Water Management Training Companion Guide

BEFORE you watch the web training, answer the following questions:

1. What do you think are the components of a Water Management Plan?

2. What do you currently have in place in your school or district?

AFTER you watch the web training, answer the following questions:

1. What additional aspects of water management did you learn during the training?

2. What will you do to begin to improve water management at your school or district?

3. What further information do you need to get started and where can you find it?

Water Management Training Companion Guide

Green Schools: A green school creates a healthy environment that is conducive to learning while saving energy, resources and money.

Water Management: The goal of a water management plan is to reduce water consumption. Key to success will be conducting thorough assessments of current conditions, including a fixture audit to determine the rate or volume of water used.

Recommended Assessments

Gathering the answers to the preliminary assessment questions below can help you determine how far along your school or district is in implementing a water management plan. This is not an exhaustive list, but it does provide a good starting point.

Water Management

- Conduct a fixture audit, including determining how many fixtures are in the school, when they were they installed, and the flush and flow rates.
- Do faucets shut off automatically?
- Is water metered for the building?
- Is there an irrigation system? Is it separately metered?
- Does the school have a full service or heat-and-serve cafeteria?
- Does the cafeteria have a garbage disposal?
- Does the school have a swimming pool? Chlorine or salt?
- Is there currently a water management policy?
- How are leaking fixtures reported?

Conducting a Fixture Audit

1. Determine Age of Fixtures

Your school's plumbing fixtures will consume more or less water, depending on their age. Fixtures installed prior to 1993 were not regulated by the Energy Policy Act of 1992 and are likely to be less efficient.

2. Calculate Fixture Rates

Fixture rate is the rate or volume of water used by a fixture over a period of time or for one use. This is measured in two ways:

- Gallons per Minute (gpm) – Used for sinks and lavatories.
- Gallons per Flush (gpf) – Used for water closets (toilets) and urinals.

Current regulated fixture rates are defined by the International and Uniform Plumbing Codes or IPC/UPC. Note: your municipality may have more or less stringent plumbing fixture requirements.

3. Determine Number of Users

An important part of establishing your water consumption baseline is determining the number of users. Calculate the Full-Time Equivalent (FTE) users based on a standard eight-hour occupancy period. An eight-hour occupant has an FTE value of one and part-time occupants have an FTE

value based on their hours per day divided by eight. You can estimate your school's transient occupants and can count them as partial FTEs. Students should have an FTE value of one.

Default Fixture Usage

Fixture Type	FTE	Visitor	Resident
	Uses/Day		
Water Closet			
Female	3	0.5	5
Male	1	0.1	5
Urinal			
Female	0	0	n/a
Male	2	0.4	n/a
Lavatory Faucet * Duration 15 seconds; 12 seconds w/ auto control	3	0.5	5
Shower *Duration 300 seconds		0	1
Kitchen Sink * Duration 15 seconds	1	0	n/a

4. Calculate Your Usage

Once you have completed your fixture audit and determined the number of users, you can calculate your installed case usage. Total the annual volume of each fixture type as determined by number of users (see charts). Determining your installed case water consumption is only part of entire school water audit. There are many systems that need to be measured. Determining your installed case water consumption is only part of entire school water audit. There are many systems that need to be measured.

Fixture Groups: Represents fixture usage patterns in the project space

Group Name	Annual Days of Operation	FTE	Transients (Students/Visitor)	Retail Customers	Residents	% Female	% Male
Student and Staff	250	150	30	0	0	50	50

Flow Fixture Data: Represents the water flow of each fixture

Fixture Groups							Flow Rate (GPM/GPC)		Annual Water Consumption (Kgal)	
Select	Display	Fixture ID	Fixture Family	Fixture Type	Total Daily Use (2)	Duration (Secs) 2	Baseline	Installed	IPC/UPC Baseline	Performance
Student and Staff	Student and Staff	SK-1	Kitchen Sink	IPC/UPC	100	15	2.2	1.5	13.81	9.41
Student and Staff	Student and Staff	SK-2	Kitchen Sink	IPC/UPC	100	15	2.2	1.5	13.81	9.41
Total calculated flow fixture water use annual volume, baseline case (kGal)							27.62			
Total calculated flow fixture water use annual volume, performance case (kGal)							18.82			
Percent reduction of water use in flow fixtures (%)							32			

5. Compare Installed Fixtures to IPC/UPC 2006

Once you have established your installed fixture water consumption, compare it to that of the IPC/UPC 2006 minimum requirements. For schools completed prior to 1993 (and without plumbing upgrades), your minimum performance should be no greater than 160% of the IPC/UPC guidelines. For schools completed after 1993, your minimum performance should be no greater than 120% of the IPC/UPC guidelines.

Components of a Successful Water Reduction Plan

Upgrade Fixtures

Upgrading fixtures is a strategy that often has the greatest effect on your school's water consumption. The EPA has developed a labeling program for water-efficient fixtures called WaterSense. It can be found on toilets, faucets, urinals and shower fixtures. Additionally, your school may want to consider "dry fixtures," such as waterless urinals and composting toilets. Note: toilets consume the most amount of water of all plumbing fixtures.

Lavatories/Shower (flow fixtures)

- Automatic faucet sensors
- Flow restrictors
- Metering controls
- Reduced-flow aerators

Toilets/Urinals (flush fixtures)

- High-efficiency
- Low-consumption
- Waterless

Landscape Design

Proper landscape design and plant selection can help your school reduce and/or eliminate the need for permanent irrigation systems.

- Mulch – retains moisture.
- Native or adaptive plants – these plants can live on the water provided by the local climate.
- Perennial flowers in lieu of annuals – less water is used to establish.
- Reduce turf grasses – not native in most places and requires irrigation and fertilizer.
- Xeriscape design – landscape design that does not require irrigation.

Drip Irrigation

If your school's landscape requires irrigation, the best system to use is drip irrigation. This strategy minimizes the use of water and fertilizer by allowing water to drip slowly to the roots, either onto the soil surface or directly onto the root zone, through a network of valves, pipes or tubing. Drip irrigation is 90% efficient, much better than conventional irrigation, which is only 65% efficient. Drip irrigation may have a higher upfront cost, but can result in an annual water-cost savings. These savings can be quantified into a payback time. For example: If a drip irrigation system and native landscape costs $15,000 more than a conventional system but saves your school $5,000 a year in water cost, you will have a payback period of three years.

Rainwater and Greywater

Rainwater can be captured and stored in cisterns to be used for site irrigation. It can also be used as the makeup water for a permanent irrigation system or be pumped for "as needed" irrigation. Greywater can be captured, stored and pumped for your school's irrigation needs.

Process Water

Reducing process water consumption can be as easy as selecting the most efficient appliances, or you can try more complex solutions such as installing water-recovery devices on your HVAC systems. Look to simple solutions like replacing dishwashers — older models use about 15 gallons per cycle, while newer, more efficient models, use seven to 10 gallons. If your school's HVAC system has cooling towers, several strategies can reduce water consumption, including installing high-efficiency cooling towers and capturing air conditioner condensate to use as makeup water.

LEED Certification: A Way to Define Green for New and Existing Schools

In 2000, the U.S. Green Building Council (USGBC) established the LEED® rating system as a way to define and measure "green buildings." In school terms, LEED is like a report card for buildings, demonstrating to the community that a facility is built and/or operated in a way that supports the health and well-being of occupants and saves energy, resources and money. LEED is an internationally recognized certification system that measures how well a building performs using several metrics:

- sustainable land use
- energy savings
- water efficiency
- CO_2 emissions reduction
- improved indoor environmental quality
- stewardship of resources

LEED provides a concise framework for identifying and implementing practical and measurable green building solutions. Based on established sustainable building practices and emerging concepts, the LEED rating systems are performance-based and comprehensive in scope. Points are awarded on a 100-point scale, and credits are weighted to reflect their potential environmental impacts. Different levels of certification are granted based on the total number of earned points. The four progressive levels of certification are: Certified, Silver, Gold and Platinum.

Once the credits are implemented and the energy-efficiency and performance requirements met, the final step for certification is submitting the project certification documentation using the Web-based LEED Online system. The Green Building Certification Institute (GBCI) reviews the application and provides feedback. If all requirements are met, GBCI awards LEED certification to the building.

LEED Rating Systems:

LEED® for New Construction & Major Renovations™
LEED® for Existing Buildings: Operations & Maintenance™
LEED® for Commercial Interiors™
LEED® for Core & Shell™
LEED® for Schools™
LEED® for Neighborhood Development™
LEED® for Homes™
LEED® for Retail™
LEED® for Healthcare™

Green Building Certification Institute (GBCI)

Established in 2008, GBCI is the institution that grants both project certification and professional credentials that recognize excellence in green building performance and practice. GBCI administers project certification for commercial and institutional buildings and tenant spaces under USGBC's LEED rating systems. GBCI also manages the professional credentialing programs based upon the LEED rating systems, including the LEED Green Associate and LEED AP credentials.

How Much Does LEED Cost?

The cost to certify a school facility is based on the project's square footage. The process provides a comprehensive third-party review of the energy and environmental performance of the school and ensures that the stated goals of the project are met.

The cost to register and certify at 100,000-square-foot school for USGBC members is less than $4,000 using LEED for Existing Buildings: Operations & Maintenance, and less than $5,500 using LEED for Schools.

Prices are determined by GBCI and are subject to change. For complete pricing information, visit www.gbci.org.

Glossary

Blackwater: Blackwater is sewage or brown water. It comes from toilets and urinals.

Greywater: Greywater is wastewater generated from domestic activities such as laundry and dishwashing, which can be recycled on-site for uses, including landscape irrigation, toilet flushing, cooling towers or constructed wetlands. Greywater is free of sewage or fecal contamination, but may contain soap or detergents.

Makeup Water: Makeup water is water needed to replace what is lost by evaporation or leakage in a closed-circuit, recycle operation.

Peak Water: Peak water is the term used to describe reaching the physical, economic and environmental limits on meeting human demands for water and the subsequent decline of water availability and use.

Potable Water: Also known as drinking water, potable water is water which is of sufficiently high quality that it can be consumed without risk of harm. Potable water is what comes out of the tap and is traditionally used in showers, toilets, spigots and most irrigation systems.

Process Water: Process water is generally defined as water used in manufacturing or treatment processes. For schools, this includes items like cooling towers, washing machines, dishwashers, water fountains, and cafeteria sinks.

Regulated Water: This term applies to water consuming systems regulated by Energy Policy Act of 1992. This is sometimes called fixture water because certain fixtures are regulated by the IPC/UPC 2006 and Energy Policy Act of 1992. The fixtures are limited to toilets, urinals, showers, kitchen sinks, and lavatories.

Runoff: Runoff is water flow that occurs when soil is infiltrated to full capacity and excess water flows across land. This includes parking lots, vegetated areas, streets and hardscapes.

Stormwater: Stormwater is water that originates during precipitation events, including snowmelt and runoff from overwatering.

LEED for Existing Buildings: Operations & Maintenance Rating System
Credits Related to Water Management Plan

The LEED for Existing Buildings: Operations & Maintenance rating system credits that apply to a water management plan fall under Sustainable Sites (SS) and Water Efficiency (WE) credit categories.

Sustainable Sites

SS Credit 6 – Stormwater Management
Limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or eliminating pollution from stormwater runoff and eliminating contaminants. Rainwater harvesting directly affects the amount of runoff entering the stormwater system and can be used in the building or for irrigation, reducing your school's water consumption.

Water Efficiency

WE Prerequisite 1 – Minimum Indoor Plumbing & Fixture Efficiency
Reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems. Establish a minimum efficiency rating relative to the UPC/IPC codes.

WE Credit 1 – Water Performance Measurement
In conjunction with the water audit and the Energy Star Portfolio Manager, measure building and subsystem water performance over time to understand consumption patterns and identify opportunities for additional water savings.

WE Credit 2 – Additional Indoor Plumbing & Fixture Efficiency
After establishing minimum efficiency for your schools plumbing fixtures, install aerators, flow restrictors, and/or new fixtures to reduce water consumption even further.

WE Credit 3 – Water Efficient Landscaping
Limit or eliminate the use of potable water, or other natural surface or subsurface resources available on or near the project site, for landscape irrigation. Rainwater harvesting, greywater recovery, installing native plants, or employing xeriscape strategies can help you create water efficient landscaping for your school.

WE Credit 4.1 – Cooling Tower Management: Chemical Management
Reduce potable water consumption for cooling tower equipment through effective water management and/or use of non-potable makeup water.

WE Credit 4.2 – Cooling Tower Management: Non-potable Water Source Use
Install efficient cooling towers and consider alternatives makeup water sources, such as air conditioner condensate or rainwater.

U.S. Green Building Council
Publications and Resources

Green Existing Schools Implementation Workbook (PDF)
The *Green Existing Schools Implementation Workbook* includes sample policies, programs, and plans; data collection forms and tables; and sample surveys.

Green Existing Schools Project Management Guide (PDF)
The *Green Existing Schools Project Management Guide* includes general guidance on navigating the LEED for Existing Buildings: O&M certification process, including how to conduct personnel and organizational assessments, educate and train staff, initiate the certification process, and manage a school or district-wide sustainability program.

LEED 2009 for Existing Buildings: Operations & Maintenance Project Checklist (XLS)
The LEED Project Checklist is a scorecard to track the credits being pursuing toward certification.

LEED 2009 for Existing Buildings: Operations & Maintenance Rating System (PDF)
The LEED 2009 for Existing Buildings: Operations & Maintenance rating system summarizes the intent, requirements, and technologies/strategies for each credit.

Sustainable Purchasing Tracker – Materials and Resources
Sustainable Purchasing Tracker – Indoor Environmental Quality
Solid Waste Management Tracker
Occupant Commuting Survey - Summary Table

The publications and resources can be found at the Centers for Green School's Green Existing Schools Toolkit at www.centerforgreenschools.org/k12toolkit.

Questions?
The Center for Green Schools at USGBC has assembled a panel of experts, facilities staff, and school district sustainability officers to answer your questions. Please email schools@usgbc.org with the subject line "Green Existing Schools," and we will promptly connect you with a peer who can help you find the answers.

Water Management
References and Resources

100 Ways to Conserve Water
http://www.wateruseitwisely.com/100-waysto-conserve/index.php

2006 International Plumbing Code
http://www.iccsafe.org

American Council for an Energy Efficient Economy (ACEEE)
http://www.aceee.org

The Carbon Footprint of Water
http://www.rivernetwork.org/resource-library/carbon-footprint-water

The Center for Green Schools at USGBC
http://www.centerforgreenschools.org/

U.S. EPA WaterSense
http://www.epa.gov/WaterSense

The WaterSense label is backed by third-party, independent testing. The label makes it easy to find and select water-efficient products and ensures consumer confidence in those products. Certifying organizations help maintain the WaterSense integrity and credibility by verifying and testing products for conformance to WaterSense specifications, efficiency, and performance.

Energy Policy Act of 1992
http://www1.eere.energy.gov/femp/regulations/epact1992.html

Green Building Certification Institute (GBCI)
http://www.gbci.org

Green Existing Schools Toolkit
www.centerforgreenschools.org/k12toolkit

U.S. EPA ENERGY STAR Portfolio Manager
http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager

U.S. EPA Stormwater Technology Fact Sheet
http://www.epa.gov/owm/mtb/sandfltr.pdf

U.S. Green Building Council (USGBC)
http://www.usgbc.org

Water Education for Kids
http://www.epa.gov/ogwdw/kids/flash/flash_watercycle.html

Water Science for Schools
http://ga.water.usgs.gov/edu/