Water Management Plan

Revision 1

U.S. Environmental Protection Agency
Large Lakes Research Station

9311 Groh Road
Grosse Ile, Michigan 48138

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EPA

U.S. ENVIRONMENTAL PROTECTION AGENCY
LARGE LAKES RESEARCH STATION
GROSSE ILE, MICHIGAN

WATER MANAGEMENT PLAN, REVISION 1

Approved by:

John C Filkins — October 31, 2011

Mr. John Filkins, Biologist/Facilities Manager — Date

Russell G Kreis Jr — October 31, 2011

Dr. Russell G. Kreis, Jr., Station Chief — Date

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

1.0 EPA'S STATEMENT OF PRINCIPLES ON EFFICIENT WATER USE

To meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water resources must be sustainable and renewable. Sound water resource management, which emphasizes wise, efficient use of water, is essential to achieve these objectives.

Efficient water use can have major environmental, public health, and economic benefits by helping to improve water quality, maintain aquatic ecosystems, and protect drinking water resources. As the country faces increasing risks to ecosystems and their biological integrity, the inextricable link between water quality and water quantity becomes more important. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can prevent pollution by reducing wastewater flows, recycling process water, reclaiming wastewater, and using less energy. As municipalities and regions deal with chronic drinking water shortages due to drought and changes in climate patterns, water conservation becomes even more important to EPA's mission.

EPA recognizes that regional, state, and local differences exist regarding water quality, quantity, and use. Differences in climate, geography, and local requirements influence the water efficiency programs applicable to specific facilities. Therefore, EPA is establishing facility-specific Water Management Plans to promote the efficient use of water and meet the water conservation requirements under Executive Order (EO) 13423, *Strengthening Federal Environmental, Energy, and Transportation Management,* and EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance.*

This Water Management Plan has been established to document and promote the efficient use of water at EPA's Office of Research and Development, Mid-Continent Ecology Division, Large Lakes Research Station (LLRS) in Grosse Ile, Michigan. The plan is organized according to the Federal Energy Management Program (FEMP) Facility Water Management Planning Guidelines.

2.0 FACILITY DESCRIPTION

LLRS houses staff from the Large Lakes and Rivers Forecasting Research Branch within the Mid-Continent Ecology Division; EPA Region 5 Superfund Emergency Response Section; Office of Enforcement and Compliance Assurance—Region 5 Criminal Investigation Division; Region 5 Great Lakes National Program Office; U.S. Fish and Wildlife Service; and support contractors.

The laboratory's research is focused on developing methods to predict and assess the effects of pollution on freshwater ecological resources. It primarily consists of mathematical modeling of environmental stressors. Although the laboratory has the capability to conduct chemical analysis of inorganic chemicals in soils, sediments, and biota, this analysis was put on hold during fiscal year (FY) 2011. The research station is composed of a main laboratory building and three ancillary buildings—a carpenter shop, a boat shop and a tin hanger. Laboratory facilities are located on a three-acre parcel at the southern end of Grosse Ile, an island in the mouth of the Detroit River.

The station has a long history. First developed in the late 1920s as a naval reserve aviation base, the boat shop is associated with this period. During the early 1940s, a U.S. Navy base on Grosse Ile became a significant naval aviation training center, and the main laboratory building was constructed. At the time, its primary function was to support aviation operations. Laboratory operations began in the 1960s under the Public Health Service of the U.S. Department of Health Education and Welfare. In 1970, the laboratory joined the newly formed EPA. The main laboratory building was renovated into its current laboratory configuration in 1974. LLRS currently contains 32,477 square feet of conditioned space and is owned and operated by EPA.

3.0 FACILITY WATER MANAGEMENT GOALS

As of October 2010, LLRS' resource conservation goals are achieved through the implementation of the EPA Office of Research and Development (ORD)-wide Environmental Management System (EMS). The Water Management Environmental Management Program (EMP) within ORD's EMS sets objectives and targets related to water use to reduce the impact on natural resources by reducing the consumption of water from facility and laboratory operations and by properly managing stormwater runoff.

The primary objective of the Water Management EMP is to improve water use efficiency and stormwater management. Targets established under this objective call for:

> Achieving annual facility-specific goals set by EPA's Sustainable Facilities Practices Branch (SFPB) under its water conservation program. (These water conservation goals are calculated for each EPA facility based on the facility's previous water use reduction and the saving potential of identified projects.)
>
> Establishing an ORD FY 2010 baseline for industrial, landscaping, and agricultural (ILA) water use by March 31, 2011.
>
> Evaluating the potential to improve stormwater management at each ORD facility by September 30, 2011.

Although not expressly stated, ORD's objectives and targets for water management imply a goal of achieving a 26 percent potable water reduction by the end of 2020, compared to a 2007 baseline, and of achieving a 20 percent ILA water reduction by the end of 2020, compared to a 2010 baseline, as set forth in EO 13514.

LLRS's FY 2007 potable water intensity baseline is 14.10 gallons per gross square foot. Facility staff acknowledge that LLRS's FY 2007 baseline is lower than their representative water use from following years because the single-pass cooled air conditioner was not in use. Since the baseline is artificially low, the facilities manager notes that it may be difficult for LLRS to achieve water use reductions consistent with EO 13514.

To continue progress toward meeting federal requirements and EMS goals, ORD facilities are working to implement site-specific water conservation projects geared toward achieving the facility water conservation target, and to investigate and install corrective actions to maintain

cooling towers, restrooms, autoclaves, dishwashers, and other water-using equipment, among other tasks outlined under the Water Management EMP.

4.0 UTILITY INFORMATION

Rate Schedule and Contact Information

Potable water and sewer service is provided by:

The Township of Grosse Ile
Department of Public Services
9601 Groh Road
Grosse Ile, MI 48138

734-676-4422

As of September 2010, water service is provided at a rate of $6.56 per 1,000 gallons, and sewer service is provided at a rate of $2.17 per 1,000 gallons.

Payment Office

Water bills are approved by the LLRS station chief and sent to the following office for payment:

Pouch and Regular Mail
Kevin Sudderth
Environmental Protection Agency
Mail Code E205-01
Research Triangle Park, NC 27711

FEDEX
Kevin Sudderth
Environmental Protection Agency
Mail Code E205-01
4930 Page Road
Research Triangle Park, NC 27711

Mr. Sudderth can be reached at 919-541-3670.

5.0 FACILITY WATER USE INFORMATION

LLRS contains a mixed use of laboratory and office space. The laboratory space is configured for bench scale analyses of samples for inorganic constituents, although analytical activity was suspended in FY 2011. The facility primarily uses water for sanitary needs and building mechanical systems (including steam boilers). The following sections provide additional details on facility water use.

Potable Water Use

Figure 1 provides historical water use trends from FY 2007 through FY 2010. Facility staff acknowledge that LLRS's FY 2007 baseline is lower than their representative water use from following years because the single-pass cooled air conditioner was not in use.

Table 1 provides estimated monthly total water use in FY 2010. Water use was low in October and November 2009 because LLRS was replacing all of its cold water piping and bypassing the city water meter briefly during construction.

Average potable water use in FY 2010 is shown by major process in Table 2. During FY 2010, LLRS used potable water for single-pass cooling of an air conditioning unit in Room DD and as a source of water to a reverse osmosis (RO) system supplying purified water for laboratory use. Due to changes in the laboratory's mission, the air conditioner system and RO system were shut down in October 2010 and March 2011, respectively.

Figure 1. Water Use From FY 2007 Through FY 2010, LLRS

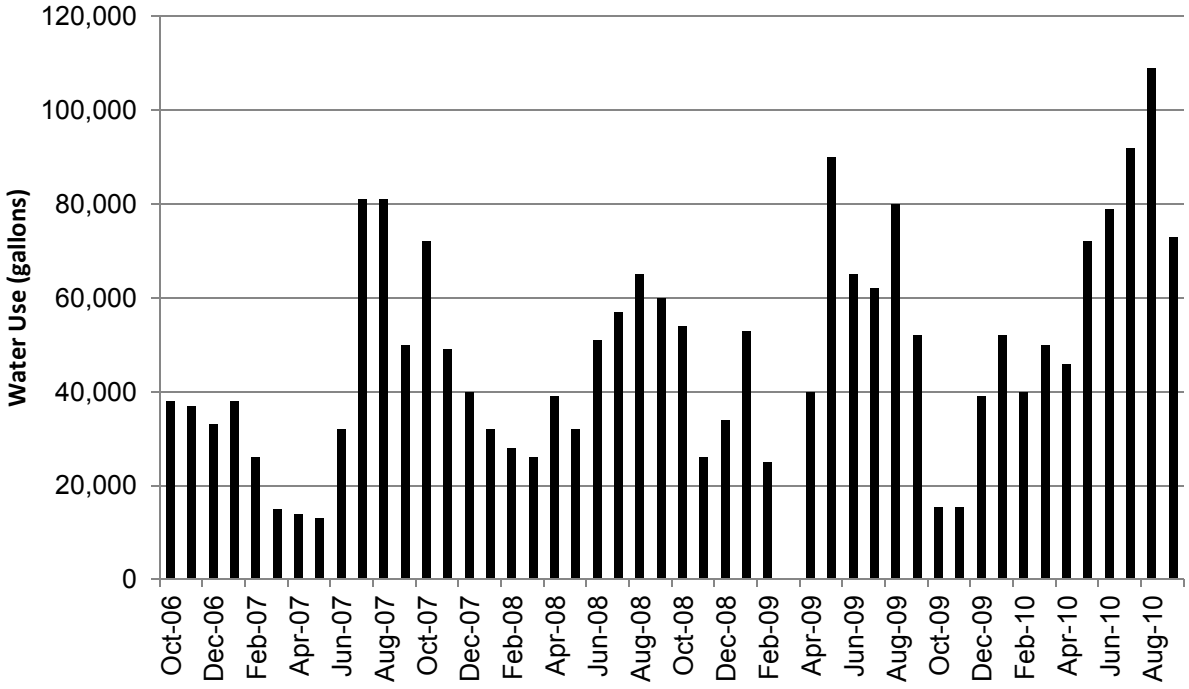

Table 1. Monthly Water Use in FY 2010, LLRS

Month	Total Water Use (gallons)
October 2009	15,500
November 2009	15,500
December 2009	39,000
January 2010	52,000
February 2010	40,000
March 2010	50,000
April 2010	46,000
May 2010	72,000
June 2010	79,000
July 2010	92,000
August 2010	109,000
September 2010	73,000
Total	**683,000**

Table 2. Major Potable Water-Using Processes, LLRS

Major Process	FY 2010 Annual Consumption (gallons)	Percent of Total LLRS Water Use	Supporting Calculations and Source Documentation
Sanitary water	150,000	22.0	Engineering estimate based on 30 people using 20 gallons per day for 250 operating days per year. 30 people × 20 gallons per person per day × 250 days per year = 150,000 gallons per year.
Other year-round water use (RO system, some single-pass cooling, laboratory water use, water softener, steam boiler, etc.)	330,000	48.3	Calculated by difference from the total metered water use and the other estimated water uses. 683,000 gallons per year - 125,000 gallons/year (sanitary use) - 203,000 gallons/year (other seasonal water use) = 355,000 (other year-round water use).
Other seasonal water use (hand irrigation, additional equipment cooling in summer months, etc.)	203,000	29.7	Seasonal water use can be calculated as the excess above baseline use. Based on the graphed water data from FY 2010, baseline water use at Grosse Ile is approximately 40,000 gallons per month. Seasonal water use in excess of the baseline can be calculated by difference from 683,000 gallons per year – 40,000 gallons/month × 12 months per year = 203,000 gallons/year.
Total Water Use	**683,000**	**100.0**	**FY 2010 metered total**

Industrial, Landscaping, and Agricultural Water Use

LLRS does not use any non-potable water for ILA purposes. LLRS is considering capturing rainwater and reusing it to water the landscape. However, since using captured rainwater is not

included in the scope of the EO 13514 ILA water reduction requirements, LLRS will not increase its non-potable water use with the completion of this project.

Measurement Devices

Incoming water is supplied by the Township of Grosse Ile Department of Public Services through two metered supply lines, one each to the main laboratory building and the carpenter shop. The main laboratory supply line is equipped with a compound meter that measures flow under both high-flow and low-flow conditions. In FY 2011, the low-flow meter stopped reading. The Township of Grosse Ile Department of Public Services installed a new water meter in October 2011.

Virtually all of the water used is delivered through the meter to the main laboratory. The meter in the carpenter shop, which supplies two utility sinks, has not registered more than 1,000 gallons per year since FY 2007.

There is also a meter in the boat shop, but the city does not bill LLRS for this meter, and there are no major water uses supplied by it any longer. The meter previously tracked water used by a steam boiler which was located there before EPA purchased the facility in the 1970s. Now, there is one tap located in the boat shop which is rarely used.

Under this plan, the facilities manager will track water use from all meters and submeters. The facilities manager will evaluate water use trends, and unanticipated usage trends will be investigated and resolved.

Shut-off Valves

The shut-off valve for the main laboratory supply is located in a metering closet in the employee break room. The shut-off valve for the supply to the carpenter shop is located in the corner of the building adjacent to the water meter.

Occupancy and Operating Schedules

LLRS is occupied by approximately 30 people on a daily basis, but employs a maximum of 50 people (some of which work offsite regularly). Typical operating hours are from 6:00 a.m. to 6:00 p.m. Monday through Friday, with occasional use during nights and weekends.

6.0 Best Management Practice Summary and Status

EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, signed in January 2007, calls for federal agencies to reduce potable water use intensity by 2 percent per year between FY 2007 and FY 2015, for a total reduction of 16 percent. This goal was extended by EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, signed in October 2009. EO 13514 calls for reducing potable water consumption intensity by 2 percent annually through the end of FY 2020, for a total reduction of 26 percent. It also calls for reducing ILA water use (including non-potable water use) by 2 percent annually through the end of FY 2020, for a total reduction of 20 percent (note that LLRS does not use any

non-potable water for ILA purpose at this time). Facilities should implement best management practices (BMPs) related to water use, taking life-cycle cost-effectiveness into consideration, to achieve these water reduction goals. FEMP has identified BMPs in 14 areas to help facilities identify and target water use reductions. LLRS has adopted BMPs in nine of the areas, designated by checkmarks in the list below. Three other areas are deemed inapplicable for LLRS, designated by "NA" in the list below. The status of each BMP at LLRS is as follows:

☑ Water Management Planning
☑ Information and Education Programs
☑ Distribution System Audits, Leak Detection and Repair
☑ Water-Efficient Landscaping
☑ Water-Efficient Irrigation
☐ Toilets and Urinals
☑ Faucets and Showerheads
☑ Boiler/Steam Systems
☑ Single-Pass Cooling Equipment
NA Cooling Tower Management
NA Commercial Kitchen Equipment
NA Laboratory/Medical Equipment
NA Other Water Use
☐ Alternate Water Sources

Information and Education Programs

All staff members are required to take annual EMS awareness training. Water conservation goals, as defined within the annually updated Water Management EMP, are covered during the training.

The facility's draft sustainability landscape plan will be highlighted in EPA's internal Leading by Example newsletter. If the facility implements the plan, which includes upgrades to its stormwater management system as well as landscaping upgrades, it may submit an article on the project to the local newspaper.

LLRS has achieved BMP status in this area because its uses EMS awareness training to inform building occupants about water conservation.

Distribution System Audits, Leak Detection and Repair

Facility staff are trained to report leaks and malfunctioning water-using equipment directly to the facilities manager or onsite operations and maintenance (O&M) contractor. Reported maintenance problems are assigned a work order, which are completed by the O&M contractor and tracked until the job is complete. In addition, the O&M contractor visually inspects the building mechanical spaces and corridors each morning and evening.

Janitors are trained to report any observed problems to the facilities manager. The facility also makes use of an automatic leak detection system, based on conductivity bridges ("water bugs") placed on the floor adjacent to water-using equipment. If water leaks on the floor, it completes a

circuit across the contacts of the conductivity bridge, which triggers an alarm on the building control system.

In addition, if water use is unexpectedly high for any given month, the Township of Grosse Ile Department of Public Services will note it on the water bill and investigate any potential leaks.

A screening-level system review was conducted in July 2011. Known water uses account for more than 90 percent of water consumption.

Under this plan, the facilities manager will monitor trends in monthly water use for all available meters. Changes that are not understood or expected will be investigated and resolved.

LLRS has achieved BMP status in this area because of its aggressive leak detection program.

Water-Efficient Landscaping

Across most of the 3-acre site, grasses and shrubs are climate-appropriate and survive on natural rainfall.

An employee of the U.S. Fish and Wildlife Service drafted a sustainable landscape plan for the site. The draft plan focuses on plant selection and includes one small rain garden. The landscaping plan may help to address problem areas on the LLRS site, including a grassy area in front of the building that is planted over old pavement, resulting in unhealthy vegetation. The plan involves less maintenance, including keeping grass height at 5 inches, mowing only once per month, and mulching around the base of each tree as far out as the canopy. LLRS is in the process of evaluating changes to the facility's stormwater management techniques, which may include some changes to the landscape. LLRS will consider implementing the sustainable landscape plan along with those changes in the near future.

Since LLRS has a landscape that can survive on limited to no supplemental irrigation, it has achieved BMP status in this area.

Water-Efficient Irrigation

LLRS does not have an in-ground or permanent irrigation system. Occasional, light hand-watering of outdoor planters near the facility's main entrance and indoor plants in the facility entryway is the only potable water used for irrigation.

LLRS is considering implementing a stormwater management plan that will include collecting rainwater in cisterns that can be used to water plants and trees, which would eliminate the need for any potable water use outdoors.

Since LLRS does not have an in-ground or permanent irrigation system and does not use excess water for hand watering, it has achieved BMP status in this area.

Toilets and Urinals

One toilet is compliant with 1992 Energy Policy Act (EPAct 1992) water efficiency requirements (1.6 gallons per flush [gpf]), but the rest are older, higher flush volume models. Half of the urinals flush at volumes higher than the EPAct 1992 requirement for urinals of 1.0 gpf, while the other half meet this requirement. Table 3 provides an inventory of sanitary fixtures.

Table 3. LLRS Inventory of Sanitary Fixtures

Fixture Type	Flow Rate	Total Number
Toilets	3.5 gpf	4
	1.6 gpf	1
Urinals	1.5 gpf	2
	1.0 gpf	2
Lavatory faucets	0.5 gallons per minute (gpm)	6
Showers	Not applicable	0

Janitorial staff and employees are trained to report leaks or other maintenance problems directly to the facilities manager. Leaks or other problems are immediately corrected.

To obtain BMP status in this area, LLRS will upgrade toilets to dual-flush models and urinals to 0.125 gpf models.

Faucets and Showerheads

Table 3 provides an inventory of faucets and showerheads installed at LLRS. All lavatory faucet fixtures meet the American Society of Mechanical Engineers (ASME) standard for lavatory faucets in public use (captured in ASME A112.18.1), which sets a maximum flow rate of 0.5 gpm. This flow rate is sufficient for hand washing and is considered a best practice for lavatory sinks in public settings.

LLRS does not have any showerheads onsite.

System pressure is maintained at 50 pounds per square inch using a pressure booster pump.

Janitorial staff and employees are trained to report leaks or other maintenance problems directly to the facilities manager. Leaks or other problems are immediately corrected.

Since 0.5 gpm faucet aerators were installed on all lavatory faucets, compliant with ASME A112.18.1, LLRS has achieved BMP status in this area.

Boiler/Steam Systems

LLRS is equipped with two steam boilers installed in 2009 to replace old boilers that were at the end of their useful life. Steam is currently generated to supply primary heat to the building air handlers. One boiler fires up into standby mode when the outside temperature drops below 60

degrees Fahrenheit, and the second boiler fires up if the outside temperature drops below 20 degrees. The steam boilers are not used in the summer. Steam condensate is collected and returned to the boilers. A small quantity of steam is blown down from the boilers each morning as a preventative maintenance measure. Steam and condensate return lines are inspected on a bimonthly basis. No chemical treatment of the boiler water is provided.
A high-efficiency hot water boiler was installed in 2009 to generate hot water to the reheat coils in the heating, ventilation, and air conditioning (HVAC) system.

LLRS has achieved BMP status in this area because the steam boilers have good condensate return, and because it recently reduced the load on the steam boilers by installing a high-efficiency hot water boiler.

Single-Pass Cooling Equipment

Single-pass cooling was previously used to cool room 201/203 using an air conditioner located in Room DD. The air conditioner was used to provide supplemental cooling for a low-level metals analysis laboratory. Due to changes in the laboratory's mission, the air conditioner was taken out of service in October 2010. If the laboratory's mission requires the use of supplemental air conditioning to any rooms in LLRS in the future, the facility will consider replacing the single-pass cool system with a remote condensing air conditioning system that would eliminate the use of single-pass cooling water.

Since LLRS is not currently running single-pass cooling water, it has achieved BMP status in this area.

Cooling Tower Management

LLRS does not use a cooling tower provide building or equipment cooling. BMP status is not applicable in this area.

Commercial Kitchen Equipment

LLRS does not operate commercial kitchen equipment. BMP status is not applicable in this area.

Laboratory/Medical Equipment

Purified water for laboratory use was generated through a multi-step process consisting of carbon filtration, water softening, and RO. The RO filters were changed regularly, but the system may have only achieved about 50 percent efficiency. Due to changes in the laboratory's mission, this system was shut down in March 2011. If the laboratory's mission changes to require the use of RO water in the laboratories, LLRS will closely evaluate the quantity of permeate water as compared to reject water to determine if it should invest in a project to increase system efficiency.

Since LLRS's research is now focused on mathematical modeling rather than laboratory analyses, BMP status is not applicable in this area.

Other Water Use

LLRS does not use potable water for any other purposes. BMP status is not applicable in this area.

Alternative Water Sources

LLRS is working with an architectural engineer on a stormwater management project. The project will evaluate the potential to collect rainwater in cisterns from the facility's roof, which can be used to water plants and trees, and excess can be diverted to a rain garden. This would eliminate the need for any potable water use outdoors.

LLRS can achieve BMP status in this area by identifying and implementing a cost-effective rainwater capture and reuse project.

7.0 DROUGHT CONTINGENCY PLAN

Neither the Township of Grosse Ile Department of Public Services nor the state of Michigan has a specific drought management plan.

In the event that voluntary or mandatory water conservation reductions are instituted by the township or the state, LLRS will form a task force of facility and operating personnel to identify and implement modifications to facility operations to achieve additional specified reductions in water consumption.

8.0 COMPREHENSIVE PLANNING

The facilities manager will ensure that the water supply, wastewater generation, and water efficiency BMPs are taken into account during the initial stages of planning and design for any facility renovations or new construction. LLRS will also consider these factors before purchasing and installing any equipment that would measurably change facility water consumption. Where available, LLRS will purchase or specify WaterSense labeled products and use WaterSense irrigation partners (see http://www.epa.gov/watersense for more information about WaterSense).

9.0 GUIDING PRINCIPLES FOR FEDERAL LEADERSHIP IN HIGH PERFORMANCE AND SUSTAINABLE BUILDINGS

The Interagency Sustainability Working Group (ISWG), formed as a subcommittee of the EO 13423 Steering Committee, established the *Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings (Guiding Principles)* to assist agencies in meeting the high performance and sustainable buildings goals of EO 13423, section 2(f). The December 1, 2008, version of the ISWG's *Guiding Principles for Sustainable Existing Buildings,* a subset of the *Guiding Principles* targeting existing buildings, established six supporting principles for protecting and conserving water. Table 4 documents LLRS' progress toward achieving the supporting principles for protecting and conserving water at existing buildings.

Table 4. Status of *Guiding Principles* to Protect and Conserve Water, LLRS

Guiding Principles	LLRS' Status
Indoor Water Two options can be used to measure indoor potable water use performance: Option 1: Reduce potable water use by 20 percent compared to a water baseline calculated for the building. The water baseline, for buildings with plumbing fixtures installed in 1994 or later, is 120 percent of the Uniform Plumbing Codes 2006, or the International Plumbing Codes 2006 fixture performance requirements. The water baseline for plumbing fixtures older than 1994 is 160 percent of the Uniform Plumbing Codes 2006 or the International Plumbing Codes 2006 fixture performance requirements; or Option 2: Reduce building measured potable water use by 20 percent compared to building water use in 2003 or one year thereafter with quality water data.	Water consumption data shows that LLRS increased water use intensity by 19.0 percent between FY 2003 and FY 2010. Facility staff acknowledge that LLRS's FY 2003 baseline is lower than their representative water use from following years because the single-pass cooled air conditioner was not in use.
Outdoor Water Three options can be used to measure outdoor potable water use performance: Option 1: Reduce potable irrigation water use by 50 percent compared to conventional methods; or Option 2: Reduce building related potable irrigation water use by 50 percent compared to measured irrigation water use in 2003 or a year thereafter with quality water data; or Option 3: Use no potable irrigation water.	The facility does not have an in-ground or permanent irrigation system. Occasional, light hand-watering of plants in the facility entryway is the only way potable water is used for irrigation.
Water Metering The installation of water meters for building sites with significant indoor and outdoor water use is encouraged. If only one meter is installed, reduce potable water use (indoor and outdoor combined) by at least 20 percent compared to building water use in 2003 or one year thereafter with quality water data.	The facility meters water supplied by the city using water meters in the main laboratory building and the maintenance shop.

Table 4. Status of *Guiding Principles* to Protect and Conserve Water, LLRS

Guiding Principles	LLRS' Status
Stormwater Management Employ strategies that reduce storm water runoff and discharges of polluted water offsite. Per the Energy Independence and Security Act (EISA) Section 438, where redevelopment affects site hydrology, use site planning, design, construction, and maintenance strategies to maintain hydrologic conditions during development, or to restore hydrologic conditions following development, to the maximum extent that is technically feasible.	Stormwater is collected through storm drain inlets to a storm sewer collection system. A recent dye test indicated that the storm sewer system may actually be tied to the municipal wastewater collection system, even though the sewers in Grosse Ile were separated many years ago (LLRS may have been overlooked). A sustainable landscaping plan was drafted, and LLRS plans to ensure sustainable stormwater management strategies are incorporated in the plan in future iterations. The current draft of the plan focuses on plant selection, though one small rain garden is present.
Process Water Per EPAct 2005 Section 109, when potable water is used to improve a building's energy efficiency, deploy lifecycle cost effective water conservation measures.	LLRS does not use potable water to improve its energy efficiency at the expense of water efficiency.
Water-Efficient Products Where available, use EPA's WaterSense labeled products or other water conserving products. Choose irrigation contractors who are certified through a WaterSense labeled program.	One men's bathroom was recently renovated and fixtures were replaced with a 2.2 gpm faucet, two 1.0 gpf urinals, and a 1.6 gpf toilet. In addition, the other bathrooms were retrofitted with 3.5 gpf diaphragms for toilets and 1.5 gpf diaphragms for urinals. While these fixtures reduced bathroom water consumption, more water-efficient options are available. The rest of the facility's faucets are either 1.5 gpm or 2.0 gpm models Following the July 2011 water assessment, the facilities manager indicated that 0.5 gpm aerators were installed on all lavatory faucets.

10.0 OPPORTUNITIES FOR FURTHER WATER CONSERVATION

LLRS is pursuing the following projects to achieve additional reductions in water use:

1) **Install 0.5 gpm aerators on lavatory faucets.** In August 2011, LLRS installed 0.5 gpm faucet aerators on all six of the faucet fixtures previously flowing between 1.5 and 2.2 gpm. This project should result in approximately 9,900 gallons of water savings per year.

2) **Replace old, high-flush-volume toilets with dual-flush models.** LLRS will consider replacing all four of its toilets with flush volumes of 3.5 gpf with fixtures that have dual-flush handles flushing at 1.6 gpf or 1.1 gpf. Replacing the four higher-flushing toilets would cost approximately $6,500 and could save approximately 33,000 gallons of water and $300 per year, for a simple payback period of approximately 23 years.

3) **Replace urinals with high-efficiency models.** LLRS will consider replacing all four urinals with urinals that use 0.125 gpf. Replacing the fixtures will cost approximately $6,500 and could save approximately 13,000 gallons of water and $100 per year, for a simple payback period of approximately 59 years.

4) **Continue working to evaluate a rainwater reuse project.** LLRS is working with an architectural engineer to evaluate options to improve its stormwater management. This project may include collecting rainwater, which would allow the option to reuse it for irrigation. LLRS will continue working to evaluate this project and will consider implementing it if it is cost-effective.

5) **Work with the Township of Grosse Ile Department of Public Services to ensure that a new low flow meter is installed in the main building**. In FY 2011, the low-flow water meter stopped reading. Since correct data is vital to understanding facility water use, LLRS worked with the Township of Grosse Ile Department of Public Services to get a new meter installed in October 2011.