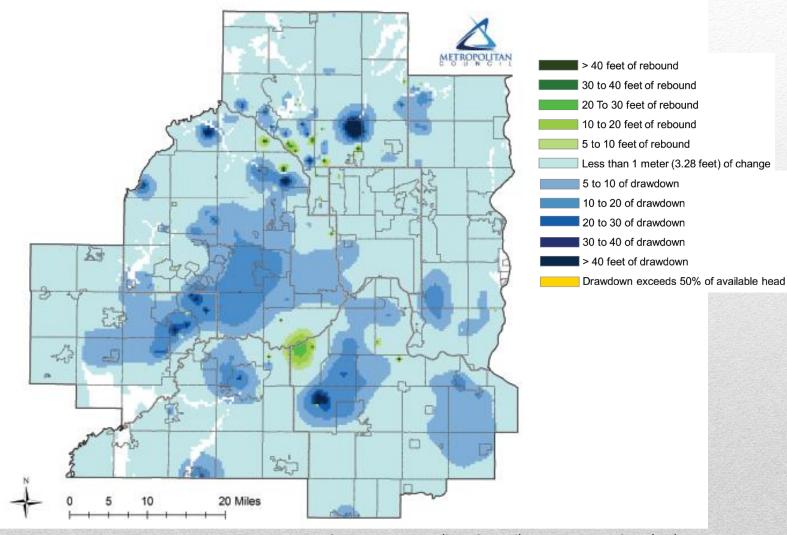
Source: Metropolitan Council

#### A) Drawdown in the Prairie du Chein-Jordan aquifer under average projected pumping.



Source: Metropolitan Council Master Water Supply Plan

#### C) Drawdown in the Tunnel City-Wonewoc aquifer under average projected pumping.

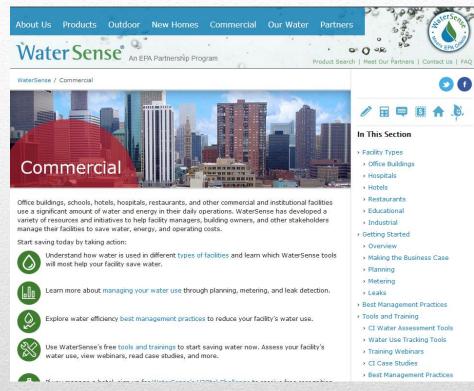


Source: Metropolitan Council Master Water Supply Plan

- THANK YOU!
- Provide guidance for CGCP protocol development
  - Successful protocol needs to consider a wide variety of sectors and viewpoints
  - Options
    - Develop new approach, adapt existing protocols, and/or combine tools from multiple existing protocols

### Task Force

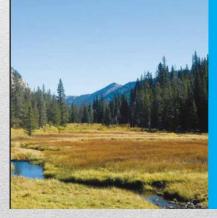
- Existing Protocols and Resources - Many
  - WaterSmart
  - Canadian Energy Audits
  - American Water Works Association
  - MnTAP
  - EPA's WaterSense
- BMP Literature Review
  - Stormwater reuse/harvest
  - Conservation/reduction practices (indoor and outdoor)
  - Infiltration BMPs



### Research Summary



#### LEAN & WATER TOOLKIT



Achieving Process Excellence Through Water Efficiency



SOUTH FLORIDA WATER MANAGEMENT DISTRICT Water Efficiency and Self-Conducted Water Audits at Commercial and Institutional Facilities A Guide for Facility Managers South Florida Water Management District Water Supply Development Section West Palm Beach, Florida sfwmd.gov

### Box 2. Examples of water uses in commercial and institutional facilities (EPA 2009)

#### Indoor (Domestic) Water

Kitchens, cafeterias, staff rooms

- Faucets
- Distilled/drinking water
- Ice machines
- Dishwashers
- Garbage disposals
- Food preparation

Restrooms and showers

- Faucets
- Toilets and urinals
- Showers

Laundry - washing machines

#### Sanitation

- Facility cleaning
- Sterilization/autoclaves
- Equipment washing
- Dust control
- Container washing

Processes – photographic and x-ray processing, silk screening, dry cleaning, printing, etc.

#### **Cooling and Heating**

Cooling towers/evaporative coolers

Boilers and steam systems

Once-through cooling

- Air conditioners
- Air compressors
- Hydraulic equipment
- Degreasers
- Rectifiers

Vacuum pumps

#### Outdoor Water Use

Irrigation

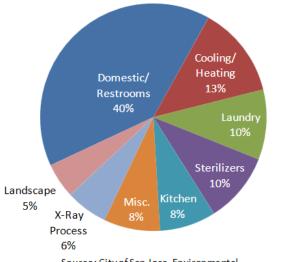
Pools and spas

Decorative water features

#### **Hospitals**

Domestic/restroom uses account for 40 percent of water use in hospitals. Additionally, hospitals use a large percentage of water for processes such as x-ray development, sterilization, and laundry. Effective water efficiency measures for hospitals may include:

- Bathroom fixture replacement
- Cooling tower efficiency retrofits
- Laundry equipment and process changes
- ♠ Condensate return systems for sterilizers
- Conversion from x-rays to digital imaging

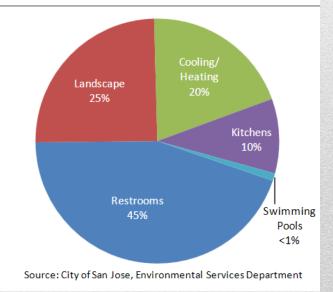


Source: City of San Jose, Environmental Services Department

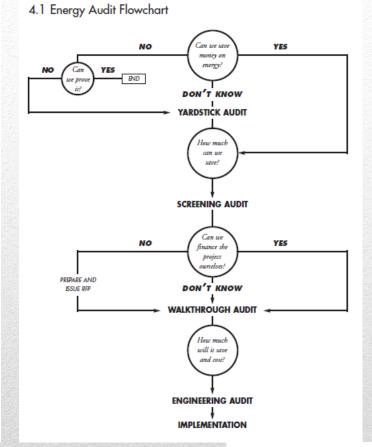
#### Schools

Nearly half of the water used in schools is related to restrooms. Other large uses include landscaping and heating and cooling. Because of these uses, effective conservation measures often include:

- Bathroom fixture replacement
- Cooling tower efficiency retrofits
- Irrigation efficiency measures such as weather- or moisture-based irrigation controllers



ENERGY AUDIT	LEVEL	WHEN TO CONDUCT	TIME TO COMPLETE (DAYS)	COST
Yardstick	Preliminary: Minimum technical data and analysis, energy demand and use profiles, indication of potential.	Basic data gathering to identify buildings which may or may not have energy-saving potential.	0.5 to 1	\$250 to \$500
Screening	Preliminary: End-use breakdowns, possible energy-saving opportunities, preliminary savings estimates.	Level of audit generally required to prepare Request for Proposal (RFP) for Energy Performance Contracting (EPC).	1 to 3	\$500 to \$1,500
Walkthrough	Preliminary: System type and equipment information, specific savings opportunities identified, preliminary costs and savings.	Prior to bidding on RFP. Conducted and paid for by prospective Energy Service Company (ESCo).	3 to 10	\$1,500 to \$5,000
Engineering	Detailed: Extensive data gathered, modelling, simulation; leads to detailed implementation plan with drawings and specifications.	ESCo that wins contract conducts detailed audit to develop implementation plan.	10 to 50	\$5,000 to \$50,000



# Canadian Energy Audit Example

Audit Standards
Guidelines



Commercial, Industrial, and Institutional Task Force
Water Use Best Management Practices
Report to the Legislature
Volume II



A Water Conservation Guide for Commercial, Institutional and Industrial Users

New Mexico Office of the State Engineer

July 1999

Prepared for the New Mexico Office of the State Engineer by Schultz Communications, Albuquerque, New Mexico. Financial assistance provided by the U.S. Bureau of Reclamation.



1-800-WATER-NM

### **BMPs**



Minnesota Stormwater Manual

Q Search

Search Help

Log in

NAVIGATION

Main page

Table of contents

Categories

What's new

Response to comments

Future updates

Events

In the News

Funding

Recent changes

Help

TOOLS

What links here

Related changes

Special pages

Permanent link

Page information

Cite this page

MPCA LINKS

MPCA Homepage

Stormwater

Policies / Disclaimers

PRINT/EXPORT

Create a book

Download as PDF

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#### Stormwater and rainwater harvest and use/reuse

Main Page > Stormwater and rainwater harvest and use/reuse

• Information: There is currently an interagency effort to advance safe and sustainable reuse in Minnesota. The Clean Water Fund Water Reuse project consists of a group of state agencies and other interested parties that are working towards clarifying the regulatory pathway for water reuse and evaluating resources needed for successful implementation of water reuse. Learn more about this Clean Water Fund project, sign up for project updates, and find the group's meeting schedule and opportunities for input at the project website.

• Green Infrastructure: Stormwater and rainwater harvest and use systems can improve or maintain watershed hydrology, reduce pollutant loading to receiving waters, increase water conservation, reduce stress on existing infrastructure, and reduce energy consumption

Rain water harvesting is the practice of collecting rain water from impermeable surfaces, such as rooftops, and storing for future use.

- Overview for stormwater and rainwater harvest and use/reuse
- Design criteria for stormwater and rainwater harvest and use/reuse
- Construction specifications for stormwater and rainwater harvest and use/reuse
- Operation and maintenance for stormwater and rainwater harvest and use/reuse
- Water quality considerations for stormwater and rainwater harvest and use/reuse
- · Environmental concerns for stormwater and rainwater harvest and use/reuse
- Cost-benefit considerations for stormwater and rainwater harvest and use/reuse
- Case studies for stormwater and rainwater harvest and use/reuse
- Calculating credits for stormwater and rainwater harvest and use/reuse
- Definitions for stormwater and rainwater harvest and use/reuse
- Requirements, recommendations and information for using Harvest and re-use/cistern as a BMP in the MIDS calculator
- · Links for stormwater and rainwater harvest and use/reuse
- · References for stormwater and rainwater harvest and use/reuse
- Technical support for stormwater and rainwater harvest and use/reuse
- · Stormwater reuse for irrigation preliminary modeling analysis

Minimal Impact Design Standards for enhancing stormwater management in Minnesota



Example of a residential rain barrel - Stillwater, MN

What's this?

### MN Stormwater Manual

- 3 categories of questions
- Pair and share method
- Time is limited
  - Succinct answers with clarification if needed
- Encourage listing ideas
  - Discussion will occur after voting
- Present top 1-3 most important points
  - Can also second points already made
- Responses recorded
- Sticker voting and discussion

### Task Force Discussion

- 5 minutes pair and share/5 minutes record group responses
  - What experience do you have with existing audits/protocols (water and/or energy)?
  - Do you have any recommended modifications for those protocols?
  - Do you think they could be a good starting point for a CGCP protocol?

# Experience with protocols

- 10 minutes pair and share/10 minutes record group responses
  - How should we identify campuses to target?
  - How should we determine campuses that will receive a plan?

### Broad-level screening

- 10 minutes pair and share/10 minutes record group responses
  - What should be the key steps in the CGCP protocol?
  - How should we calculate cost-effectiveness?
  - Should the process include indoor BMPs as well?
  - What should the final deliverable to the campus look like?

### Protocol Development

- 5 minutes
- 12 stickers total
- 6 stickers for each group of questions
  - Vote on broad-level screening and protocol development
- Distribute stickers across responses

## Voting

- 15 minutes
- Comments
- Questions
- Points of clarification

### Discussion

- Level 1 participants will develop detailed outline of protocol based on today's comments
- Set Task Force Meeting #2 date
  - Strive for beginning or end of day
    - Meeting #2 Early-mid April Review detailed outline of protocol
    - Meeting #3 Late May Review complete draft of protocol
    - Meeting #4 Late July Review final protocol

### Next Steps

# Campus Groundwater Conservation Planning (CGCP)

Task Force Meeting #2 Thursday, April 13<sup>th</sup>, 2017 1:00 PM – 3:00 PM





- Reintroductions (5 minutes)
- Brief review of Meeting 1 outcomes (5 minutes)
- Broad-scale campus identification (20 minutes)
- Promotion to campuses (20 minutes)
- Final campus selection (20 minutes)
- CGCP protocol (35 minutes)
- Campus follow-up and outreach (10 minutes)
- Next Steps and Meeting Schedule (5 minutes)

# Agenda

- Name
- Organization
- Favorite food



### Reintroductions

- Produce results
- SWCD staff capabilities
- Transparency about time investment
- Begin with public campuses
- State-wide implementation
  - Training

# Meeting 1 Outcomes – General considerations

- Previous experience with protocols
  - Many existing protocols to reference
- Broad-level screening
  - Wide array of suggestions from target aquifers to willingness to participate
- Protocol development
  - Indoor and outdoor BMPs
  - General steps of process

# Meeting 1 Outcomes – Specific Topics

- 5 categories from outline
  - Blue = outline topics
  - Red = potential discussion items
- Seeking feedback on primary outline categories
  - Pair and share method
  - Choose 1-2 bullets to focus on during pair time
- Share and document responses
- Time is limited
  - Succinct answers with clarification if needed
  - Encourage listing ideas
  - Present top 1-2 most important points
  - Can also second points already made

- Use data from 'yardstick' analysis
- Detailed descriptions of water using systems – as-<u>builts</u> when available
- Established list of BMP options
- Indoor/outdoor/operations
   BMP ID and analysis
- Implementation plan with action sheet
- Indoor and outdoor protocols to use
- · What is feasible?
- What tools should be developed for ease of implementation?
- What training materials need to be developed?

### CGCP Protocol Discussion Points

# Meeting #2 Approach

- Analysis can be conducted in a reasonable timeframe
   (e.g. 150-200 hours) and still produce meaningful results
- Adaptation of existing protocols
- Develop tools (e.g. spreadsheets) to assist with calculations of potential benefits
- Templates for promotion, outreach, and reporting

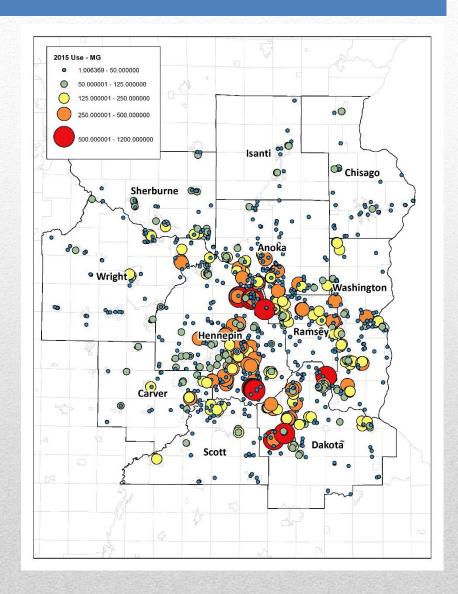
### **Current Vision**

- 10 minutes pair and 10 minutes share/document group responses
  - What are the requirements to be considered eligible for the CGCP process?
  - What methodology can be used to identify best campuses to pursue?

# Broad-Scale Campus Identification

#### MPARS Data

- Permit/InstallationStatus: Active
- Groundwater
- 11 County Metro
- Use category:
   Heating/Cooling, Non Crop Irrigation, and
   Water Supply
- 2015 Use >1 MG



## Example

- Public campus
- Source of water used is groundwater
- Sub-metered data available
- Existing partnership/known conservation interest
- Volume used
- Age of facility
- Aquifer recharge potential
- Proximity to sensitive areas
- Planned expansion
- Campus visibility

- Potential challenges for determining
- Other factors to consider
- Tools and data sets to use for ID
  - e.g. GIS data sets

## Broad-Scale ID Discussion Points

- 10 minutes pair and 10 minutes share/document group responses
  - How do we most effectively advertise benefits to interested campuses?
  - What materials do we need to accomplish the promotion?

### Promotion to Campuses

- Complete front-end 'yardstick' analysis
  - Personalized for property
  - Roughly estimate water use
- Emphasize groundwater importance
- Common BMP examples
- Benefits (groundwater and financial)
- Possible funding sources

- Tools for roughly estimating use
- Materials to accomplish promotion
  - e.g. handouts or videos

## Campus Promotion Discussion Points

- 10 minutes pair and 10 minutes share/document group responses
  - How are interested campuses prioritized for final selection?

### Final Campus Selection

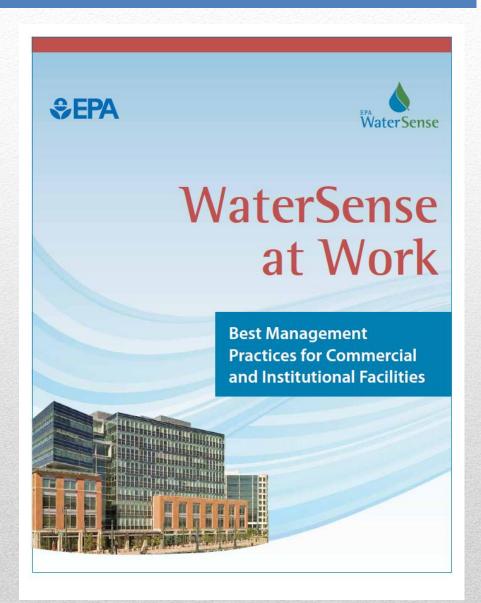
- Conduct 'yardstick' data analysis
  - 24 months of billing data
  - Building area
  - Grounds area and irrigation system
  - Age of infrastructure
  - Occupancy and use
- Compare to similar buildings
- Provide summary
- Establish clear expectations with proper participants
- Thresholds for advancement to full protocol

- Prioritization factors
- How available are the data?
- Compile resources for referencing use by similar types of buildings

## Campus Selection Discussion Points

- 15 minutes pair and 20 minutes share/document group responses
  - What methods and tools should be developed and/or adapted for the CGCP process?

### **CGCP** Protocol



## Example

#### **Table of Contents**

	ting Started	
1.1	Introduction	
1.2	Water Management Planning	
	Step 1. Making a Commitment	
	Step 2. Assessing Facility Water Use	
	Step 3. Setting and Communicating Goals	
	Step 4. Creating an Action Plan	
	Step 5. Implementing the Action Plan	
	Step 6. Evaluating Progress	1-24
	Step 7. Recognizing Achievement	1-25
Wat	er Use Monitoring and Education	
2.1	Introduction to Water Use Monitoring and Education	2-2
2.2	Metering and Submetering	2-4
2.3	Leak Detection and Repair	2-9
2.4	User Education and Facility Outreach	
2.5	Codes, Standards, and Voluntary Programs for Water Efficiency	
Sani	itary Fixtures and Equipment	
3.1	Introduction to Sanitary Fixtures and Equipment	3-2
3.2	Toilets	
3.3	Urinals	
3.4	Faucets	3-16
3.5	Showerheads	
3.6	Laundry Equipment	
Con	nmercial Kitchen Equipment	
4.1	Introduction to Commercial Kitchen Equipment	4-2
4.2	Commercial Ice Machines	
4.3	Combination Ovens	
4.4	Steam Cookers	
4.5	Steam Kettles	
4.6	Wok Stoves	
4.7	Dipper Wells	
4.8	Pre-Rinse Spray Valves	
4.9	Food Disposals	
4.10	·	
4.11	Wash-Down Sprayers	
	11451. 5 5111. 5 p. 4, c. 5	7 52

	oor Water Use
5.1 I	Introduction to Outdoor Water Use5-2
5.2 I	Landscaping 5-4
5.3 I	Irrigation5-11
	Commercial Pool and Spa Equipment5-20
5.5	Vehicle Washing5-29
	anical Systems
	Introduction to Mechanical Systems6-2
	Single-Pass Cooling6-4
	Cooling Towers6-8
	Chilled Water Systems6-18
6.5 I	Boiler and Steam Systems6-25
	ratory and Medical Equipment
	Introduction to Laboratory and Medical Equipment7-2
	Water Purification7-4
	Vacuum Pumps7-10
	Steam Sterilizers7-16
	Glassware Washers7-24
	Fume Hood Filtration and Wash-Down Systems7-27
	Vivarium Washing and Watering Systems7-33
7.8 I	Photographic and X-Ray Equipment7-38
Onsite	e Alternative Water Sources
Resou	urces
Apper	ndix A: Case Studies Demonstrating
Best 1	Management Practices in Action
A.1 I	Introduction to Case Studies
A.2	Federal Agency Implements Comprehensive Water Management StrategyA-3
A.3 I	Hotel Installs Water-Efficient Sanitary FixturesA-6
A.4 I	Restaurants Install Water-Efficient Commercial Kitchen EquipmentA-9
A.5 (	Office Complex Reduces Outdoor Water Use
A.6	Laboratory Eliminates Single-Pass Cooling
A.7 I	Hospital Installs Water-Efficient Laboratory and Medical Equipment A-18
A.8	University Makes the Most of Onsite Alternative Water Sources A-22
Apper	ndix B: Sample Worksheets for Water
Mana	gement PlanningB-1
Table E	B-1. Building Water Survey WorksheetB-3
Table E	
Table E	B-3. Water Consumption History WorksheetB-5
Table E	
Table B	B-5. Water Use Inventory WorksheetB-7

October 2012 iii iv October 2012

#### 1.2 Water Management Planning

Table 1-4. Action Plan Water Use Reduction Opportunity Checklist

Water Use Reduction Opportunity/Project	Reference Section	Already Implemented	Evaluate/ Consider	Not Applicable		
Webselle Medicales and Education		· ·	~	~		
Water Use Monitoring and Education						
Read water meters and record monthly water use.	2.2					
Install submeters on any major water-using equipment, systems, or processes.	2.2					
Implement a leak detection and repair program.	2.3					
Educate facility staff, building occupants, employees, and visi- tors on water management program goals and initiatives.	2.4					
Review, understand, and utilize information in codes, stan- dards, and voluntary programs for water efficiency.	2.5					
Sanitary Fixtures and Equipment						
Replace old tank-type toilets with WaterSense labeled models.	3.2					
Replace old flushometer-valve toilets flushing greater than 1.6 gallons per flush (gpf) with high-efficiency models, and install retrofit dual-flush conversion devices on 1.6 gpf flushometer valve toilets.	3.2					
Replace old flushing urinals with WaterSense labeled models.	3.3					
Replace lavatory faucets or faucet aerators (for private use) with WaterSense labeled models and install 0.5 gallons per minute (gpm) faucets or aerators in public-use settings.	3.4					
Replace old showerheads with WaterSense labeled models.	3.5					
Wash only full loads of laundry.	3.6					
Replace old single-load clothes washers with ENERGY STAR qualified models or consider the water factor when purchasing larger or more industrial-sized laundry machines.	3.6					
Commercial Kitchen Equipment						
Replace old ice machines with ENERGY STAR qualified models.	4.2					
Replace old steam cookers with ENERGY STAR qualified models.	4.4					
Load steam cookers, steam kettles, and combination ovens to capacity.	4.3, 4.4, 4.5					
Switch to connectionless combination ovens, steam cookers, and steam kettles.	4.3, 4.4, 4.5					
Replace old water-cooled wok stoves with a waterless model.	4.6					
Install in-line flow restrictor to reduce dipper well flow rate to 0.3 gpm.	4.7					

(continued)

1-20 October 2012

#### 1.2 Water Management Planning

Table 1-4. Action Plan Water Use Reduction Opportunity Checklist (cont.)

Water Use Reduction Opportunity/Project	Reference Section	Already Implemented	Evaluate/ Consider	Not Applicable
Commercial Kitchen Equipment (cont.)				
Replace existing pre-rinse spray valves with models that use 1.3 gpm or less.	4.8			
Hand scrape food from dishes or install food strainers and compost food waste.	4.9			
Load dishwashers to capacity.	4.10			
Replace old dishwashers with ENERGY STAR qualified models.	4.10			
Use a broom or mop instead of a water broom or high- pressure hose to clean floors.	4.11			
Outdoor Water Use				
Plant native or drought-tolerant species.	5.2			
Use mulch around trees and plant beds.	5.2			
Install WaterSense labeled weather-based irrigation control- lers or consider irrigation controllers with rain or soil moisture sensors.	5.3			
Use drip irrigation to water plant beds.	5.3			
Ensure irrigation schedule is appropriate for climate, soil conditions, plant materials, grading, and season.	5.3			
Have an irrigation professional certified by a WaterSense labeled program conduct an irrigation audit.	5.3			
Check the position and location of spray heads to ensure that they are working properly and water is not being directed onto non-landscaped areas, such as sidewalks.	5.3			
Use pool covers to control evaporation loss.	5.4			
Maintain proper pool chemistry to limit pool cleaning and drainage events.	5.4			
Use friction washing in vehicle washes and consider installing a water reclamation and reuse system.	5.5			
Mechanical Systems				
Eliminate single-pass cooling.	6.2			
Professionally monitor cooling tower and boiler chemistry and maximize cycles of concentration.	6.2, 6.5			
Install cooling tower meters and control systems to control chemical feed and blowdown based on conductivity.	6.3			

(continued)

October 2012 1-21

#### 1.2 Water Management Planning

Table 1-4. Action Plan Water Use Reduction Opportunity Checklist (cont.)

Water Use Reduction	Reference Section	Already Implemented	Evaluate/ Consider	Not Applicable	
Opportunity/Project	Section	V	V	V	
Mechanical Systems (cont.)					
Inspect chillers and air handler coils regularly and remove dirt and scale buildup.	6.4				
Regularly check and maintain boilers, steam lines, and steam traps.	6.5				
Laboratory and Medical Equipment					
Use water purification only when necessary.	7.2				
Turn off pumps when not in use.	7.3				
Install thermostatically actuated valves to control the flow of cooling water for steam sterilizer condensate discharge.	7.4				
Replace old steam sterilizers and vacuum pumps with newer models that do not use single-pass cooling or con- densate discharge tempering water.	7.3, 7.4				
Replace old fume hoods with a filtration system that does not require water (e.g., activated carbon).	7.6				
Inspect and repair worn cage-and-rack washer valves and rinse nozzles.	7.7				
Run glassware and cage-and-rack washers only when full.	7.5, 7.7				
Consider converting from traditional film to digital X-ray equipment.	7.8				
Onsite Alternative Water Use					
Consider using onsite alternative water for irrigation, cooling tower make-up, toilet and urinal flushing, fume hood scrubbers, and other uses not requiring potable water.	8.0				

#### **Prioritizing Projects**

All projects and practices selected should be considered in the context of achieving established water management goals, as well as overall cost-effectiveness. Once water-saving opportunities have been identified, they should be prioritized using criteria, such as urgency, cost-effectiveness, amount of potential water savings, visibility, and environmental impact. The water management team should address the simplest and most urgent tasks first, as follows:

- Fix any equipment that is malfunctioning or leaking to target the most urgent issues first.
- Start with simple projects and practices, particularly for new water management programs. This will help create initial positive results and gain acceptance of program goals and initiatives.

1-22 October 2012



### WaterSense® Simple Water Assessment Checklist for Commercial and Institutional Facilities

Use this checklist to identify potential projects and best management practices that will save water, energy, and operating costs. Use <u>WaterSense</u> <u>at Work: Best Management Practices for Commercial and Institutional Facilities</u> to find more information and equations to calculate potential water, energy, and cost savings. This information can be used to prioritize projects and create an action plan for reducing water use in a facility. Water efficiency projects and practices that are shown in **blue** represent low- and no-cost actions to save water.

	Water-efficient Project or Practice	Section of WaterSense at Work <sup>1</sup>	Evaluate 🗸	Implement	Done 🗸	Notes		
Gen	General Facility Water Management—Monitoring and Education							
1.	Read water meters and record monthly water use; verify that all meters and submeters are installed properly.	2.2						
2.	Track water and cost savings over time in ENERGY STAR®'s Portfolio Manager® or another utility management system.	1.2, 2.2						
3.	Install submeters on all major water-using equipment, systems, or processes (e.g., cooling towers, tenant spaces, irrigation systems, single-pass cooling, and HVAC systems).	2.2						
4.	Include leak detection and repair in all operation and maintenance (O&M) programs.	2.3						
5.	Instruct staff and visitors with clear signage on how and where to report leaks at all points of water use.	2.3						
6.	Educate facility staff, building occupants, employees, and visitors on water management program goals and initiatives.	2.4						
7.	Incorporate water-efficient best management practices (BMPs) into all Standard Operating Procedures (SOPs) for O&M throughout the facility (including those for both maintenance and cleaning staff).	2.4						
8.	Form a green team to engage employees in saving water throughout the building.	2.4						

<sup>&</sup>lt;sup>1</sup> U.S. Environmental Protection Agency. October 2012. WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. <a href="https://www.epa.gov/watersense/docs/ws-at-work">www.epa.gov/watersense/docs/ws-at-work</a> bmpcommercialandinstitutional 508.pdf.

- Use data from 'yardstick' analysis
- Site visits to gather data
- Detailed descriptions of water using systems – as-builts when available
- Established list of BMP options
- Indoor/outdoor/operations
  - BMP ID and analysis
- Implementation plan with action sheet

- Indoor and outdoor protocols to reference
- What is feasible?
- What tools should be developed for ease of implementation?
- What training materials need to be developed?

## CGCP Protocol Discussion Points

- 5 minutes pair and 5 minutes share/document group responses
  - How do we conduct follow-up site visits to track implementation and encourage advertisement of benefits?

# Campus Follow-Up and Outreach

- Gauge implementation of CGCP recommendations
- Promote CGCP program through outreach

- Questionnaire for site visit
- Resources (technical and financial) for implementation

# Follow-Up and Outreach Discussion Points

- Level 1 participants will develop draft of protocol based on today's comments
- Next task force meeting dates
  - Meeting #3 Early-mid June Review draft of protocol and concepts for tools and materials
  - Meeting #4 Early August Review final protocol

### Next Steps

### Thank You!