CMAP

Evanston Water Conservation and Efficiency Plan

EPA WaterSense PARTNER

June 2012

The front cover image is from Mary Castellini, a 3rd grader at Martin Luther King Lab School in Evanston. Mary was the winner of Evanston's 2012 Drinking Water Week Coloring Contest held in association with American Water Works Association's annual National Drinking Water Week from May 6th through May 12th.

Back cover images courtesy of the City of Evanston. Illustration by third grader from McGaw YMCA, as part of Evanston 2012 National Drinking Water Week Coloring Contest.

The Chicago Metropolitan Agency for Planning (CMAP) is the region's official comprehensive planning organization. Its GO TO 2040 planning campaign is helping the region's seven counties and 284 communities to implement strategies that address transportation, housing, economic development, open space, the environment, and other quality of life issues.

See **www.cmap.illinois.gov** for more information.

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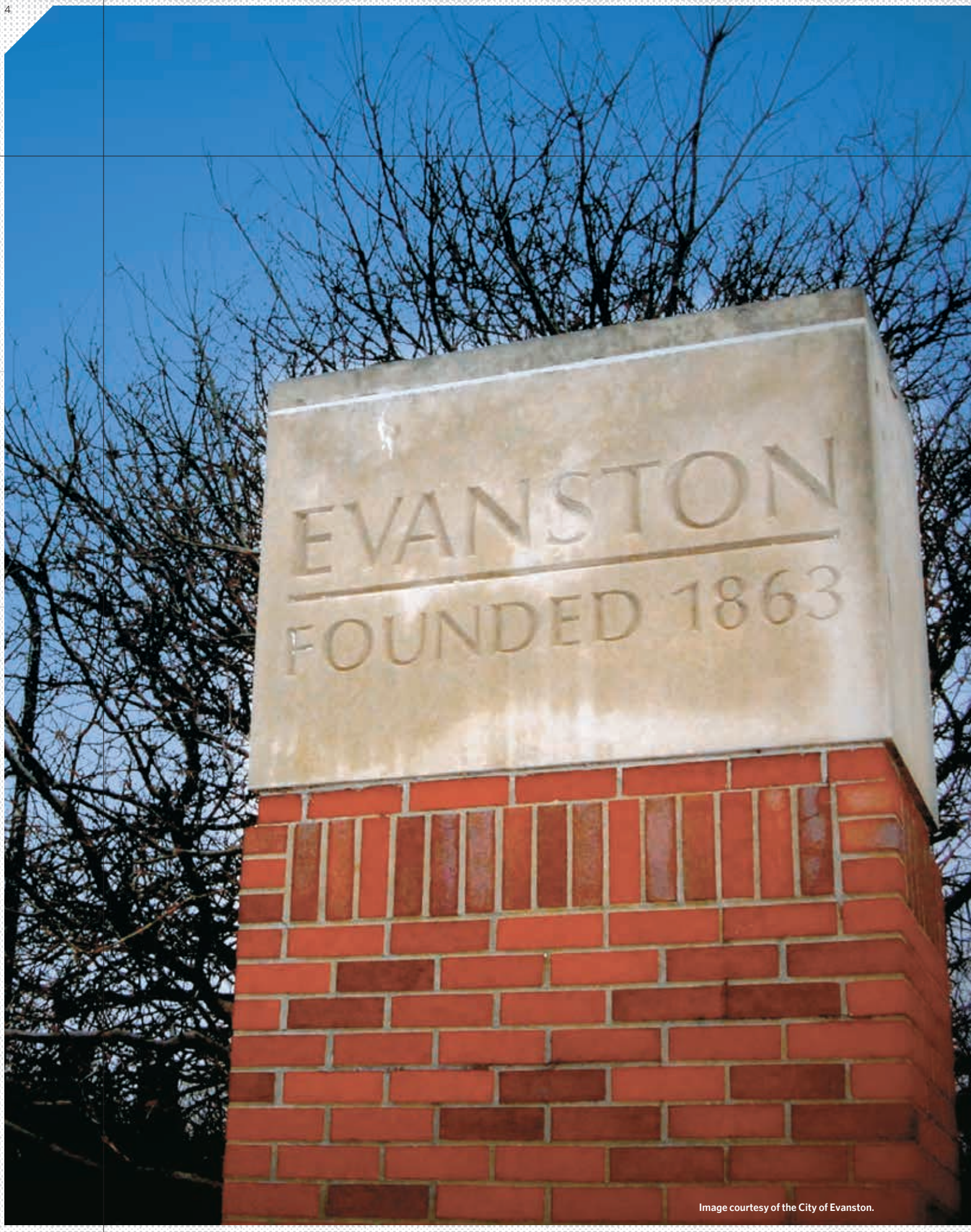


Image courtesy of the City of Evanston.

Section 1: Introduction and Background

In May 2011, the City of Evanston was awarded a staff assistance grant through the Chicago Metropolitan Agency for Planning (CMAP)'s Local Technical Assistance (LTA) Program to create a water conservation and efficiency plan. The development and production of this document is funded through a U.S. Department of Housing and Urban Development (HUD) Sustainable Communities Regional Planning grant, which supports CMAP's LTA program. The purpose of this plan is to develop an action-based framework that pursues conservation and efficiency measures while engaging the city's stakeholders about the importance and value of water.

About Water Conservation and Efficiency

The terms water conservation and water efficiency are often used interchangeably.[1] While both terms refer to reducing water use, there are slight distinctions between their respective definitions. Water conservation is defined as "any beneficial reduction in water loss, waste, or use."[2] Conservation includes both behavioral changes (turning the faucet off during teeth brushing) and hardware/process advances (leak detection). Water efficiency specifically addresses those hardware/process advances and is defined as the "accomplishment of a function, task, process, or result with the minimal amount of water feasible."[3] A high-efficiency toilet is a commonly used example of water efficiency as it performs the same task with less water without changing the quality of use. As technology continues to improve in the water industry, water efficiency opportunities both at the utility level (supply side) and the customer level (demand side) continue to grow.

Water conservation and efficiency are achieved from the implementation of water conservation and efficiency measures. Measures can be defined as an action, behavioral change, device, technology, or improved design or process. This plan includes both water conservation and efficiency measures.

1 Demand management may also be used.

2 Amy Vickers, 2001. *Handbook of Water Use and Conservation.* Amherst, MA: WaterPlow Press.

3 Ibid.

Why Water Conservation and Efficiency are Important in Evanston

The concepts and strategies associated with water conservation and efficiency complement the existing culture of Evanston, previous planning efforts, and possible future economic opportunities for the city. Evanston has a long standing commitment to sustainability. This is officially recognized through the Office of Sustainability, which was established in 2007 to work with City departments, residents, businesses, and regional, state, and national partners to develop policies and implement initiatives that strengthen the environmental and economic sustainability of Evanston. Furthermore, the City's Strategic Plan identified environmental sustainability as one of the three guiding values for Evanston along with economic viability and strengthening community.[4] This commitment is also demonstrated through local volunteers who actively contribute to the City's sustainable initiatives.

This Plan is an extension of Evanston's Climate Action Plan which was unanimously adopted in November 2008 by the City Council.[5] The Climate Action Plan calls for achieving a 13-percent reduction in greenhouse gas (GHG) emissions by 2012 and outlines over 200 strategies including water-related strategies to reach this goal. The following two Climate Action Plan strategies are incorporated in this planning process:

- Implement policies and practices that treat rainwater as a precious resource and make use of it where it falls.
- Optimize the use of native plants throughout Evanston.

At the regional level, this Plan is in line with two separate but complementary planning processes, GO TO 2040[6] and Water 2050.[7] Both plans were completed in 2010, led by CMAP, and recommend water conservation and efficiency measures at the municipal and utility level.

At the national level, Illinois is a party to the Great Lakes — St. Lawrence River Basin Water Resources Compact (Compact), a binding agreement between the eight Great Lakes states to protect, conserve, restore, improve, and manage the renewable but finite water resources of the Great Lakes Basin for the use, benefit, and enjoyment of all basin citizens.[8] The Compact became law on December 8, 2008. While Illinois is largely exempt from the Compact, pursuant to the U.S. Supreme Court Consent Decree that governs the Illinois diversion of Lake Michigan water, the State is obligated to comply with the Compact's water conservation and efficiency programs provision outlined in Section 4.2. This section obligates the Compact parties to promote "Environmentally Sound and Economically Feasible Water Conservation Measures." This includes any measures that promote the efficient use of water, application of sound planning principles, and demand-side and supply-side measures or incentives.[9] Evanston's Plan, therefore, seeks to be in line with the provisions of the Compact and could serve as a model for other Illinois communities and the State of Illinois itself.

Evanston's direct access to Lake Michigan and local treatment plant are community assets. Sustainable water use is fundamentally about recognizing the value of water in all its varying uses. Water for essential uses (drinking, sanitation) has a different value to society than water used for non-essential uses, such as lawn watering. Similarly, water used for revenue generating opportunities has yet other benefits. Implementing water efficiency strategies will potentially decrease Evanston's overall water demand, allowing for that conserved water to become a potential revenue generating opportunity for the city. Evanston already wholesales water to Skokie and the Northwest Water Commission and this service area could be expanded. Expanding the current service area allows for the sharing of costly capital infrastructure across the larger customer base. However, factors such as project feasibility and environmental impacts among others will need to be evaluated long before such expansions would occur.

4 City of Evanston. "Strategic Plan." **http://www.cityofevanston.org/government/strategic-plan/**.

5 City of Evanston. "Evanston Climate Action Plan." November 2008. **http://www.cityofevanston.org/pdf/ECAP.pdf**.

6 Chicago Metropolitan Agency for Planning."GO TO 2040." **http://www.cmap.illinois.gov/2040/main**.

7 Chicago Metropolitan Agency for Planning. "Water 2050." **http://www.cmap.illinois.gov/water-2050**.

8 The Council of Great Lakes Governors. "Great Lakes — St. Lawrence River Basin Water Resources Compact." December 13, 2005. See **http://www.cglg.org/projects/water/docs/12-13-05/Great_Lakes-St_Lawrence_River_Basin_Water_Resources_Compact.pdf**.

9 Measures are defined in the Great Lakes Compact as any legislation, law, regulation, directive, requirement, guideline, program, policy, administrative practice, or other procedure.

Water Conservation and Efficiency Planning

A water conservation and efficiency plan is a guiding document for a community's water conservation efforts and actions. Typically a planning process follows well-established basic steps such as those outlined by the American Water Works Association's (AWWA) Water Conservation Programs-A Planning Manual (M52)[10] or U.S. Environmental Protection Agency (U.S. EPA)'s Water Conservation Plan Guidelines.[11] Plans can be as detailed or basic as resources and data are available. However most plans to some degree include the following elements:

- ***Planning Goals*** - desired outcome of plan implementation; usually includes a water savings goal.
- ***Water Utility Profile*** - basic statistics about water use, water loss, population served, and maintenance practices.
- ***Demand Forecast*** - estimate for future water demand for the service area.
- ***Identification and Evaluation of Water Conservation and Efficiency Measures*** - selection of specific actions that will help achieve established goals.[12]
- ***Implementation Strategy*** - the creation of a timeline to implement selected measures.

The Plan's Goals

As a first step, goals were developed to guide the planning process to ensure the protection of Evanston's water source, Lake Michigan, and to increase the sustainability of Evanston's water use over time. Each goal will be supported by a set of measures or related actions in the Plan with the purpose of goal achievement.

1. Reduce water consumption by 6 percent by 2020.[13]
2. Adopt cost-effective and community appropriate conservation and efficiency measures.
3. Continuously inform residents and businesses about the value of tap water and the connection between water usage, household behaviors, and business water-related decisions.
4. Adopt municipal ordinances that support the Plan.

10 American Water Works Association. "Water Conservation Programs - A Planning Program, M52." 2006. **http://apps.awwa.org/ebusmain/OnlineStore/ProductDetail.aspx?ProductId=6740**.

11 United States Environmental Protection Agency. "Water Conservation Plan Guidelines." 1998. **http://www.epa.gov/watersense/pubs/guide.html**.

12 Cost effectiveness of measures should be considered.

13 Based on 2010 total annual pumpage of 2,566 million gallons. This is in addition to the water reduction goal in Evanston's Climate Action Plan- Reduce amount of water used by 15% below 2000 water consumption levels by 2015. (Goal of Greenest Region Compact, approved by City Council, 1/28/08), which has already been achieved at the time of this planning process. Calculation details found on page 42.

Image courtesy of the City of Evanston.

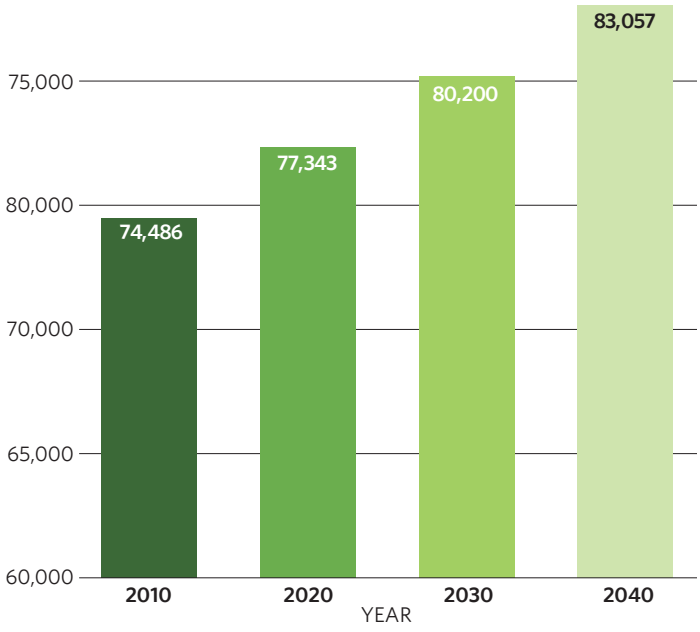
Section 2: Utility Profile

After developing Plan goals, the next step is to understand the current conditions of Evanston's Utility to identify opportunities for water savings. Extensive information about the City's Utility exists in Evanston's Water and Sewer Division's 2010 Annual Report.[14] This section of the Plan will only highlight basic information and other pertinent details to support plan recommendations. Future water demand forecasting is also addressed in this section.

Demographics

The City of Evanston is located in northern Cook County, Illinois bordered by Chicago to the south, Skokie to the west, and Wilmette to the north. The city encompasses 7.8 square miles and has a current population of 74,486 (2010), with an expected 10-percent increase to 83,057 by 2040 (Figure 1).[15]

Figure 1. Evanston population forecast



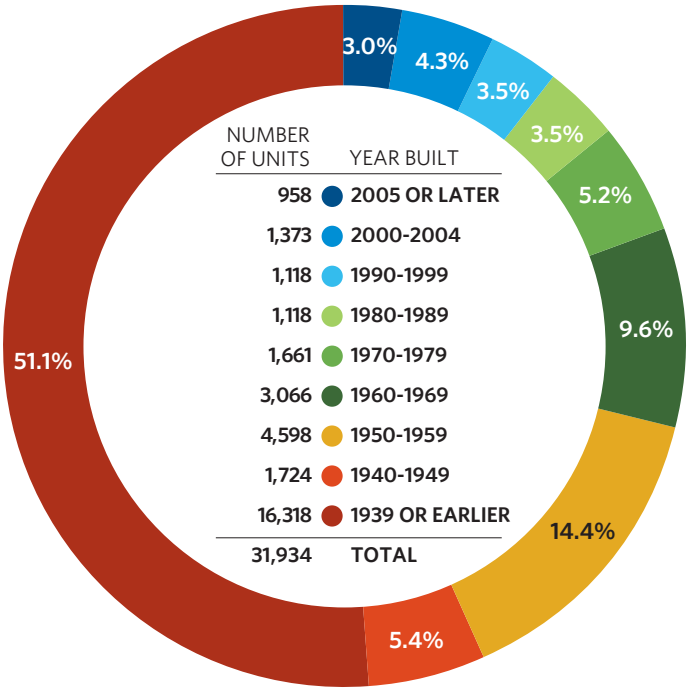
Source: Chicago Metropolitan Agency for Planning, U.S. Census 2010.

14 City of Evanston. "Plans, Reports & Brochures." http://www.cityofevanston.org/utilities/plans-reports-brochures/.

15 Census 2010. "Evanston Demographic Profile." http://2010.census.gov/2010census/ and Chicago Metropolitan Agency for Planning. "Population Forecast (2040)." http://www.cmap.illinois.gov/population-forecast.

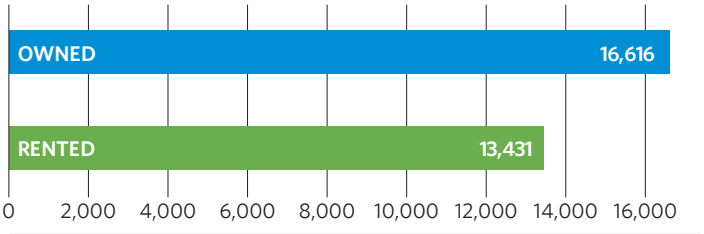
Evanston has 31,934 housing units. The majority of Evanston's housing units were built in 1939 or earlier (Figure 2).[16] Older homes generally have older fixtures such as dishwashers, toilets, and faucets. While renovations and updates to these units are fairly common, older fixtures may still be in place in some units. Older fixtures use more water than newer more efficient fixtures. Furthermore, the majority of housing units in Evanston are owner-occupied (Figure 3).[17] Ownership can provide more of an incentive to save water because utility bills are paid by the owner. This combination of older housing units and majority ownership provides an opportunity for the city to encourage homeowners and property owners to update their fixtures. Lastly, there are considerably more multifamily units than single family units in the city (Figure 4).[18] This statistic is important as it implies the amount of outdoor space and therefore outdoor watering that is likely to occur.[19] Understanding Evanston's demographic data can assist in the targeting of appropriate information and outreach efforts and establishing effective recommendations.

Figure 2. Evanston structure age



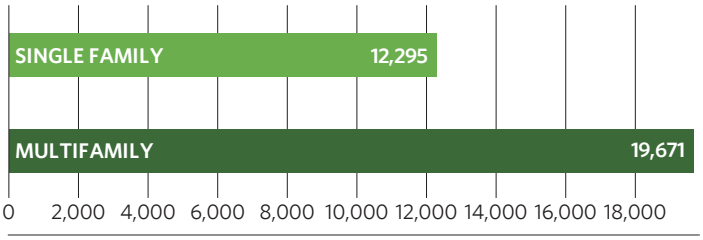
Source: U.S. Census Bureau, 2010 Census.

Figure 3. Evanston housing status, number of units



Source: U.S. Census Bureau, 2010 Census.

Figure 4. Evanston housing types, number of units



Source: U.S. Census Bureau, 2010 Census.

16 Census 2010. "American Community Survey 1 Year: CP04: Selected Housing." http://2010.census.gov/2010census/.

17 Census 2010. . "American Community Survey 1 Year: CP04: Selected Housing." http://2010.census.gov/2010census/. This represents the number of occupied units, approximately 87.4% of the total number of housing units in the city.

18 Ibid.

19 Assuming that multifamily units have less outdoor space per unit than single family homes.

Water Supply

Evanston draws directly on Lake Michigan for its municipal water supply. The City also wholesales water to five nearby communities: Skokie, Arlington Heights, Buffalo Grove, Palatine, and Wheeling (Figure 5). Arlington Heights, Buffalo Grove, Palatine, and Wheeling are collectively members of the Northwest Water Commission. Evanston provides water for 54.3 square miles of land and approximately 362,072 people (Table 1).[20] All communities that use Lake Michigan water are required to obtain a permit from the Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR). Each permittee receives a designated annual water allocation that is reviewed and updated periodically with the last iteration occurring in October 2007. For 2010, Evanston is currently allocated 9.344 million gallons a day (MGD), although the city currently uses about 80 percent of this allocation. Evanston's allocation increases slightly each year and is set until 2030.[21]

Additionally, each permittee must comply with several conditions of permit. While there is no requirement for permittees to submit a conservation and efficiency plan, IDNR does require several conservation practices such as metering new construction and restricting lawn watering. Permittees also must limit water loss to eight percent or less based on net annual pumpage and must provide an annual report of water loss to IDNR, known as the LMO-2 Form.[22] Evanston currently adheres to all of the conditions of permit and is going beyond those conditions to develop this conservation and efficiency plan that will serve as a model for other municipalities in the region.[23]

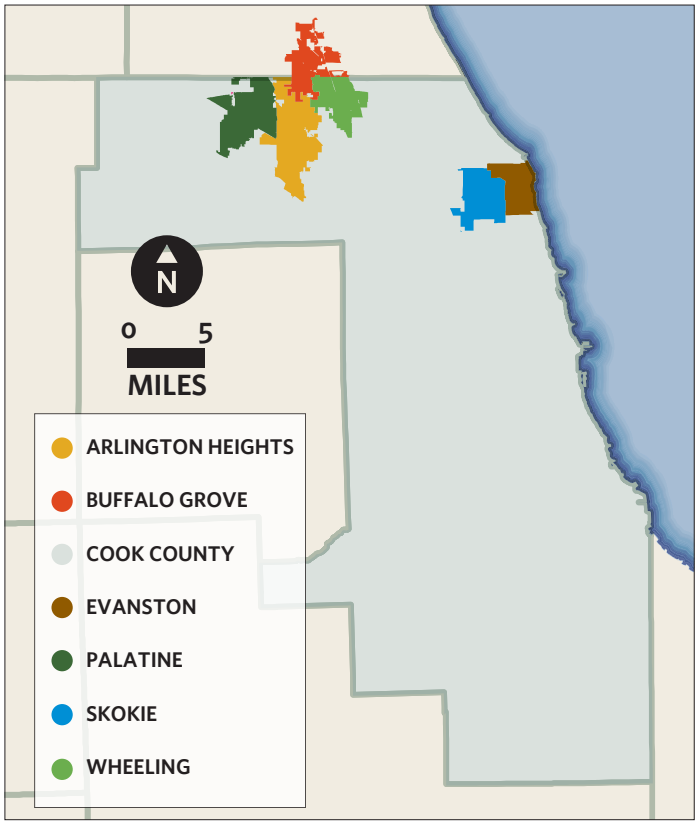
The Illinois diversion of Lake Michigan, although managed by IDNR, is governed by a U.S. Supreme Court Consent Decree as previously noted.[24] The Illinois diversion is limited to 3,200 cubic feet/second (cfs) as measured over a forty-year accounting period. This amount is roughly equivalent to 2.1 billion gallons of water per day.[25] This means that although Evanston has received an allocation for Lake Michigan water until 2030, Illinois's overall diversion of Lake Michigan water is limited and is shared among approximately 200 permittees including 160+ other communities. In addition to domestic pumpage, other diversion accounting components include stormwater runoff, lockage, leakage, navigation-makeup water, and discretionary diversion.[26]

Table 1. Evanston and wholesale customer service area and population

	AREA (SQUARE MILES)	2010 PERSON
Evanston	**7.8**	**74,486**
Skokie	**10.5**	**64,784**
NORTHWEST WATER COMMISSION		
Arlington Heights	**15.0**	**75,101**
Buffalo Grove	**4.5**	**41,496**
Palatine	**9.0**	**68,557**
Wheeling	**7.5**	**37,648**
Total served	**54.3**	**362,072**

Source: City of Evanston, U.S. Census Bureau 2010 Census.

Figure 5. Evanston and wholesale customer service area



Source: Chicago Metropolitan Agency for Planning.

20 City of Evanston, Water and Sewer Division. "2010 Annual Report." http://www.cityofevanston.org/utilities/plans_reports_brochures/2010%20Annual%20Report-revised.pdf.

21 Illinois Department of National Resources. "Lake Michigan Water Allocation." http://dnr.state.il.us/owr/LakeMichiganWaterAllocation.htm.

22 Illinois Department of Natural Resources. "2011 Annual Water Use Audit Form (LMO-2)." http://dnr.state.il.us/owr/Publications/LakeMichiganO-2Form_2011.pdf.

23 For a complete list of IDNR conditions of permit see 17 ILAC Ch. 1, Subch. H, Sec. 3730. http://www.dnr.illinois.gov/adrules/documents/17-3730.pdf.

24 Wisconsin v. Illinois, 388 U.S. 426 (1967); 449 U.S. 48 (1980).

25 Chicago Metropolitan Agency for Planning. "Water 2050." http://www.cmap.illinois.gov/water-2050.

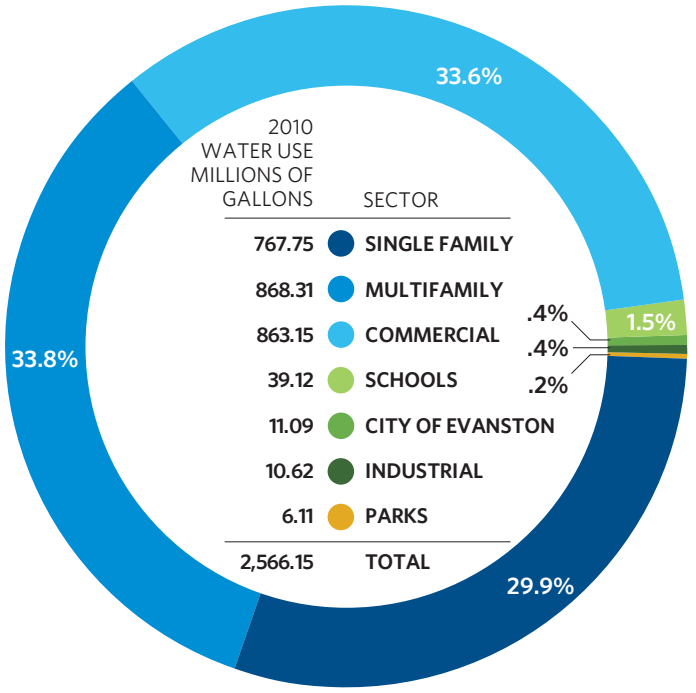
26 Stormwater leaving the Lake Michigan basin is counted against the set limit of 3,200 cubic feet per second along with the other uses.

Water Pumpage and Use

In 2010, Evanston pumped 14,202 million gallons from Lake Michigan or on average 39 million gallons a day. The majority of this annual water pumpage, nearly 59 percent (8,472 million gallons) was delivered to the Northwest Water Commission. Skokie received 22 percent (3,094 million gallons) and the City of Evanston used 19 percent (2,628 million gallons). Evanston's 2010 average day pumpage was 7.202 MGD. That's 97 gallons a day for every person that lives in Evanston! However, water use in Evanston and its wholesale customers overall has decreased from 2003-2010 (Table 2).[27]

Within the city, water is distributed to customers categorized by six sectors: Single Family, Multifamily, Commercial, Industrial, City of Evanston, Parks, and Schools (Figure 6). The residential sectors make up the majority of 2010 water use by volume, representing 63.8 percent of total water use, followed by Commercial (33.6 percent), Schools (1.5 percent), Industrial sector (0.4 percent), City of Evanston (0.4 percent) and Parks (0.2 percent) usage. There are 14,348 water accounts in the city that are shared among these sectors.

Figure 6. Water use by sector



Source: City of Evanston.

Table 2. Average daily per capita water use

	EVANSTON		SKOKIE		NORTHWEST WATER COMMISSION	
YEAR	POPULATION	GALLONS PER CAPITA USE	POPULATION	GALLONS PER CAPITA USE	POPULATION	GALLONS PER CAPITA USE
2003	**73,421**	**128**	**63,126**	**157**	**221,643**	**112**
2004	**74,360**	**118**	**63,633**	**145**	**221,364**	**111**
2005	**74,360**	**122**	**63,633**	**153**	**221,364**	**120**
2006	**74,360**	**106**	**63,633**	**143**	**221,364**	**110**
2007	**74,360**	**115**	**63,633**	**153**	**221,364**	**111**
2008	**74,360**	**114**	**63,633**	**128**	**221,364**	**106**
2009	**74,360**	**110**	**63,633**	**122**	**221,364**	**104**
2010	**74,486**	**97**	**64,784**	**131**	**222,802**	**104**

Source: City of Evanston.

27 City of Evanston, Water and Sewer Division. "2010 Annual Report." http://www.cityofevanston.org/utilities/plans-reports-brochures/.

Non-Revenue Water and Water Loss

The difference between the amount of water pumped from Lake Michigan in 2010 in Evanston — 2,628 million gallons and the amount of water billed to customers in 2010 in Evanston — 2,566 million gallons is often referred to as non-revenue water.[28] For 2010, Evanston assumes approximately 62 million gallons in non-revenue water or around 2 percent of the total water pumped. Non-revenue water includes water that is authorized to be used but not billed, water that is "lost" in the water system through real losses such as leaks, and water that is "lost" from apparent losses such as unauthorized consumption, metering inaccuracies, and billing errors. Some water loss is expected in all systems regardless of size and age; however, minimizing these water losses is an important part of sustainable water management. Evanston's water loss from real and apparent losses varies from year to year and generally oscillates between 2 percent and 7 percent.

Water Rates

The City of Evanston's water rate includes a minimum base charge dependent on meter size and a uniform volumetric rate for all sectors after the base charge and initial usage (first 500 cubic feet of water) have been met.[29] A uniform volumetric rate charges a standard rate ($/100 cubic feet of water) regardless of total water use.[30] Evanston's current water rate as of January 1, 2012, is $1.75 per 100 cubic feet or $2.34 per 1,000 gallons. This is a 5-percent increase from the 2011 water rate of $1.67 per 100 cubic feet or $2.23 per 1,000 gallons.[31] The rate in 2010 was $1.52 per 100 cubic feet or $2.03 per 1,000 gallons. If recent historical trends in water rates continue, conservation and efficiency can help Evanston's customers manage their water bill. Wholesale customer rates vary depending on the contractual agreement and several other factors that are incorporated into the final rate.

Evanston currently recovers day to day operating and maintenance costs and a portion (approximately half) of the capital costs through the rate structure. Ideally all utility costs would be recovered through the water rates. However this is not currently the case in Evanston. For example, the City is currently using bonds to pay for the capital program (infrastructure upgrades). Additionally $3.1 million is transferred out of the City's water fund to the City general fund for services and return on investment. Incorporating full cost pricing principles can help move the Utility toward self-sufficiency and accurately defining the true cost of providing water service to customers. Full cost pricing is discussed in further detail in Section 6.

28 Terminology references the American Water Works Association (AWWA) Water Audit Method. **http://www.awwa.org/Resources/WaterLossControl.cfm?ItemNumber=48055&navItemNumber=48162**.

29 This is categorized as a flat rate in the Illinois Department of Natural Resources Lake Michigan Water Rate Survey in 2005.

30 One cubic foot of water equals approximately 7.48 gallons.

31 City of Evanston. "Water Rates." **http://www.cityofevanston.org/utilities/rates/**.

Treatment and Water Quality

Raw water from Lake Michigan is pumped to the water treatment plant where it travels through a series of treatments.[32] The plant uses conventional sand filtration using alum with gas chlorine as a disinfectant to ensure the high quality of Evanston's water supply.[33]

Water quality is tested on a daily basis and the City is required[34] to produce an annual water quality report (Consumer Confidence Report) as well as notify customers of violations on contaminants found in drinking water. These requirements are a result of the passage of the Safe Drinking Water Act that was approved by Congress in 1974 to "protect public health by regulating the nation's public drinking water supply and protecting sources of drinking water."[35] Evanston's water is currently within all of the U.S. EPA's guidelines for water quality and has no violations to report.[36]

In addition to regulated testing of drinking water, many utilities have started testing for unregulated chemicals and compounds. Many of these unregulated chemicals and compounds have historically not been tested for and are now capable of being detected at low concentrations. These chemicals and compounds have become known as contaminants of emerging concern (CECs) or emerging contaminants because the risk to human health and the environment associated with their presence, frequency of occurrence, or source may not be known.[37] One sector of CECs is Pharmaceuticals and Personal Care Products (PPCPs), which include prescription drugs, fragrances, and lotions. When people ingest medicines and apply lotions, some chemicals in these products are not fully absorbed in the body. Instead they are washed or flushed away to the local water supply source or downstream to another municipality's water supply source. Currently Evanston participates in the Solid Waste Agency of Northern Cook County's Pharmaceutical/Sharps Disposal Program[38] by providing a drop-off location at the Evanston Civic Center. Drop-off locations allow residents to properly dispose of pharmaceuticals to ensure that they are not introduced into the water sources. The City also hosted a RX Take-Back Day on April 28, 2012 in association with Peer Services.[39]

Furthermore, providing a drop-off location allows residents to properly dispose of some Endocrine Disrupting Chemicals (EDCs) like pesticides, natural chemicals found in plants, pharmaceuticals, and hormones that are excreted in animal and human waste. EDCs are being researched to better understand the potential health effects in human and wildlife populations.[40] For example, landscaping and agricultural products can runoff from their intended location into local rivers and lakes that provide wildlife habitat and in some cases, the local water supply.

In response to the growing interest and awareness of contaminants of emerging concern, Evanston voluntarily tests Lake Michigan water for 67 of these compounds[41] and chemicals with the results reported in parts-per-billon (pbb).[42] However unregulated compounds and chemicals do not have established water quality standards to meet or exceed and therefore testing simply confirms their presence or absence at this time. Emerging contaminants are being detected throughout the nation's waterbodies and research needs to continue to fully understand the effects of these compounds and chemicals on humans and the natural environment.

Filtration system. Image courtesy of the City of Evanston.

32 City of Evanston. "Treatment Process." http://www.cityofevanston.org/utilities/water-division/treatment-process/.

33 City of Evanston. "Filtration." http://www.cityofevanston.org/utilities/water-division/filtration/.

34 United States Environmental Protection Agency, Office of Water. "Water on Tap-what you need to know." December 2009. http://www.epa.gov/ogwdw/wot/pdfs/book_waterontap_full.pdf.

35 Ibid.

36 For more information access the City of Evanston's 2010 Water Quality Report. http://www.cityofevanston.org/assets/2010%20Evanston%20Water%20Quality%20Report.pdf.

37 United States Environmental Protection Agency. "Contaminants of Emerging Concern." http://water.epa.gov/scitech/cec/.

38 Solid Waste Agency of Northern Cook County. "Pharmaceutical/Sharps Disposal." http://www.swancc.org/index.php/programs/pharmaceuticalsharps-disposal.

39 City of Evanston. "RX Take-back Day Set for April 28." http://www.cityofevanston.org/news/2012/04/rx-take-back-day-set-for-april-28/.

40 Some contaminants may be both a PPCP and EDCs. For more information: http://www.epa.gov/ncer/science/endocrine/ and http://www.epa.gov/ppcp/.

41 Including Total Chromium which is tested on a quarterly basis. City of Evanston. "Chromium Testing." http://www.cityofevanston.org/utilities/water-division/chromium-test-results/.

42 City of Evanston. "2010 Water Quality Report." http://www.cityofevanston.org/assets/2010%20Evanston%20Water%20Quality%20Report.pdf.

Wastewater and Stormwater

Stormwater drain. Courtesy of the City of Evanston.

After water has been used by businesses, residents, and the City, it becomes wastewater. Stormwater is water that is released through precipitation events. Both wastewater and stormwater must be managed. In Evanston, the majority of both wastewater and stormwater are managed together in a combined sewer system.[43] In most cases, Evanston's wastewater and stormwater flow through the combined sewer system to the Metropolitan Water Reclamation District (MWRD) of Greater Chicago's interceptors where it is treated at the North Side Water Reclamation Plant and then released to the North Shore Channel.[44] The water then flows through the Chicago Area Waterways System and on through the Des Plaines, Illinois, and Mississippi Rivers to the Gulf of Mexico.

Especially in wet weather, combined sewer systems are vulnerable to sewer overflows which happen when the amount of water in the system exceeds capacity. This is often the cause for sewage backups in basements.[45] To minimize sewer overflows, Evanston has developed a Long Range Sewer Improvement Program that was constructed between 1991 and 2008 with a cost of approximately $210 million dollars to complete. The Program includes the installation of a larger diameter relief combined sewer system that is designed to carry additional stormwater and overflows from the main combined sewer system, the installation of flow restrictions in alley and street drainage inlets to slow down flows from moderate and extreme rainfall events, and a few separate storm sewers to address specific areas.[46] As a result of these improvements, Evanston's stormwater and wastewater systems are functional and equip to handle most circumstances.

There is a direct connection between water use and wastewater. Reductions in water use lead to reductions in wastewater as well. Therefore, the implementation of this plan will reduce the volume of wastewater that is being released into Evanston's combined sewer system. Ideally water supply, wastewater, and stormwater systems should be addressed and managed as an integrated water system realizing that changes to one system affect all three systems.

43 City of Evanston. "Sewer Systems." http://www.cityofevanston.org/utilities/sewer-division/sewer-systems/.

44 Metropolitan Water Reclamation District of Greater Chicago. http://www.mwrd.org/irj/portal/anonymous/Home.

45 It should be noted that sewer backups may happen for a variety of reasons including root blockages, water line breaks, and power failures; only one potential reason is discussed here.

46 City of Evanston. "Sewer Systems." http://www.cityofevanston.org/utilities/sewer-division/sewer-systems/.

Infrastructure and Maintenance

Water infrastructure is a term that describes all of the pipes, meters, pumps, treatment equipment, and valves that are necessary to deliver water to customers. Unseen and forgotten by the average person, maintaining water infrastructure is critical to providing safe clean drinking water and for ensuring sustainable use of a community's water supply.[47] As infrastructure ages, a system is increasingly prone to main (pipe) breaks and leaks as well as loss of efficiency from deteriorating equipment.

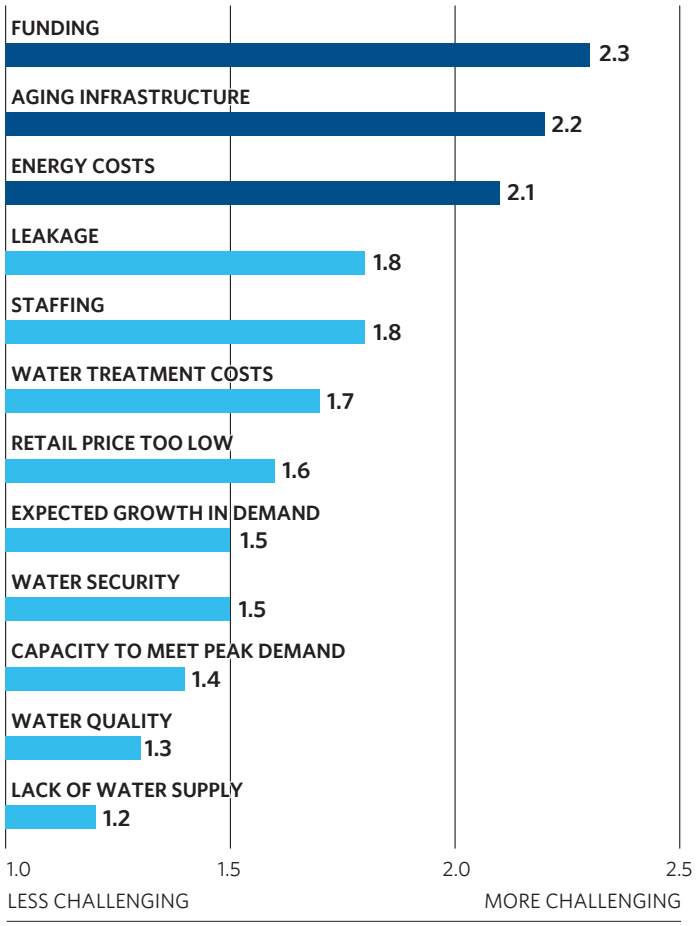
Aging infrastructure is now becoming a national issue. In 2002 the U.S. EPA released a report titled *Clean Water and Drinking Water Gap Analysis*, which describes the anticipated funding gap over the next 20 years between the infrastructure needs of water and wastewater utilities and the current rate of funding such improvements. It is estimated that there will be a $122 billion gap for clean water (wastewater) capital costs and $102 billion for drinking water (water supply) capital costs. Larger gaps were estimated for operating and maintenance needs amounting to $148 billion for clean water and $161 billion for drinking water. Overall this report identifies a $500 billion dollar funding gap for water and wastewater infrastructure. To close these gaps, funding and investment will need to drastically increase over the next 20 years.[48]

In 2012 the American Water Works Association (AWWA) released a similar report, *Buried No Longer: Confronting America's Water Infrastructure Challenge*, that estimates more than $1 trillion investment in drinking water infrastructure is needed between now and 2035. The report states that this funding is likely to come from higher water bills and local fees and urges the need for infrastructure investments to happen sooner than later to avoid additional costs and increased likelihood of water main breaks and other infrastructure failures. The effects of utility size and regional location on infrastructure issues is also discussed.

Furthermore, the American Society of Civil Engineers (ASCE) provides periodic report cards on our nation's water, transportation, public facilities, and energy infrastructure. In the 2009 report card, ASCE graded our nation's drinking water infrastructure at a D- and has identified an annual shortfall of at least $11 billion that is needed to replace aging infrastructure and to fully comply with existing and future federal water regulations.[49]

Within our 11-county northeastern Illinois region, water utilities ranked funding, aging infrastructure, and energy costs as their top three challenges (Figure 7).[50] Funding and aging infrastructure are directly related as funding as demonstrated by the above reports. With such a magnitude of infrastructure needs facing the country, the importance of evaluating and maintaining current infrastructure at the local level is imperative. The following paragraphs provide such detail about Evanston's infrastructure.

Figure 7. Northeastern Illinois utility challenge ratings



Source: CMAP utility survey, 2008.

47 United States Environmental Protection Agency. "Water Distribution Systems." http://www.epa.gov/awi/distributionsys.html.

48 United States Environmental Protection Agency. "U.S. Water Infrastructure Needs & Funding Gap." http://water.epa.gov/infrastructure/sustain/infrastructureneeds.cfm.

49 American Society of Civil Engineers. "Infrastructure Report Card," 2009. http://www.infrastructurereportcard.org/fact-sheet/drinking-water.

50 CMAP. "2008 Survey of Water Utilities." http://www.cmap.illinois.gov/water-2050.

51 City of Evanston. "Meter." http://www.cityofevanston.org/utilities/water-division/meter/.

Images courtesy of the City of Evanston.

Water main repair.

Pipes

Evanston's water system contains 158 miles of water main or principal pipes that carry water. Evanston replaces water mains on average about one and half miles per year. Regular replacements are necessary to decrease the frequency and volume of leakage as well as decrease water main breaks. Breaks cause water loss and sometimes property damage. Age and composition of pipes are important to consider when replacing water mains and can contribute to prioritizing repair schedules. Evanston's pipes are a mix of cast iron and ductile iron, depending on the year of installation with a very small amount of Polyvinyl chloride or PVC. It is common to have various ages and compositions of pipe in one system due to repair schedules, pipes replacements, and system expansions. The majority of Evanston's pipes (91 miles) are 81 years old or older. Additionally, the City replaces approximately 20 valves and 20 fire hydrants per year. As of 2010, there are 1,412 publicly owned hydrants in the city, and 955 of them are over 20 years old.

High lift pumps.

Pumps

Evanston's water system contains both low lift and high lift pumps. Low lift pumps are used to pump raw Lake Michigan water into the treatment facilities. High lift pumps are used to pump the treated finished water through the distribution system. These pumps have a capacity of 147 million gallons per day. Additionally booster pumps are used throughout the system to maintain water pressure. Evanston operates and maintains four booster pumping stations with seven booster pumps. Pumps must be maintained and repaired on a regular basis.

Residential meter.

Meters

Evanston's 14,348 water accounts are 100-percent metered.[51] The bulk of these meters are connected to a radio transmission device (MTU) that transmits meter readings twice a day. These reads are sent to various data collectors located throughout the city. The data is then transferred to the Evanston Water Department and aggregated for billing purposes. It is important for a water system to be fully metered so that water use may be tracked. Meters also need to be accurate so that the amount of water that is accounted for is as close as possible to real use. Meters not only act as cash registers for the Utility by ensuring that the amount of water being used is paid for but also act as an efficiency tracking tool to help identify problem areas within the system. In addition to customer meters, the utility also meters and monitors water movement within the system through the use of flow meters.

Storage and Expansion

Currently the City of Evanston has between 15 and 32 hours of water storage at any given time. The storage capacity will vary depending on the time of year (a factor of outdoor use) and the degree to which wholesalers are included. Improving system efficiency can extend storage capacity, which could be critical in emergency scenarios. Evanston is already aware of the need to plan for water emergencies. In 2009, the City collaborated with U.S. EPA Region 5 and Evanston's wholesale customers to participate in a Water Emergency Roundtable. The Roundtable participants discussed public-private sector interdependencies, water infrastructure and the potential impacts from loss of service, and identified actions and resources needed to respond to and recover from a water emergency.[52]

Evanston is currently operating at 35 percent (38 MGD) of total plant capacity (108 MGD). At this time, there are no plans to expand the Utility's infrastructure system.

Capital and Asset Management Plans

There will always be an ongoing need to maintain and upgrade water infrastructure, especially in older systems such as Evanston's. Proper maintenance and equipment upgrades require resources, which are often limited by budget availability. Therefore, the prioritization of infrastructure needs is necessary. Capital and asset management plans can assist a utility in identifying infrastructure needs and prioritizing those needs to the benefit of the utility.

A capital planning process can provide an understanding of local infrastructure, needed long-range improvements, cost estimates, and financing options. The capital plan will typically involve a master plan study, since the infrastructure needed will be dependent on community population growth, land use plans, and service area expansion.

When combined with proper accounting and budgeting, utilities can build necessary funds to address infrastructure investment needs so that good decisions can be made about investment in infrastructure. Estimated capital costs can also be used in rate setting to charge users the true costs of water infrastructure, thereby sending pricing signals to use water efficiently. Evanston currently has a capital improvement plan in place that is updated every five years.[53] This practice should continue.

An asset management plan is a complementary tool for effective capital planning. Asset management aims to minimize the total cost of acquiring, operating, maintaining, and renewing infrastructure. In an environment of limited financial resources, asset management planning helps systems extract the most value from each asset and helps to ensure adequate financial resources are available to rehabilitate and replace them when necessary. Evanston should consider the development of an asset management plan.

52 U.S. EPA, Water Security. "Evanston Water Emergency Roundtable," 2009. **http://water.epa.gov/infrastructure/watersecurity/upload/evanstonwateremergencyroundtablesep2009.pdf**.

53 City of Evanston. "Capital Improvement." **http://www.cityofevanston.org/planning-zoning/capital-improvement/**.

Connection between Energy and Water Use

It takes water to produce energy (thermoelectric cooling, fuel production, etc.) and energy to produce water (pumping and treatment). This concept is known as the water-energy nexus and demonstrates that by saving water through efficiency and conservation, energy will also be saved. Additionally energy costs as a function of energy use has been identified as one of the top challenges (ranking 3rd out of 12) facing northeastern Illinois water utilities.[54] Therefore, Evanston chose to look at water-related energy use as part of this Plan. As Evanston works towards higher water system efficiency, understanding the role and cost of energy from pump to faucet can be useful in short- and long-term planning, assessing infrastructure needs, and projecting future utility revenue requirements.

Figure 8. Water-Energy Nexus

Energy for Water	Water for Energy

Energy and power production requires water:
- Thermoelectric cooling
- Hydropower
- Energy minerals extraction/mining
- Fuel production (fossil fuels, H_2, biofuels/ethanol)
- Emission controls

Water production, processing, distribution, and end-use requires energy:
- Pumping
- Conveyance and Transport
- Treatment
- Use conditioning
- Surface and Ground water

Source: Adapted from Mike Hightower, Completing the energy sustainability Puzzle, Energy and Water, Energy-Water Science & Technology Research Roadmap, Sandia National Laboratories, presentation 2005-2006. Full Report approved by U.S. Department of Energy January 12, 2007.

Just over 12 million kilowatt hours were required to pump, treat, and deliver water throughout Evanston and to its wholesale customers in 2010. This amount of electricity is equivalent to meeting the needs of 3,100 Evanston residents for a year.[55] Evanston spent $829,181 to purchase this electricity in 2010, representing approximately 10 percent of the Utility's total operating and maintenance budget. It takes 837 kilowatt hours to deliver 1 million gallons of water to Evanston. In addition to electricity, natural gas is also used by the Utility for heating and standby pumping. In 2010, Evanston used 37,000 therms costing around $28,000. The Utility's total electricity and gas costs to deliver water to customers amounted to $63 per million gallons of water (Table 3).

These metrics were calculated as part of a larger statewide study of water and energy use in 2011 administered by the Illinois Section American Water Works Association (ISAWWA)'s Water Efficiency Committee.[56] Around 50 utilities participated in the study, representing nearly 42 percent of the state's population. Table 3 shows Evanston's metrics and how they compare to the survey results both by water source (Lake Michigan) and size (Medium: 5,000-15,000 service connections). This statewide survey represents the first attempt to collect this type of utility level data and is the first step towards developing statewide utility benchmarks for water-related energy use. Greater participation is needed from the utilities to more accurately represent the state's water-related energy use.

There are also energy use and costs associated with treating wastewater. Treatment of Evanston's wastewater occurs outside of the community through the Metropolitan Water Reclamation District (MWRD) of Greater Chicago. Fees are paid to MWRD to perform this task. In the future, Evanston should research the impacts, use, and costs of wastewater-related energy use. For example, the City could utilize the U.S. EPA's Energy Use Assessment Tool to estimate energy use and costs for both water and wastewater resources.

Table 3. 2010 water-energy nexus metrics

	ANNUAL VALUE	AVERAGE LAKE MICHIGAN UTILITY	AVERAGE MEDIUM UTILITY
TOTAL COST OF ELECTRICITY ($)	**$829,181**	**$254,421**	**$247,732**
ELECTRICITY COST AS PERCENT OF TOTAL OPERATING BUDGET	**10.20%**	**8.20%**	**9%**
ENERGY INTENSITY OF WATER PRODUCTION (KWH/MG)	**837**	**866**	**1,560**
WATER PRODUCTION COST FROM ENERGY ($/MG)	**$62.67**	**$94**	**$140**
UNIT ELECTRICITY COST ($/KWH)	**$0.07**	**$0.12**	**$0.09**

Source: Illinois Section American Water Works Association, Water Efficiency Committee.

54 CMAP. "2008 Survey of Water Utilities." **http://www.cmap.illinois.gov/water-2050**.

55 U.S. Department of Energy. "Energy Efficiency & Renewable Energy, Energy Consumption in Illinois Homes," 2005. **http://apps1.eere.energy.gov/states/residential.cfm/state=IL**.

56 Illinois Section American Water Works Association. "Water Energy Nexus Survey," March 2012. **http://www.isawwa.org/resource/collection/82A33FB3-E26F-4EA1-932D-866A9E8E264A/FY12-0077_ISAWWA_SURVEY_REPORT_final.pdf**.

Water Demand Forecasts

After accessing current conditions through the Utility profile, the next step in developing a water efficiency and conservation plan is estimating future water demand. Knowing how much water a community and its wholesale customers are likely to use can help a utility select appropriate and effective water conservation and efficiency measures, prioritize utility improvement projects, and estimate future revenue requirements.

In this plan, the demand forecast is straightforward and is a function of future municipal population estimates and 2010 per capita water use. Table 4 displays the population forecasts and population percent changes for Evanston, Skokie, and the Northwest Water Commission (NWC).[57] Collectively the service region is expected to grow by 17 percent, representing 73,684 people. The forecasts are based on CMAP's population forecasts developed for the regional comprehensive plan, GO TO 2040.[58]

Water demand is represented by per capita use, which is denoted by total water use from all sectors divided by population. Per capita water use (average gallons per person) was calculated for Evanston (97 gallons per capita), Skokie (131 gallons per capita), and the Northwest Water Commission (104 gallons per capita) and then was multiplied by each respective estimated change in population. Table 5 displays the resulting water demand forecast results. Overall projected demand is expected to increase by 8 million gallons a day for all three entities, with Evanston having the smallest change in demand-around 831,000 gallons a day between 2010 and 2040. It should be noted that these demand forecasts do not incorporate the potential impact of water conservation efforts included in this plan and other passive conservation impacts. It is assumed that the current 2010 per capita water demand will continue until 2040.

Table 4. Population growth forecasts[59]

YEAR	EVANSTON POPULATION	EVANSTON % POPULUATION CHANGE	SKOKIE POPULATION	SKOKIE % POPULATION CHANGE	NWC POPULATION	NWC % POPULATION CHANGE
2010	74,486	N/A	64,784	N/A	222,802	N/A
2020	77,343	3.69%	69,945	7.38%	239,346	6.91%
2030	80,200	3.56%	75,105	6.87%	255,890	6.47%
2040	83,057	3.44%	80,266	6.43%	272,434	6.07%
CHANGE FROM 2010-2040	**8,571**	**10.32%**	**15,482**	**19.29%**	**49,632**	**18.22%**

Source: Chicago Metropolitan Agency for Planning.

Table 5. Water demand in gallons per day

YEAR	EVANSTON	SKOKIE	NWC	TOTALS
2010	7,225,142	8,486,704	23,171,408	38,883,254
2020	7,502,261	9,162,746	24,891,982	41,556,989
2030	7,779,381	9,838,787	26,612,557	44,230,724
2040	8,056,500	10,514,829	28,333,131	46,904,460
NET CHANGE FROM 2010-2040	**831,358**	**2,028,125**	**5,161,723**	**8,021,206**

Source: Chicago Metropolitan Agency for Planning.

57 The Northwest Water Commission includes Wheeling, Arlington Heights, Buffalo Grove, and Palatine.

58 CMAP. "Population Forecasts." **http://www.cmap.illinois.gov/population-forecast**.

59 2010 data is based on 2010 Census, **http://2010.census.gov/2010census/** and 2040 data from the Chicago Metropolitan Agency from Planning. "Population Forecasts." **http://www.cmap.illinois.gov/population-forecast**. Straight line estimates were calculated for 2020 and 2030.

Image courtesy of the City of Evanston.

Evanston, let's talk about water!

Evanston Water Conservation & Efficiency Plan
City of Evanston Public Meeting

What are the current water supply conditions for Evanston? What are the possibilities for the future demand of Evanston's water supply? Take this opportunity to weigh in and assist Evanston as they create a Water Conservation & Efficiency Plan for the City.

All are welcome!

For information, contact the Evanston Office of Sustainability at **sustainability@cityofevanston.org** or **(847) 488-8069**.

Provide additional input for the plan, by completing a brief survey at **https://www.surveymonkey.com/s/evanstonwaterplan**.

FY12-0100

City of Evanston
Public Meeting

Thursday, April 26, 2012
7:00 to 9:00 p.m.

Lorraine H. Morton
Civic Center, Room 2200
2100 Ridge Road
Evanston, IL 60201

City of Evanston

Chicago Metropolitan Agency for Planning

Section 3: Public Outreach

With a basic understanding of current conditions and potential future demand, Evanston and CMAP reached out to the public and other stakeholders to communicate about the Plan and gather input about potential recommendations. Community outreach was designed to gather input early in the planning process using a variety of means to engage as many residents as possible.

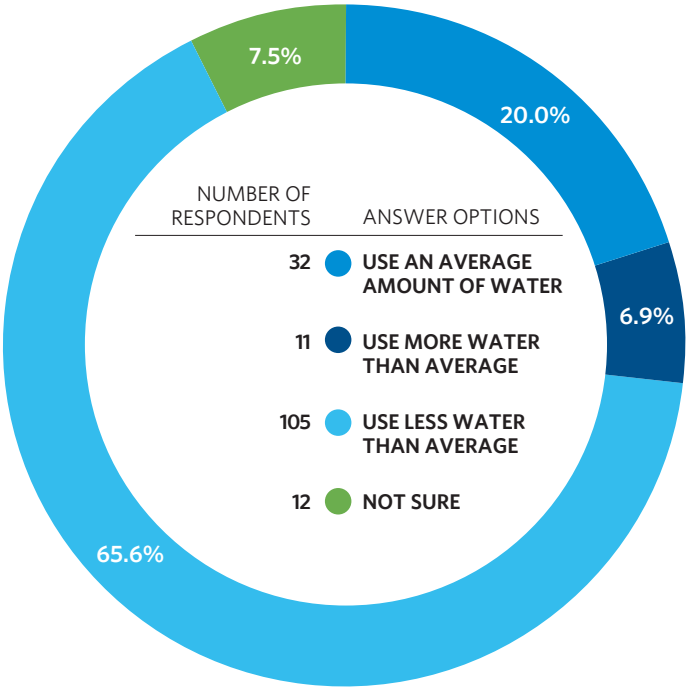
The goal of the Plan's outreach strategy was not only to ensure residents' voices were heard, but also to understand their level of awareness of current conditions and potential individual roles in water efficiency and conservation. Knowledge of this awareness helps the City formulate strategies to increase understanding through informational initiatives, an integral part of Plan implementation. Additional efforts were targeted to receive input from businesses.

The first outreach tool was a residential survey released in March 2012. In addition, public meetings were conducted in April 2012. The meetings were intended to help residents and businesses understand current conditions, to introduce the planning process and goals of the Plan, and to receive input. Information about and updates on the project were also included on both CMAP's and the City's websites during this time. The following sections outline more details about the survey and public meetings.

Survey Results

Residents received notification about the 23-question survey instrument in several ways, including links to an on-line survey version in printed in meeting announcements and in the City of Evanston's E-News publication. The information gathered from respondents of the survey includes demographic information, level of awareness of water issues, water use and conservation practices, interest in learning more about related topics, and preference for receiving information and updates from the City on the planning process.

Figure 9. How would you describe your household's daily water use compared to Evanstons's 2010 average of 97 gallons per person?



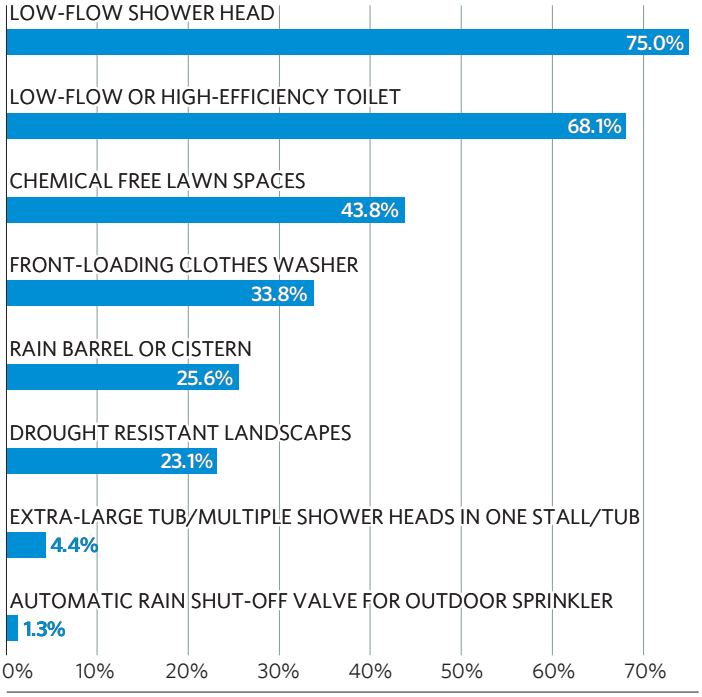
Source: City of Evanston, Public Water Survey, March 2012.

One hundred and sixty-two residents responded to the survey. The large majority was White/Caucasian, and nearly two-thirds were female. Over half own single family homes and three-quarters hold a Bachelor's or higher degree. Of those choosing to answer the question, over half of the residents earned between $50,000 and $199,000 in 2010. Seventy percent have been Evanston residents for over 10 years. The following points highlight the survey results:

- *Two-thirds of the respondents to the survey think they use less than the average Evanston resident (97 gallons per person per day). (Figure 9)*
- *The most common water conserving or efficient features respondents' reported having in their homes are low-flow showerheads (75 percent), low-flow or high-efficiency toilets (68 percent), and chemical-free lawn areas (43 percent). A little over one-third have front-loading clothes washers. (Figure 10)*
- *Fifteen percent of respondents were not prompted to use less water when they knew the cost of their water increased. More than one-quarter did not notice an increase.*
- *Seventy percent of respondents think there is no likelihood of a water shortage occurring in Evanston in the future, however nearly all consider it important to conserve water.*
- *Over half of respondents believe water from the faucet is safe to drink and less than 1 percent report buying bottled water a few times a week.*
- *Over half also believe that it is safe to use rainwater for some indoor use (flushing toilets and watering plants but not for cooking or drinking), that home water use affects water quality in the community, and that water-conserving landscapes look as good as traditional lawns.*
- *More than half of the respondents indicated interest in learning more about incentive programs to replace old toilets and shower heads, installing rain barrels, and converting yard area from lawn to native landscape.*

Based on the survey results, there is a strong environmental ethic in the city. However, most respondents underestimated how much water they use. This clearly points to a need to connect the desire residents have to conserve water with an understanding of their current practices and the economic and environmental costs of using water. The fact that a large majority of residents believe it safe to use rainwater for indoor uses and are willing to install native landscaping, indicates that residents are open to conducting progressive practices to conserve water.

Figure 10. Percent of respondents using water saving features



Source: City of Evanston, public water survey, March 2012.

Public Meetings

Two public meetings were held on April 26, 2012, at the Lorraine Morton Civic Center in Evanston — one targeted to residents and one targeted to businesses. Notice of the public meetings were printed as flyers and posters and distributed throughout the city and published in the City of Evanston E-News. At the meetings, CMAP and City staff introduced residents to the planning process and goals, listened to their water supply concerns, their current efforts to conserve and use water efficiently, and their ideas for future actions and initiatives.

All meeting participants felt that it is important to conserve water in Evanston right now, primarily to protect the environment. As with the on-line survey, most described their household as using less water than average. More than half have installed chemical free lawn spaces and a couple installed drought resistant landscapes.

Residents discussed ways to conserve water and use it more efficiently. Ideas expressed include:

- Need to report violations for outdoor watering.
- Promote WaterSense Landscape Irrigation Professionals Certification.
- Need for education on native/low water use landscaping.
- Utilize the Lawn to Lakes Program.
- For MWRD: charge true cost for energy and treatment.
- For Plumbers: utilize leak detection tablets with customers.

Partnerships figured prominently in the discussion as well. Ideas expressed include:

- Partnering with the Illinois Landscape Contractor Association to campaign for limiting irrigation needs.
- Partnering with businesses for courtesy tap water refills.
- CMAP partnering with the MWRD on stormwater issues.
- Partnering with local hardware stores on selling pre-rinse spray valves to local restaurants and other appropriate entities.

A full summary of the survey results will be available on Evanston's website.

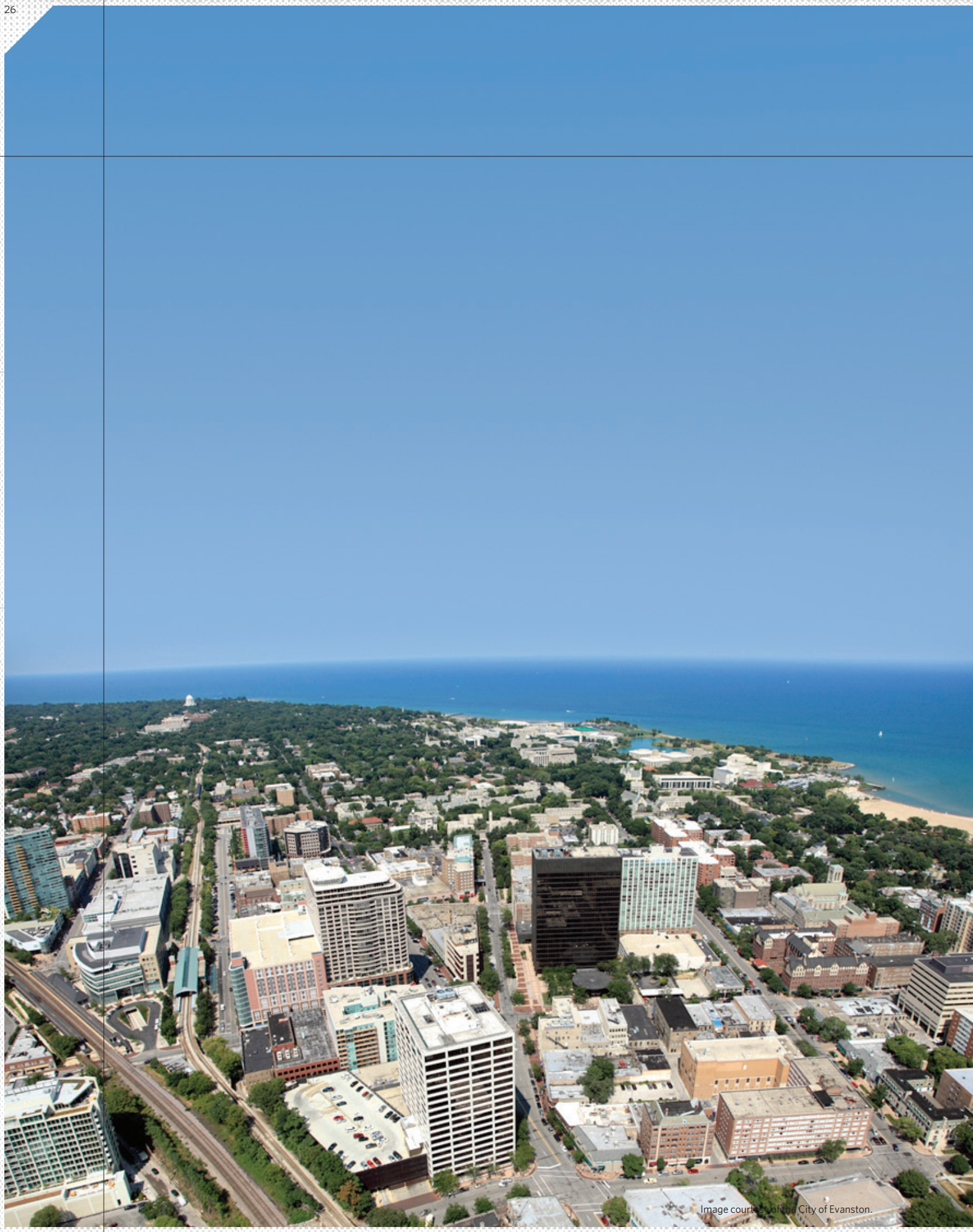


Image courtesy of the City of Evanston.

Section 4: Recommendations

In summer 2011, the City solicited the help of several volunteers to research water conservation and efficiency measures. The research was reviewed by City staff to build a list of possible measures that could then be evaluated as potential recommendations. Measures were ranked according to three metrics: benefit towards goals, current level of use, and difficulty or cost. Figure 11 provides the results. The highest ranking measures formed the Plan's draft recommendations and provided a base to help guide outreach and information efforts during the planning process.

Figure 11. Ranking of conservation and efficiency measures

	CRITERIA		
SCALE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST
BEST	3 - Significant Benefits	3 - Few	3 - Low effort or low cost
↕	2 - Measurable Benefits	2 - Some	2 - Inconvenient change or moderate investment
WORST	1 - Minimal Water Benefits	1 - Significant	1 - Major behavior change or high cost

HARDWARE - INDOOR	CRITERIA			
MEASURE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST	TOTAL
	30%	30%	40%	**100%**
High efficiency toilets	3	3	2	**2.6**
Toilet retrofit devices for high-volume toilets	2	2	3	**2.4**
Low flow shower head	2	2	2	**2.0**
Low flow faucets	2	2	2	**2.0**
Faucet retrofit with aerators	2	2	3	**2.4**
Low flow or waterless urinals	2	2	1	**1.6**
Urinal retrofit devices	2	2	2	**2.0**
High efficiency washing machine	2	2	1	**1.6**
Water efficient dishwashers	2	2	1	**1.6**
Leak detection tablets	3	2	3	**2.7**
Shower timer	3	2	2	**2.3**
Tankless water heaters	2	2	1	**1.6**

HARDWARE - OUTDOOR	CRITERIA			
Rain barrels and cisterns for rainwater harvesting	3	2	3	**2.7**
Automatic shutoff nozzles for hand-held watering	3	1	3	**2.4**
Flow-control devices for manual sprinkling	3	1	1	**1.6**
Sprinkler with variable spray patterns and low precipitation rates	3	1	3	**2.4**
Soaker hoses	2	2	2	**2.0**
Shutoff devices activated by rainfall	1	2	1	**1.3**
Rain gauges	2	2	3	**2.4**
Irrigation system controllers (for automatic in-ground sprinkler and drip systems)	1	2	1	**1.3**
Soil moisture sensors and probes	1	2	1	**1.3**
Drip irrigation systems	2	2	1	**1.6**
Practical turf areas	3	2	2	**2.3**
Native and drought tolerant turf grasses	3	2	2	**2.3**
Native and drought tolerant plants	3	1	2	**2.0**
Soil improvements	3	1	3	**2.4**
Mulches	3	2	2	**2.3**
Recirculating water fountains and decorations	1	2	1	**1.3**
Pool and pond covers	1	2	1	**1.3**
Grey water/treated effluent reuse for irrigation	1	3	1	**1.6**

Ranking of conservation and efficiency measures

BEHAVIOR / MANAGEMENT PRACTICE - INDOOR	CRITERIA			
MEASURE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST	TOTAL
	30%	30%	40%	100%
Turning off the faucet while brushing teeth	3	1	3	2.4
Washing dishes when machine is full	2	1	2	1.7
Load dishes without rinsing first	3	1	2	2.0
Washing clothes in a full load only	2	1	2	1.7
Restaurants to provide water on request only	3	3	2	2.6
Limit shower time	2	3	2	2.3
Fix leaking fixtures	3	2	2	2.3
Self-performed water audit and selection of areas to improve water efficiency/conservation	3	2	2	2.3

BEHAVIOR / MANAGEMENT PRACTICE - OUTDOOR	CRITERIA			
MEASURE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST	TOTAL
	30%	30%	40%	100%
"No Watering" option	3	2	3	2.7
Check for and repair leaks	3	2	2	2.3
Use containers for small areas and individual plants	2	2	3	2.4
Proper irrigation scheduling to maximize efficiency	3	2	3	2.7
Monthly adjustment of irrigation system controllers	2	1	2	1.7
Maintenance of sprinkler components	2	1	2	1.7
Sprinkler distribution uniformity	2	1	1	1.3
Design new landscapes with water-wise planning and design principles	3	2	1	1.9
Limit turf to functional areas	3	3	2	2.6
Use separate irrigation systems for different hydrozones	2	2	1	1.6
Replace nonfunctional turf areas with low-water-use alternative ground cover and plants	2	3	1	1.9
Proper maintenance of water-efficient landscapes	3	2	2	2.3
Perform landscape water audits	2	3	2	2.3

Ranking of conservation and efficiency measures

HARDWARE - UNACCOUNTED FOR FLOW	CRITERIA			
MEASURE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST	TOTAL
	30%	30%	40%	100%
Leak detection and repair	3	1	2	2.0
Water audit	2	1	3	2.1
Meter testing and repair	3	1	2	2.0

BEHAVIOR / MANAGEMENT PRACTICE - UNACCOUNTED FOR FLOW	CRITERIA			
MEASURE	BENEFIT TOWARDS GOALS	CURRENT LEVEL OF USE	DIFFICULTY OR COST	TOTAL
	30%	30%	40%	100%
Add per capita calculator on water bills and track past and average usage	3	3	3	3.0
Billing system set to look for spikes or non-typical usage	2	2	3	2.4
Meet with top users a few times per year to evaluate/identify areas for improvement in conservation	2	1	2	1.7
Limit water waste during tank cleaning and repair	1	2	3	2.1
Limit water waste in the water quality laboratory	1	2	3	2.1
Tighten valves	2	3	2	2.3
Repair leaks at pump station facilities	2	3	2	2.3
Repair leaks in distribution main	3	3	2	2.6
Grey water/treated effluent reuse for street cleaning	1	3	1	1.6
Capture/reuse of water from hydrant flushing	1	3	1	1.6

Source: City of Evanston.

After incorporating information obtained during the public outreach process, current Utility conditions, residential survey results, and input from Evanston and CMAP staff, the finalized plan recommendations were crafted.

Ninety-three percent of the respondents to the public survey agreed that conservation is the combined responsibility of the City, residents, and businesses. This desire is reflected in the recommendations for each category: Utility, City, Residential, and Business and Institutions. It should be noted that the Utility is publically owned and managed by the City, however, there are different recommendation categories for both the City and the Utility because of the differing conservation and efficiency roles and responsibilities. Additionally within each category there are three potential types of recommendations: Communication and Outreach, Activity, and Policy.

For some recommendations, there are also short-term (implemented in 0-3 years) and long-term (implemented in 4-8 years) strategies for accomplishing the recommendation. Implementation strategies will vary for each recommendation; some can be implemented through the development of a program such as a toilet rebate program with specific guidelines, rules, and associated water savings while others need to be implemented through collaboration and action externally or through the City, as is the case with the ordinance review and update.

Utility

The Utility's role in this plan is primarily to increase efficiency both in terms of water and energy use and to provide customers with water conservation-related information. The following recommendations are strategies to accomplish this role.

1. Increase water-related information dissemination (Communication and Outreach)

As a first step to increase awareness, the Utility should provide more water-related information on the City's website including updates on policies, practices, and events that pertain to water conservation. Another opportunity lies in the annual water quality report (Consumer Confidence Report) that is required to be distributed every year to water customers. In the 2010 Consumer Confidence Report, information about the U.S. EPA's WaterSense program and water conservation tips were highlighted.[60] In future reports, the City should continue this practice and expand information about conservation and efficiency. Leakage rates and leak detection and repair practices should be added to the Consumer Confidence Report published by the Utility. Finally a link to this Plan and updates on Plan implementation progress should be available through the City's website for interested parties.

Recommendation #1

SHORT-TERM STRATEGY	Link Plan and water related information on city website upon completion. Continue to include water conservation information in the Consumer Confidence Report.
LONG-TERM STRATEGY	Incorporate leakage rates and leak detection and repair practices in Consumer Confidence Report published by utility.

Source: Chicago Metropolitan Agency for Planning.

60 City of Evanston. "2010 Water Quality Report." **http://www.cityofevanston.org/assets/2010%20Evanston%20Water%20Quality%20Report.pdf**.

2. Update water billing practices (Activity)

The water bill provides a consistent communication outlet from the Utility to their customers. In addition to payment information, the bill could also be used to promote water conservation. Two methods to achieve this type of communication are below.

- *Modify water bill format to provide water use information in gallons, comparative use data, and water conservation tips.* Water use is currently displayed in cubic feet and should be updated to gallons to provide customers with a more easily understood measurement. In order to save water, a customer needs to understand how much water they are using. Furthermore the top portion of the bill could be utilized to include comparative average water data within each sector. Knowing average usage, a customer can then benchmark their own use and adjust if they so choose. Furthermore an example of a water bill could be posted on the City's website with explanations of how to read and interrupt billing data. Lastly, conservation tips and related City events could be included in the bill. Ultimately the City should work toward developing a web-based water use tracking system that will allow customers to log in and view real time data. As seen with the survey results in Section 3, many residents are unaware of how much water they use. These billing modifications provide opportunities for customers to be more informed water users.

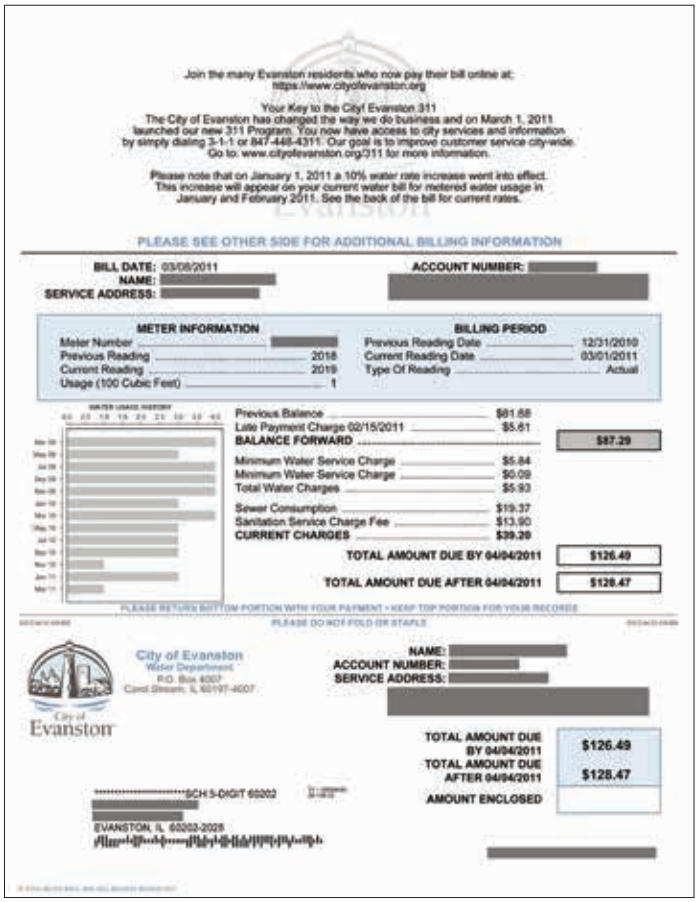
Recommendation #2

SHORT-TERM STRATEGY	Utilize existing billing software to provide water use information in gallons, comparative use data, and water conservation tips, where possible.
LONG-TERM STRATEGY	Explore new billing software to provide water use information in gallons, comparative use data, and water conservation tips. Develop web-based water use tracking system that provides real time data.

Source: Chicago Metropolitan Agency for Planning.

- *Investigate the costs and benefits of switching all water accounts to monthly billing.* The City currently bills residential water customers on a bi-monthly basis. Increased billing frequency can allow customers to more precisely track water use, observe seasonal variations, detect leaks, and adjust water use according to direct and frequent feedback.[61] In this context, the water bill serves more as a consistent management tool than simply a means to collect revenue. Monthly bills can also be more useful for planning and management purposes within the Utility.

Figure 12. Sample Evanston water bill



61 The Commonwealth of Massachusetts, Executive Office of Environmental Affairs and Water Resources Commission. "Water Conservation Standards." July 2006. **http://www.mass.gov/Eoeea/docs/eea/water/water_conservation_standards.pdf**.

City

The City's role in this Plan is to increase awareness about the value of water, the benefits of water conservation and efficiency, and to lead by example through aligning City practices with the Plan's goals. The following recommendations are strategies to accomplish this role.

Image courtesy of the City of Evanston.

3. Incorporate sustainable water policies into City departments and functions (Policy)

Sustainable water policies should be promoted at the City level and be integrated into all City departments. For this Plan, sustainable water policies include water conservation and efficiency, ordinance updates, proper maintenance practices, and planning for current and future infrastructure needs.

Water conservation and efficiency measures can be implemented in all City departments. Each department should identify opportunities specific to their functions that could reduce water use. City buildings should also be audited for water use in coordination with the Utility. For example, restroom fixtures could be inventoried and their flow rates identified for possible replacement if higher efficiency models and resources are available. City-wide water conservation and efficiency policies should also be adopted. For example, regular leak detection and meter accuracy testing should be officially adopted as a best practice at the City level to ensure these programs continue and receive adequate resources now and in the future. There should also be a process developed for City staff to easily report leaks in municipal facilities for prompt repair.

Additionally, Evanston should review and consider adopting a portion of CMAP's Model Water Use Conservation Ordinance.[62] Currently Evanston has ordinances that address lawn sprinkling and recirculating systems. However, during the planning process, several other areas were identified as opportunities to demonstrate regional leadership through a more progressive water conservation and efficiency ordinance.

It is recommended that Evanston at a minimum consider the following topics to include in an ordinance update:

- Alternative lawn watering and irrigation practices.
- Water efficient fixtures (toilets, showerheads, and faucets) in all new construction (including residential and commercial) and all major renovations.
- Water waste prohibition.[63]
- Water reuse (rain barrels and cisterns) for landscaping.

Lastly, planning for current and future water infrastructure needs should be a regular and cyclical activity. There are many strategies to accomplish this important task. For example, Evanston is currently undergoing a cost of service study to evaluate the amount of resources needed to deliver water to its wholesale customers. Another strategy is incorporating current and future infrastructure costs (including capital costs) into water rates. This fulfills one component of full cost pricing, a concept discussed in more detail in Section 6. Evanston should work toward incorporating these practices into Utility operations and communicating their importance to Evanston's customers.

Recommendation #3

SHORT-TERM STRATEGY	Develop water conservation and efficiency policy. Review and consider adoption of CMAP's Model Water Use Conservation Ordinance. Complete water use audits of all municipal buildings.
LONG-TERM STRATEGY	Ongoing review of the cost of municipal services. Work toward incorporating full cost pricing.

Source: Chicago Metropolitan Agency for Planning.

62 Chicago Metropolitan Agency for Planning. "Ordinance Review and Update." http://www.cmap.illinois.gov/ordinance-review-and-updates.

63 Water waste is the general misuse or inefficient use of potable water and includes topics like household leaks, watering of impervious areas, washing of impervious areas with water such as sidewalks, non-circulating water features and air cooling systems and inefficient car washing.

4.Promote communication and outreach on water conservation behaviors

(Communication and Outreach)

Public information messages create broad-based awareness and can be organized through the development of a public information program (PIP). The purpose of a PIP is to increase the public's awareness regarding the value of water and to promote how it can be used more efficiently through a cohesive series of messages and events. Changing behavior through a PIP is a viable strategy for accomplishing the Plan's goals and recommendations. Stakeholders need to understand why conservation is important and what they can do to participate. Furthermore, the City should define the target audience(s) and tailor an information campaign to that audience. For example, there may be a slightly different message for renters in multifamily buildings than owners in single family households. The Plan recommends creating "Top 5" tip lists[64] targeted at reducing outdoor water use in single family homes and at reducing indoor use in multifamily buildings as a short term strategy. Additional "Top 5" lists should be created during plan implementation to address the other recommendations. All lists should be posted to the City website, included in water bills if space allows, and distributed at public events.

PIPs can be multi-faceted and can feature a variety of communication media, workshops, advertising, public relations, and promotional tactics to help raise awareness. The cost of a PIP depends on the selection of tools used to carry the message and the duration of the program. For example, if the duration is short-term perhaps to address an immediate need such as a drought or a long-term program that aims to inform and influence behavior, different strategies may be adopted.

Evanston should partner with wholesale customers to share best management practices and outreach and education materials that promote water conservation and efficiency. To assist with outreach and information and the development of a PIP, there are many readily available resources that cover a wide variety of topics included in the Plan from water efficient fixtures to native landscaping. The following text provides a few resources that will be especially helpful for Evanston.

WaterSense[65]

WaterSense is a voluntary, nationally recognized program sponsored by the U.S. EPA that promotes water conservation and efficiency. Similar to the U.S. EPA ENERGYSTAR program, there are two main branches of the WaterSense Program. The first branch is product labeling in which products such as toilets, faucets, and showerheads are rated for compliance with WaterSense standards. If compliant, the product is then labeled as a WaterSense product. This typically means that the product uses 20 percent less water than its conventional counterpart. The second branch offers seven voluntary partnerships representing a variety of interests. Evanston has been a WaterSense Promotional Partner since 2010. As a partner, the City has access to a variety of water conservation outreach materials including bill inserts, magnet designs, press releases, public service announcements, guidance on how to run a rebate program, water savings tip brochures, fact sheets, and web banners. The City can access all these materials through the WaterSense Partner website.

U.S. EPA Healthy Lawn Care Practices Video[66]

The U.S. EPA provides informational videos for homeowners, schools, and other interested parties. One such video, Healthy Lawn Care Practices, provides practical information and tips for homeowners to reduce pesticide and chemical use on their lawns. This video can be posted to the City website and featured at public events and meetings.

Liquid Assets[67]

Liquid Assets is a documentary about the importance of water infrastructure and the role of the water utility in the country's public health, economic development, and growth. The movie contains a variety of perspectives from cities across the country. Evanston could host viewings of the movie to increase awareness about the need for maintaining infrastructure and reducing water waste throughout the country and locally.

64 The lists would include the best 5 water savings practices for the specific target audience.

65 United State Environmental Protection Agency. "WaterSense." http://www.epa.gov/WaterSense/index.html.

66 United State Environmental Protection Agency. "Lawn and Garden." http://www.epa.gov/pesticides/lawncare/.

67 Penn State Public Broadcasting. "Liquid Assets." http://liquidassets.psu.edu/the_film/index.html.

68 Lawn to Lake. http://www.lawntolake.org/.

69 Metropolitan Planning Council and Openlands. "What Our Water's Worth." http://www.chicagolandh2o.org/.

Lawn to Lake[68]

Lawn to Lake (L2L) is a collaborative program promoting healthy lawn and landscape practices to protect water resources in the Great Lakes region. This program works with municipalities, lawn and landscape professionals, school districts, homeowners, product retailers, and turf managers to implement natural lawn care and sustainable landscaping practices. Evanston should work with the L2L program to offer and encourage participation in the program's workshops, teacher trainings, and partnership development initiatives with lawn care retailers. Additionally, Evanston's homeowners can participate by showcasing their property as a demonstration site and receive acknowledgement through L2L's recognition program.

What Our Water's Worth Website[68]

The Metropolitan Planning Council and Openlands partnered to create an outreach website that provides regional case studies, conservation tips, water supply information, and resources for continued learning about water issues in the region.

American Water Works Association (AWWA)'s Conservation Community Website[70]

A comprehensive list of existing outreach and education programs can be found on the AWWA's website. These sucessful examples can be used as a model for Evanston while it develops a PIP.

Annual Water Event

Beyond a PIP, another way of promoting the sustainable use of water is continual municipal participation in an annual water-related event. Currently there are many water-related national campaigns the City could partner with for an annual event. The U.S. EPA WaterSense Program hosts "Fix a Leak Week" March 12th-18th every year to remind residents to check their toilets, faucets, and irrigation systems for leaks.[71] The WaterSense website provides pledges, facts and figures, education resources, and related videos to assist with community participation. The Food and Agriculture Organization of the United Nations hosts "World Water Day" on March 22nd every year to raise awareness about water security issues.[72] The World Water Day website provides campaign materials, water security facts, and has an interactive map that showcases worldwide participation. The AWWA hosts "National Drinking Water Week" May 6th-12th to raise awareness about the essential role of drinking water in daily life and the importance of water infrastructure.[73] The AWWA website provides logos, press releases, coloring contest materials, public service announcements, and other resources for participants. Evanston participated in National Drinking Water Week in 2012 by hosting several events during the week including a coloring contest, Sunset Paddle canoe trip, *Bottlemania* book discussion, after school activities with the Ecology Center staff, film screening of *Tapped*, and a dramatization of scenes from Ibsen's "Enemy of the People."[74] Evanston should continue to participate in these types of events.

School Education

The City should also address school education. The purpose of a school education program is to reach the youngest water users in order to increase awareness of the value of water so that lifelong water conservation behavior is established. School education programs typically include working with both public and private schools and the school districts. Although programs can be useful at all levels, typically they are geared towards grades K-8 and aligned with school curriculum. Programs can include utility facility tours as well as classroom presentations. There are many resources available through the AWWA's Conservation Community website[75] that Evanston can reference during the development of a locally appropriate school education program.

Recommendation #4

SHORT-TERM STRATEGY	Create "Top 5" water saving tips list to post on website, distribute through water bill, and disseminate at public events. Additional tip sheets should be created to cover all appropriate strategies in the plan. Target outdoor water use and multifamily buildings. Participate in annual water related event.
LONG-TERM STRATEGY	Establish widely recognized public information program with varying methods of outreach outlets. Participate in annual water related event.

Source: Chicago Metropolitan Agency for Planning.

70 American Water Works Association. "Educational Resources." **http://www.awwa.org/awwa/community/links.cfm?FuseAction=Links&LinkCategoryID=3**.

71 United State Environmental Protection Agency. "WaterSense, Fix a Leak Week." **http://www.epa.gov/watersense/our_water/fix_a_leak.html**.

72 Food and Agriculture Organization of the United Nations. "World Water Day." **http://www.unwater.org/worldwaterday/index.html**.

73 American Water Works Association. "Drinking Water Week 2012." **http://www.awwa.org/government/content.cfm?itemnumber=44766&navitemnumber=3863**.

74 City of Evanston. "Drinking Water Week." **http://www.cityofevanston.org/sustainability/water-conservation/drinking-water-week/**.

75 American Water Works Association. "Educational Resources." **http://www.awwa.org/awwa/community/links.cfm?FuseAction=Links&LinkCategoryID=3**.

5. Promote tap water and reduce bottled water use (Activity)

Every day, 24 hours a day, clean reliable tap water is delivered directly to Evanston's homes, businesses, and schools. The quality of tap water is continuously monitored on a daily basis by Evanston's Water Division to ensure compliance with the U.S. EPA water quality standards. Tap water provides Evanston with public health protection, fire protection, and supports the economy and quality of life.[76] Being more efficient in municipal and business operations and promoting conservation to residents sends the message that Lake Michigan is a valuable resource in the community that should not be wasted. Tap water is also extremely economical when compared to bottled water that can cost up to 4,000 times more per unit. For example, Evanston's tap water costs residents $0.002/gallon whereas bottled water is sold for between $1.00 and $8.40 per gallon.

Bottled water has become integrated into our society and is often perceived as always providing a higher quality product. However, bottled water is regulated by the Food and Drug Administration, which does not require as frequent water quality monitoring as the U.S. EPA does for tap water. There are also water quality concerns with the bottle itself such as chemicals leaching into the water after long periods of time. Additionally there is a waste factor associated with the discarded bottles. Nationally, over 30 million bottles end up in landfills or as litter every day. This is equal to over 10 billion bottles per year nationwide. It is estimated that only 12 percent of this annual use is recycled.[77] Lastly, bottled water does not provide other services beyond drinking water unlike tap water which provides several community services. While useful in certain situations, bottled water as a primary drinking water source leaves something to be desired in terms of affordability, quality, and sustainability. The City should work with the Evanston Environment Board to complete a life cycle analysis of bottled water use to provide more information on this topic. Table 6 summarizes cost, quality, and testing information for bottled and tap water.

Table 6. Bottled water and tap water Information

	BOTTLED WATER	EVANSTON TAP WATER
COST	**$1.00 to $8.40 per gallon**	**$0.002 per gallon**
QUALITY	**Overseen by U.S. Food and Drug Administration**	**Overseen by U.S. Environmental Protection Agency**
TESTING	**Varies**	**Daily/hourly basis**

Source: City of Evanston.

The City can promote the use of tap water through participation in AWWA's "Only Tap Water Delivers" campaign.[78] The website contains outreach materials such as bill stuffers, talking points, print ads, and consumer handouts. Furthermore, the City should promote tap water within municipal buildings by removing bottled water as an option in vending machines. However, the removal of bottled water should to be coupled with an alternate water option for visitors. For example, Evanston could sell reusable water bottles in municipal buildings and encourage residents to fill up their bottles (either purchased or brought from home) with tap water instead. Evanston should encourage staff to utilize existing water fountains through the use of reusable bottles or other drinking ware during working hours.

Staff should also inventory and identify opportunities for additional public water fountains in municipal buildings as well as public open spaces. Lastly, the City should explore potential designs to create a mobile drinking water fountain for use at public events.

Mobile drinking water fountain. Image courtesy of the City of Evanston.

Recommendation #5

SHORT-TERM STRATEGY	Participate in Only Tap Water Deliver's campaign. Encourage the use of tap water and reusable water bottles. Remove bottled water from vending machines in municipal buildings. Work with Evanston Environment Board to complete life cycle analysis.
LONG-TERM STRATEGY	Inventory opportunities for new and retrofitted public water fountains in municipal buildings as well as public open spaces.

Source: Chicago Metropolitan Agency for Planning.

76 American Water Works Association. "Only Tap Water Delivers." **http://www.awwa.org/.Government/Content.cfm?ItemNumber=3846&navItemNumber=3847**

77 City of Evanston. "Tap Water." **http://www.cityofevanston.org/utilities/water_department/Tap%20Water%20Brochure.pdf**.

78 American Water Works Association. "Only Tap Water Delivers." **http://www.awwa.org/Government/content.cfm?ItemNumber=3846**.

Residents

A resident's role in this plan is to become aware of how much water is used in their household and take actions to minimize this usage. The majority of Evanston's water supply, 63 percent, is consumed by residents. Nationally residential water use averages about 100 gallons per person and is typically divided into outdoor and indoor use with outdoor accounting for 31 percent and indoor accounting for the remaining 69 percent of total daily consumption (Figure 13).[79] As a result of public outreach, CMAP and Evanston staff identified two areas that residents have expressed interest in for pursuing water conservation and efficiency: reducing indoor use from toilets and reducing outdoor use primarily from lawn watering. The following recommendations are strategies to accomplish this role.

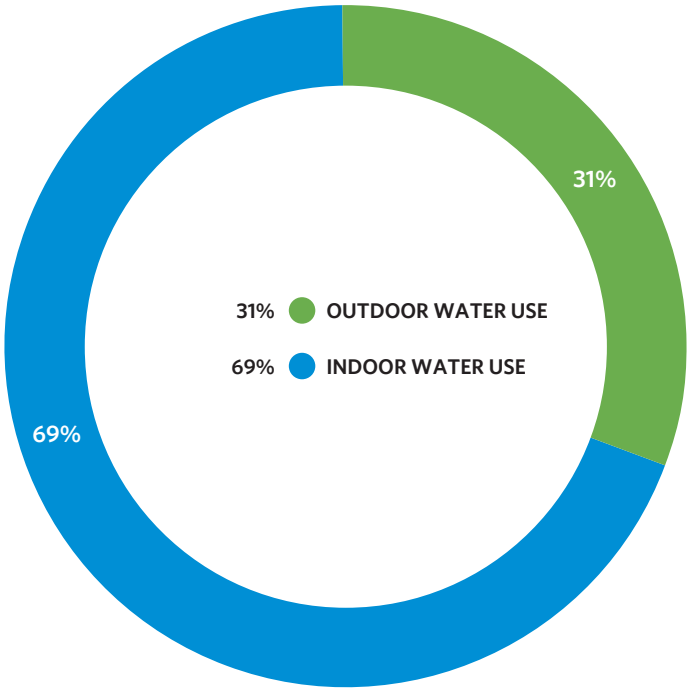
6. Reduce indoor water use from toilets (Activity)

Toilets are the number one water use in a household (Figure 14), accounting for nearly 30 percent of total indoor use or 18.5 gallons per capita per day.[80] However there has been significant progress in national policy and technology to reduce water use in this area. The Energy Policy Act (EPAct) of 1992 established the first uniform plumbing standard for fixtures and fixture fittings sold, installed, or imported to the United States effectively decreasing toilet flush rates from 3.5 gallons per flush to 1.6 gallons per flush. The EPAct came into full effect in Illinois in 1994, therefore all toilets purchased in Evanston after this date are low-flow toilets (1.6 gallons per flush or less).

79 Wayne B. Solley, Robert R. Pierce, and Howard A. Perlman, *Estimated Use of Water in the United States in 1995*, p. 24. (outdoor) and Mayer et al, Residential End Uses of Water, p. 86. (indoor)

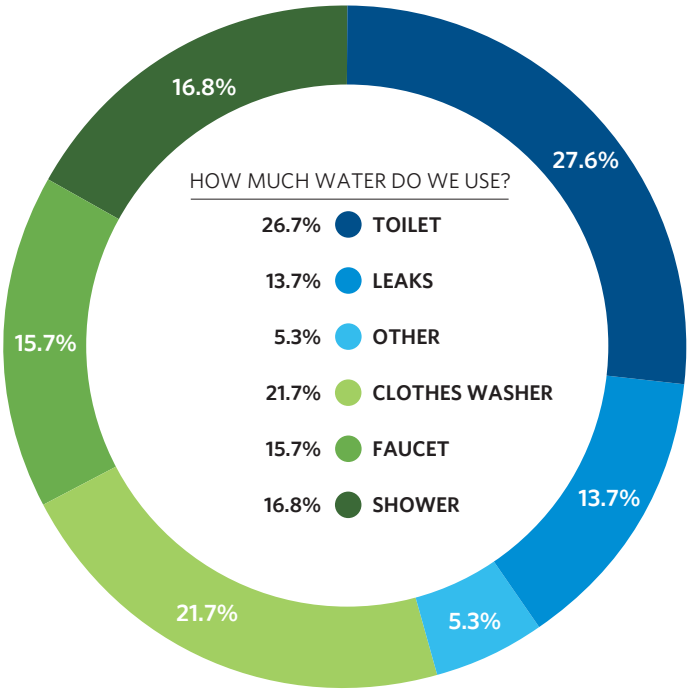
80 Adapted from Mayer et al, Residential End Uses of Water, p. 86. Published in Amy Vickers, 2001. *Handbook of Water Use and Conservation.* Amherst, MA:WaterPlow Press.

Figure 13. Residential water use



Source: Wayne B. Solley, Robert R. Pierce, and Howard A. Perlman, *Estimated Use of Water in the United States in 1995*, p. 24. (outdoor) and Mayer et al, Residential End Uses of Water, p. 86. (indoor).

Figure 14. Residential indoor water use



Source: Adapted from Mayer et al, Residential End Uses of Water, p. 86. Published in Amy Vickers, 2001. *Handbook of Water Use and Conservation.* Amherst, MA:WaterPlow Press.

Since EPAct, technology has continued to improve and high-efficiency toilets were developed with a flush rate of 1.28 gallons per flush. Additionally dual flush toilets are now available. Dual flush toilets use separate, user-selectable buttons for liquid (1.0 gallon per flush) and solid (1.6 gallons per flush) wastes. The opportunity for Evanston to reduce water use from toilets lies in upgrading older fixtures that were installed pre-EPAct with new high-efficiency toilets. Since 90 percent of Evanston's housing stock was built before 1990, toilet replacements in these older homes could provide substantial water savings. If resources are available, the City could sponsor a toilet rebate program in coordination with local hardware stores to provide an incentive to residents to replace their older toilets. Ideally the toilet rebate program would provide rebates only for the purchase of U.S. EPA WaterSense labeled toilets that have been performance tested to ensure high quality functionality.

Dual flush toilet.

If a household's toilet is already low-flow or high-efficiency, a resident should check for leaks to ensure that water waste is not occurring. For example, a small leak in a toilet's flapper (the rubber piece that seals the water in the tank until it is released from flushing) could waste up to 200 gallons of water or more each day. By simply replacing a flapper that costs between $2 and $10, a family can save water and money on their bill, assuming water rates stay constant. One of the most common ways to check for leaks in a toilet is to drop leak detection tablets or a couple of drops of food coloring into the toilet tank and wait 15 minutes. If colored water appears in the toilet bowl, there is a leak that should be addressed. Additional tips for checking for leaks can be found on the U.S. EPA's WaterSense website.[81]

Recommendation #6

SHORT-TERM STRATEGY	Upgrade to high efficiency toilet if appropriate. Regularly test toilet for leaks using leak detection tablets or food coloring. Evanston should consider distributing leak detection tablets at City events.
LONG-TERM STRATEGY	To assist with toilet replacement, the City should develop a toilet rebate program if resources are available.

Source: Chicago Metropolitan Agency for Planning.

81 United State Environmental Protection Agency. "WaterSense, Fix a Leak Week." **http://www.epa.gov/WaterSense/pubs/fixleak.html**.

7. Reduce outdoor water use (Activity)

It is estimated that there are three times more acres of lawns in the U.S. than irrigated corn, making lawns the most irrigated crop in the country.[82] Considering this observation, it is easy to understand why about a third of household water consumption is used outdoors. The good news is that there are substantial water savings to be gained in this area. The Plan recommends changing watering behavior, incorporating native or low water use plantings, and using alternative watering methods to reduce outdoor water consumption. A public information campaign can help communicate these three methods with the intention of ultimately reducing outdoor water use. Partnering with the *Lawn to Lake* program described in Recommendation #4 for this purpose would be ideal.

Rain guage.

Many people over water their lawns resulting in water waste. About an inch a week is needed to maintain a healthy lawn and it is best to water all at once instead of multiple smaller watering sessions throughout the week.[83] A single watering session allows the water to soak further into the root system. An inch a week includes any rainfall that has occurred. For example, if it rained 1/2 inch one day, the lawn only needs another 1/2 inch for a complete weekly watering. Rain gauges may be purchased to assist homeowners in reaching the 1 inch per week goal. The time of day matters when watering the lawn. U.S. EPA WaterSense states that up to 50 percent of water used for irrigation goes to waste due to evaporation, wind, improper system design, and overwatering. To reduce this waste, it's best to water in the early morning before 10:00 a.m. or after 6:00 p.m.[84] It should be noted that Evanston's current lawn watering ordinance prohibits lawn watering between 10:00 a.m. and 4:00 p.m. from May 15th through September 15th each year.[85]

In addition to behavioral changes, certain landscape types can reduce outdoor water consumption, as particular plants native to Illinois' climate naturally need less water. Replacing even a portion of a traditional lawn with native plants can reduce a household's outdoor water use. In addition to using less water, native plants need fewer fertilizers and pesticides than traditional lawns, help reduce air pollution, provide shelter and food for wildlife, promote biodiversity and stewardship of our natural heritage, reduce water runoff, and flooding.[86] The Natural Resources Conservation Service (NRCS) provides an Illinois Native Plant Guide for more information.[87] Low water use or drought tolerant plants may also be utilized for this purpose.[88]

Lastly, residents can use an alternative water supply to water their lawns instead of potable water from the City. This is typically accomplished through the use of one or more rain barrels. Rain barrels are containers that collect rainwater from a home's rooftop for use on site. The average rain barrel holds about 55 gallons. One rain barrel may be sufficient for a property however some homeowners may choose to have multiple rain barrels to meet their outdoor watering needs. On average, one rain barrel can save 1,300 gallons of water during peak summer months.[89] Rain barrels save potable water, save money over time, and divert water away from the stormwater system. If resources are available, the City could sponsor a rain barrel rebate/discount program in coordination with local hardware stores to provide an incentive to residents. Rain barrels are currently for sale at Evanston's Ecology Center for $70 each or two for $130. Proceeds support the Ecology Center and Evanston Environmental Association.[90] Additionally, information should be provided on how to properly use, manage, and store rain barrels to ensure long term water savings and benefits.


Rain barrel. Image courtesy of the City of Evanston.

Recommendation #7

SHORT-TERM STRATEGY	Consider alternative watering practices, utilize rain gauges, and transition lawn to native/low water using plants. The City should develop outreach materials on these topics and host related workshops for residents.
LONG-TERM STRATEGY	Install rain barrel-(s), if locally appropriate. To encourage rain barrel installation, Evanston should provide rebates, if resources are available.

Source: Chicago Metropolitan Agency for Planning

82 NASA. "More Lawns than Irrigated Crops." **http://earthobservatory.nasa.gov/Features/Lawn/lawn2.php**.

83 U.S. Environmental Protection Agency. "Water Conservation Tips for Residents." **http://www.epa.gov/region1/eco/drinkwater/water_conservation_residents.html**.

84 Chicago Metropolitan Agency for Planning. "Model Ordinance." **http://www.cmap.illinois.gov/water-2050/model-ordinance**.

85 City of Evanston. "City Code." **http://www.cityofevanston.org/government/city-code/**.

86 U.S. Environmental Protection Agency. "Green Landscaping: Greenacres." **http://www.epa.gov/greenacres/nativeplants/factsht.html**.

87 Natural Resources Conservation Service. "Illinois Native Plant Guide." **http://www.il.nrcs.usda.gov/technical/plants/npg/**.

88 U.S. Environmental Protection Agency. "Water-Efficient Landscape Design Tips." **http://www.epa.gov/watersense/outdoor/landscaping_tips.html**.

89 U.S. Environmental Protection Agency. "Rain Barrels." **http://www.epa.gov/reg3esd1/garden/rainbarrel.html**.

Businesses and Institutions

The role of business and institutional customers in this Plan is to promote water conservation to their customers and patrons and increase efficiency in their operations through cost-effective practices. The following recommendations are strategies to accomplish this role. It should be noted many partnership opportunities exist in the implementation of these recommendations.

8. Promote water conservation to customers and incorporate water efficiency internally (Communication and Outreach)

Over the last several decades, many businesses have developed an ethic of sustainability as part of their public identity. The Plan recommends that Evanston businesses identify opportunities for customers to conserve water. For example, lodging (hotels, motels and bed and breakfast) establishments should provide an informational card that gives multi-night guests the option to reuse towels and linens. This practice saves water and energy but also save the business money on cleaning costs and labor. The Hilton Orrington and Margarita European Inn in Evanston have already incorporated this practice into their operations. In addition, the Hilton Orrington has installed water restrictors in guest showerheads to decrease water use.

Hilton Orrington informational water card.

For restaurants, informational table top cards can inform customers that water is only served on request. This eliminates water waste in two ways: by eliminating water waste from non-water drinkers and by decreasing dishwashing loads. The City of Evanston should partner with local businesses and create informational card templates for both lodging establisment and restaurants that could be used citywide sending a unified message to residents and guests. Furthermore, Evanston could develop a recognition program for participating businesses.

Pre-rinse spray valve.

Businesses should also incorporate water efficiency into internal operations with the understanding that opportunities will vary by business type. Similar businesses may coordinate with each other to identify water saving practices within their industry. For example, in commercial food operations such as restaurants, pre-rinse spray valves (PRSVs) are used to remove food waste from dishes prior to dishwashing. Traditional PRSVs use approximately 2 to 5 gallons a minute. If a restaurant is consistently washing dishes during peak dinner hours (6:00 p.m. to 8:00 p.m.), they could use 240 to 600 gallons of water just on rinsing. In fact, the Alliance for Water Efficiency states that "the water used in the pre-rinsing operation is often twice the volume of water used by dishwashing equipment."[91]

90 City of Evanston. "Rain Barrel Sales Help Support Ecology Center & Evanston Environmental Association." April 20, 2012. http://www.cityofevanston.org/news/2012/04/rain-barrel-sales-help-support-ecology-center-evanston-evironmental-associaiton/.

91 Alliance for Water Efficiency. "Commercial Dishwashing Introduction." http://www.allianceforwaterefficiency.org/commercial_dishwash_intro.aspx?terms=pre+rinse+spray+valve.

However, there are more efficient dishwashing options. In 2006, a national PRSV standard took effect setting the maximum flow rate of 1.6 gallons a minute. Newer high-efficiency pre-rinse spray valves use less than 1.3 gallons per minute.[92] Older commercial food operations built before 2006 may have the older less efficient spray valves still in place. Evanston has an estimated 5,791 businesses and about 161 of them are food service related.[93] Replacing PRSVs in even a portion of these older restaurants could provide water and energy savings due to the reduction of hot water use and in some cases may also reduce costs. The typical cost of a PRSV is about $60 per unit.[94] Rebates could be provided by the City to accelerate installation, if resources are available. Additionally installing high-efficiency toilets could also be appropriate for some businesses and institutions and should be considered. Partnerships with local hardware and home improvement stores could provide incentives for replacing these fixtures.

Additional opportunities could be identified and supported by the City and the business community. Coordination through local businesses organizations such as Downtown Evanston and the Chamber of Commerce are recommended.[95]

Recommendation #8

SHORT-TERM STRATEGY	Distribute informational cards that encourage customers to reduce water use. Evanston should provide card templates to businesses.
LONG-TERM STRATEGY	Upgrade to high efficiency pre-rinse spray valves, if appropriate. The City should offer a rebate, if resources are available.

Source: Chicago Metropolitan Agency for Planning

9. Reduce Top 20 customer water use (Activity)

The Evanston Water Department should meet with the Top 20 (by volume) accounts. Specifically targeting these accounts can be an efficient way to reduce water use in this class. Due to the varied nature of these accounts (hospitals, schools, and multifamily residences), there are likely some specialized water uses that are not addressed in the Plan but could be better addressed through direct contact. To start the discussion, the Water Department should provide historical water use data to discuss significant use changes and related causes to see if reductions are possible. Furthermore, identifying the flow rates of building fixtures (toilets, faucets, etc.) and equipment (ice machines, etc.) can determine if more efficient cost-effective options are available. Figure 16 has a list of the Top 20 customers and their respected 2010 water use.

Northwestern is one of Evanston's largest water customers by volume. Image courtesy of Evanston.

Recommendation #9

SHORT-TERM STRATEGY	Partner with Water Department to explore appropriate water saving strategies. The Water Department should initiate contact with these larger users.
LONG-TERM STRATEGY	Implement cost effective strategies.

Source: Chicago Metropolitan Agency for Planning

A complete recommendations table is located in the back of this document.

92 Ibid

93 Dun and Bradstreet, April 2011.

94 Valparaiso City. "Water Conservation Plan for Valparaiso City Utilities." **http://www.ci.valparaiso.in.us/DocumentView.aspx?DID=740**.

95 Evanston Downtown. **http://www.downtownevanston.org/** and Evanston Chamber of Commerce. **http://www.evchamber.com/**.

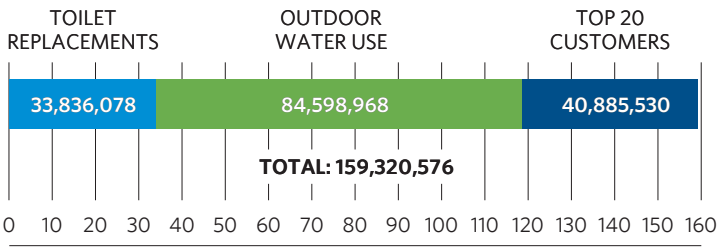
96 Actually exact percentage of savings is 6.2 percent, however for this document the savings percentage is rounded to the nearest whole number of 6 percent.

97 The Energy Policy Act of 1992 took effect in Illinois January 1, 1994. A household built after this date has updated efficient fixtures. Ideally the conservation calculations would only include households built before January 1, 1994. However Census household-built data is attainable only in predetermined block time periods. Therefore household-built data used for these calculations includes households built in 1989 and prior.

Water and Energy Reduction Goals

After water conservation and efficiency measures were selected, associated water savings were then calculated. Although all nine recommendations are essential to this Plan, not all of them can be quantified with water savings. However recommendations #6, #7, and #9 (Toilet replacement, Outdoor water use, Top 20 customers) can be quantified, resulting in a water reduction goal of 6 percent of 2010's total annual pumpage or 159.320 million gallons (Figure 15).[96] These savings should be achieved by 2020.
A detailed explanation is provided below for each calculation. It should be noted that the remaining recommendations could not be quantified at this time but will increase overall water conservation and efficiency in the city.

Figure 15. Total water savings, by measure, in millions of gallons



Source: Chicago Metropolitan Agency for Planning.

The first calculation is aimed at reducing water use from toilets. The Plan estimates that 33.836 million gallons can be saved by replacing 20 percent of the city's older, less efficient toilets. Census data was used to determine the number of households built 1994 and prior, approximately 28,000.[97] The Texas Water Development Board 2004 Study[98] assumes a household average replacement of 2 percent a year from 1994-2011, meaning a certain portion of households have likely already upgraded their toilets. Therefore around 10,000 households are subtracted out to produce the adjusted eligible households, 18,000. A daily per capita water savings (11.3 gallons per toilet) was estimated and multiplied by Evanston's average of 2.25

Table 7. Outdoor water savings

MONTH	WATER USE IN GALLONS PER MONTH	WATER USE IN GALLONS PER CAPITA PER MONTH	DAYS PER MONTH	AVERAGE WATER USE IN GALLONS PER CAPITA PER DAY	DIFFERENCE BETWEEN DECEMBER WATER USE IN GALLONS PER CAPITA PER DAY	OUTDOOR WATER USE IN GALLONS PER CAPITA PER MONTH
10-MAR	**201,292,000**	**2,702**	**31**	**87**	**6**	**187**
10-APR	**207,652,000**	**2,788**	**30**	**93**	**12**	**354**
10-MAY	**226,394,000**	**3,039**	**31**	**98**	**17**	**524**
10-JUN	**227,217,000**	**3,050**	**30**	**102**	**21**	**616**
10-JUL	**269,031,000**	**3,612**	**31**	**117**	**35**	**1,097**
10-AUG	**253,851,000**	**3,408**	**31**	**110**	**29**	**893**
10-SEP	**227,729,000**	**3,057**	**30**	**102**	**21**	**623**
10-OCT	**213,083,000**	**2,861**	**31**	**92**	**11**	**345**
10-NOV	**213,248,000**	**2,863**	**30**	**95**	**14**	**429**
10-DEC	**187,350,000**	**2,515**	**31**	**81**	**0**	**0**
11-JAN	**202,417,000**	**2,718**	**31**	**88**	**7**	**202**
11-FEB	**199,628,000**	**2,680**	**28**	**96**	**15**	**408**
Estimated annual outdoor use in gallons per capita						**5,679**
Estimated annual outdoor use in gallons						**422,996,839**

Source: CMAP, City of Evanston.

98 Water Conservation Implementation Task Force, Texas Water Development Board. "Water Conservation Best Management Practices Guide, Report 362." November 2004. **http://www.twdb.state.tx.us/conservation/municipal/plans/Doc/WCITFBMPGuide.pdf**.

99 Amy Vickers, 2001. *Handbook of Water Use and Conservation*. Amherst, MA:WaterPlow Press. Census 2010 Data, **http://2010.census.gov/2010census/.**

100 Dr. Peter H. Gleick, D. Haasz, C. Henges-Jeck, V. Srinivasan, G. Wolff, K. Kao Cushing, A. Mann. "Waste Not, Want Not: The Potential for Urban Water Conservation in California." The Pacific Institute, November 2003. Appendix B. **http://www.pacinst.org/reports/urban_usage/appendix_b.pdf**.

101 The Plan's advisory team considered 10% a reasonable estimate for savings. This goal is assuming no significant growth during the planning horizon of the Top 20 users.

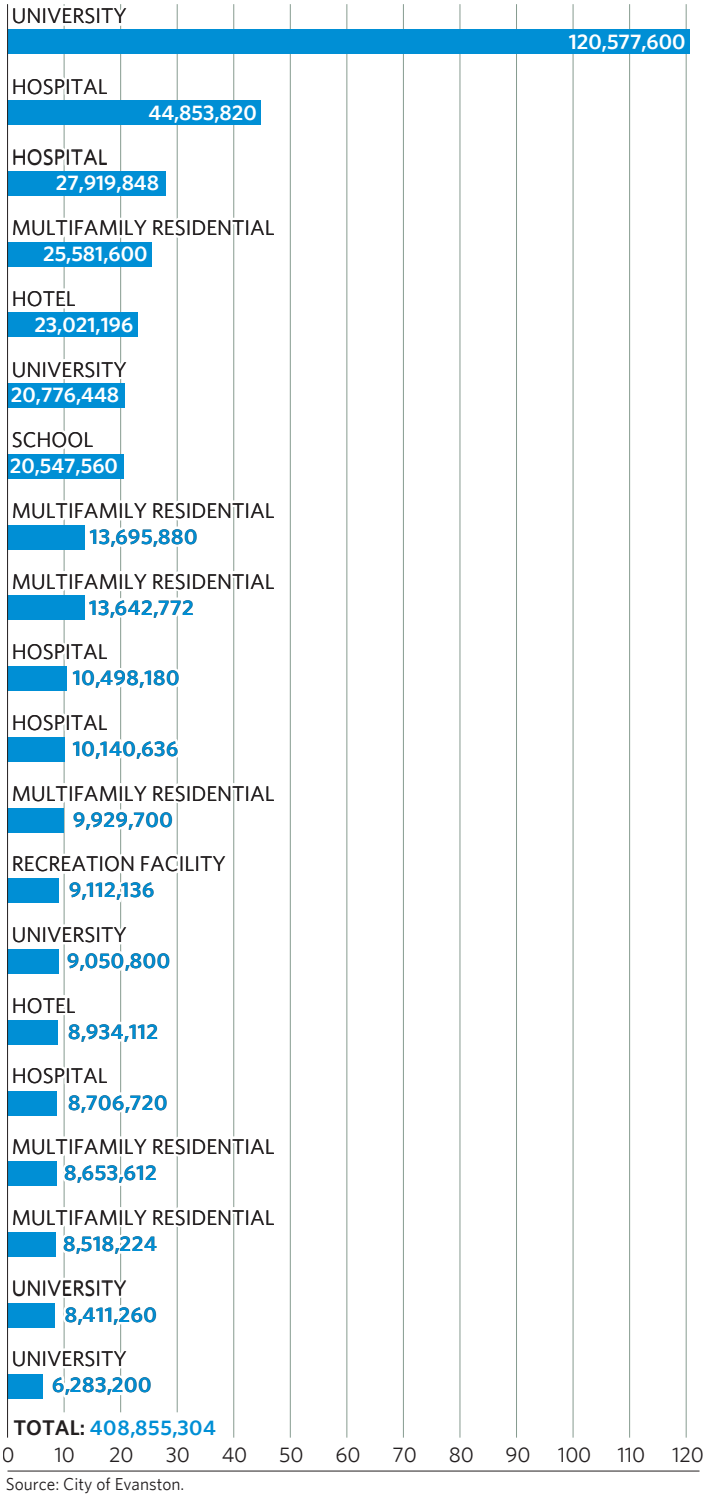
persons per household to get a household savings per day or 25.4 gallons per toilet.[99] It is assumed that only one toilet will be replaced per household. Lastly 20 percent of the eligible households (3,600) is calculated and multiplied by household water savings for a total savings of 33.836 million gallons.

The second calculation is based on reducing outdoor water use (Table 7). Outdoor water use is estimated by using 2010 monthly total water usage (Column B) and applying the minimum monthly method.[100] December has the lowest 2010 monthly water usage at around 187 million gallons. December usage will represent indoor water use for all months. Monthly usage is displayed in gallons per capita (Column C) and then divided by the number of respective days of each month (Column D) to arrive at average gallons per capita per day for each month (Column E). The difference between Column E and December's average water use per capita per day are calculated and represent per capita outdoor water use (Column F). Monthly per capita outdoor use is represented in Column G. The Column G total is multiplied by Evanston's 2010 population of 74,486, to arrive at the total estimated outdoor water use of 422 million gallons or 14 percent of total 2010 use. The Plan assumes a 20 percent reduction in outdoor use totaling 84.598 million gallons.

The third calculation is derived from the city's Top 20 water customers by volume. The total 2010 usage of these Top 20 customers is 408.855 million gallons.[101] The Plan estimates that a 10 percent savings of this usage is possible by 2020 or 40.885 million gallons. Figure 16 shows the Top 20 customers which include hotels, university buildings, hospitals, multifamily residential buildings, and recreational facilities with their respective 2010 water use.

Based on the estimated water savings, water-related energy savings can also be calculated. There is a direct relationship between reduced water demand and reduced pumping. By reducing water demand by 159.320 million gallons, the City can save 133,351 kilowatts and $9,300 in energy costs. That's enough energy to supply 35 Evanston residents with electricity for a year. This energy use reduction can contribute to the achievement of Evanston's Climate Action Plan greenhouse gas reduction goal.[102]

Figure 16. Top 20 customer water use



Source: City of Evanston.

102 City of Evanston. "Evanston Climate Action Plan." November 2008. http://www.cityofevanston.org/pdf/ECAP.pdf.

Table 8. Evanston water conservation and efficiency plan implementation schedule

				2012		2013				2014				2015	
CATEGORY	#	TYPE	RECOMMENDATION	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Utility	1	Communication and Outreach	Increase water related information dissemination												
	2	Activity	Update water billing practices												
City	3	Policy	Incorporate sustainable water policies into City Departments and functions												
	4	Communication and Outreach	Promote communication and outreach on water conservation behaviors												
	5	Activity	Promote tap water and reduce bottled water use												
Residents	6	Activity	Reduce indoor water use from toilets												
	7	Activity	Reduce outdoor water use												
Businesses and Institutions	8	Communication and Outreach	Promote water conservation to customers and incorporate water efficiency internally												
	9	Activity	Reduce Top 20 customer water use												

Source: CMAP, City of Evanston.

Section 5: Plan Implementation and Schedule

This plan has an eight-year implementation schedule from 2012-2020. In coordination with the City, CMAP developed a schedule for the first three years of implementation (Table 8) based on current knowledge and budgeting. Priorities may change as costs and benefits are established and as the level of available resources increase or decrease. Evaluating city water consumption, tracking Utility water and energy use, and outreach to stakeholders should be done every year.

At a minimum, the City should reevaluate this schedule and the progress of Plan implementation in 2015.

To better understand implementation options, it is recommended that Evanston complete a cost-benefit analysis of all recommendations. For some recommendations, estimating water savings is not plausible and for others more details are needed to produce such data. At the time of plan production, a cost-benefit analysis was not completed. After a cost-benefit analysis is completed, the City may re-prioritize the recommendations accordingly and assign available resources. There are several tools and services available to perform this task. For example, the Alliance for Water Efficiency offers an excel-based tracking tool to evaluate the costs and benefits of implementing a water conservation and efficiency plan.[103] Estimates could also be made in house with the combined effort of internal departments.

Partnerships will also be integral to successful plan implementation as they pull together resources like funding, staff time, and outreach efforts to accomplish a common goal. Local partnerships can be with businesses, environmental groups, universities, or other City departments. Regional partnerships can also provide value to plan implementation. Several organizations that should be considered for future partnerships include the Metropolitan Planning Council (MPC), the Center for Neighborhood Technology (CNT), and U.S. EPA Region 5 among others. Furthermore, CMAP has a continued interest in partnering with Evanston, when appropriate.

103 Alliance for Water Efficiency. "AWE Water Conservation Tracking Tool." http://www.allianceforwaterefficiency.org/Tracking-Tool.aspx.

Image courtesy of the City of Evanston.

Section 6:
Utility Revenue and Funding Implementation

Conservation and Utility Revenue

If effectively implemented, this Plan will save water and energy for the city. However, this desired result can have some unintended consequences. The less water the Utility sells the less revenue the Utility collects from residents, businesses, and institutions, assuming rates stay constant.[104]

Revenue is used to maintain the water system, pay for electricity costs, fund Utility staff, and provide for other costs that are essential to operating a utility. For utility management, one concern is that reduced revenues will decrease the availability of resources needed to effectively operate the facilities and system. However there are several potential benefits of reduced demand that can, in some cases, help minimize revenue impacts.

For example, reduced water demand can reduce the amount of chemicals needed for treatment and reduce energy use from pumping. Furthermore there can be long-term maintenance benefits such as reduced use of pumps, pipes, and other infrastructure, which may extend the life cycle of such equipment.[105] Reduced water use also produces less wastewater and can extend the life cycle of wastewater equipment as well as reduce energy use from pumping and treating wastewater. These savings could be negligible or substantial depending on many other interconnected factors including current and future increases in per unit cost of chemicals and energy. More study is needed to determine whether these cost and resource savings will apply to Evanston. When implementing a water conservation and efficiency plan, a utility will need to evaluate demand reductions and impacts on revenue on a regular basis and may need to allow for incremental price adjustments along the way.

Another benefit of actively promoting water conservation is improving the public's perception of a water utility. By supporting the public's participation in plan recommendation while simultaneously implementing supply side efficiency practices, Evanston's Utility can become a sustainable leader in the community. Developing such a relationship with customers can be helpful if emergency situations arise or support is needed to continue conservation and efficiency efforts.

104 Assuming the rate structure remains the same during plan implementation.

105 American Water Works Association. "Water Conservation Programs-A Planning Program, M52." 2006.

Funding the Plan

The implementation of water conservation and efficiency measures often require both money and time upfront. The level of resources available will directly affect the degree to which this plan can be implemented. Funding for water conservation is most often generated at the local level. Local funding allows for the most flexibility and creativity in implementing a plan. Additionally building partnerships with local businesses on rebate programs is one effective technique to share the cost of implementation and to engage the community in water conservation. Staff resources are also needed to implement this plan. The Utility should consider implementation costs (staff time, hardware, informational materials, and rebates), the cost to the Utility from reduced revenues, and other costs to customers or partners to maintain the conservation measures (native landscaping, irrigation improvements).[106] A Utility should pursue those activities that will be cost effective in the long-term while keeping in mind that funding conservation and efficiency is funding spent toward the long-term sustainability of the Utility and ultimately will benefit both the Utility and its customers.

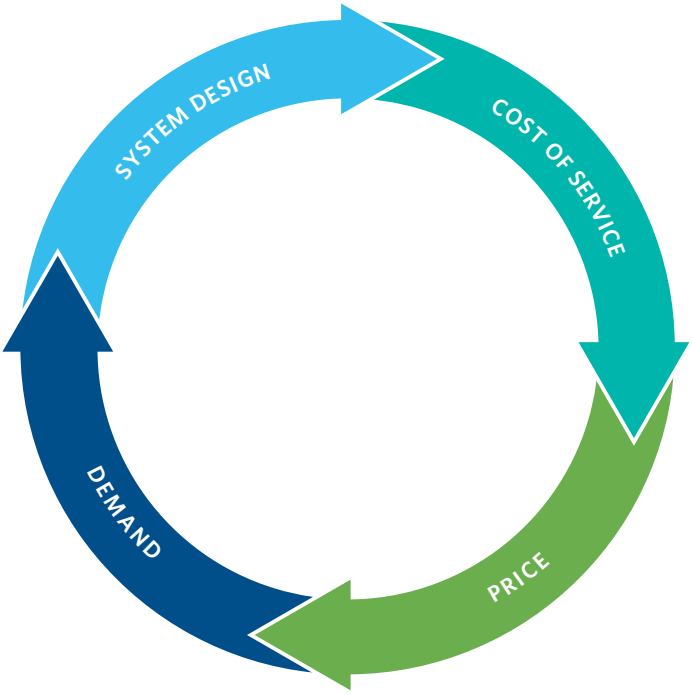
Even though Evanston doesn't currently have funding budgeted toward plan implementation, there are a variety of funding options Evanston has access to for this purpose including: full cost and conservation pricing, user fees, partnerships, discretionary monies, and grant opportunities.

Full Cost and Conservation pricing

The pricing of water plays an important role in providing community water service. As shown in Figure 17, there is a circular relationship between price, demand, system management, and costs. According to the *law of demand*, when price increases, the amount of water demanded decreases (and vice versa).[107] Just like electric systems, water systems need to be attentive to their demand loads because a water system is designed and managed accordingly. The design of the system — how the system serves demand — affects the costs of service.[108] The costs of providing service are recovered though charging for water.

This circular relationship between price, demand, system design, and costs, means that an incorrect price — for example, a price set "too low" that undercharges for water — sends incorrect signals to consumers. A low price will cause consumers to demand "too much" water, resulting in inefficient water use and water waste. Underpricing will also fail to provide adequate revenue to build adequate reserves and keep up the system. Ultimately, continuing to charge a price that is "too low" over sustained periods of time may

Figure 17 . Role of price in system sustainability



Source: Adapted from Wisconsin Public Utilty Commission.

106 Ibid.

107 According to the economic "law of demand" when price decreases, customers buy more (and vice versa), and water is no exception to this law. The effect of a change in water price on water use can be measured with the price elasticity of demand. Price elasticity of demand is calculated by taking the ratio of the percent change in quantity demanded to the percent change in price — for example, if water price increased 10 percent and the quantity of water use falls by 4 percent, then the price elasticity of demand is equal to 4 percent divided by 10 percent, or 0.4. The price elasticity of demand for urban water has been estimated to generally fall within the range of 0.3 to 0.4, meaning for every 10 percent increase in price, there is a reduction in the quantity of water demanded ranging from 3 percent to 4 percent.

108 Designing the system to meet demand load requires investment (in treatment plants, water storage, transmission lines, distribution mains, pumping stations, etc.) and also covering costs of repair, replace, and rehabilitate existing infrastructure investment. Decisions regarding the system design therefore affect the costs of service though the type and timing of infrastructure investment undertaken.

threaten the ability to meet the communities level of service, health and safety standards, and potentially create supply and demand imbalances.[109]

Since every municipality is unique and will therefore set its own water rate objectives, which will be suited to the local conditions. Such goals for water rates can include: full cost recovery, affordability, equitability, and more. Since revenues generated by water rates are, and will continue to be, the primary source of revenue for most community water systems, charging water rates that recover full costs comprise part of a larger strategy for ensuring adequate revenue. Full cost water rates can support necessary revenue generation to sustain necessary investments in water infrastructure and encourage efficient water use.

Full-cost recovery involves "recouping the *entire cost* of water provision through rates, fees, charges, and other revenue derived from water sales."[110] Cost recovery refers to the ability of the Utility to raise sufficient revenues to pay the cost of water and sewage services, including costs of operations, maintenance, repair, and ultimate replacement of the infrastructure. The term 'full cost pricing' has also been used to include all resource costs occurring as a result of producing and consuming a product, including production costs.[111]

The AWWA issued a policy statement defining and supporting full cost pricing policies including:

- Water service rates covering operation and maintenance, capital costs, working capital, and required reserves.
- Maintenance of utility accounts separate from other municipal functions.
- Use of a uniform system of accounts based on generally accepted accounting principles, such as accounting procedures outlined in the AWWA accounting text.
- Fair and equitable cost allocation of water service costs across customer classes.
- Asset record maintenance, both for the utilities' use in infrastructure management as well as a means of communicating with the public about needed system improvements and their costs.[112]

Going forward, the City should assess their need and status regarding full cost pricing policies as part of a larger strategy to promote water efficiency. Including the cost and impact of conservation and efficiency in the current rate structure is the preferred funding option for plan implementation as it institutionalizes water conservation and efficiency as a legitimate priority. This strategy offers long-term stability when compared to other funding options.

After accounting for the full cost of providing water service, conservation-orientated rate structures offer an additional incentive to conserve water. There are a variety of conservation-orientated rate structures a municipality can consider including inclining rates with volumetric blocks, seasonal pricing, and water budget rate structures. Inclining rates with volumetric blocks encourage conservation by increasing the unit charge for water at higher levels of use. Seasonal pricing charges a higher rate for use during a particular time of year, usually the summer months to reduce the peak demand from outdoor water use. Water budget rate structures develop a tailored water use estimate for each customer and increase rates after budget is exceeded.[113] Revenue collected from conservation-orientated rate structures can be used to fund water conservation and efficiency. In summary, "The idea behind conservation-oriented pricing is to charge customers for the full cost of water service and, over the long-term, bring supply and demand into balance."[114] Evanston may also considering adopting conservation-orientated rates in the future to further encourage conservation.

109 Note that this logic can be reversed for a price that is set "too high," with potential harm to consumer welfare and economic development, and revenue over-recovery.

110 U.S. Environmental Protection Agency, Office of Water. "Case Studies of Sustainable Water and Wastewater Pricing." December 2005. **http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_fullcost_pricing_case_studies.pdf**.

111 Rogers, Bhatia, and Huber, 1998.

112 U.S. Environmental Protection Agency. "Water and Sewer Rates: Full Cost Recovery." March 2006. **http://www.epa.gov/safewater/smallsystems/pdfs/guide_smallsystems_fullcost_pricing_case_studies.pdf**; American Water Works Association. Statement of Policy On Public Water Supply Matters–Financing, Accounting and Rates. Revised January 16, 2005. **http://www.awwa.org/about/oandc/officialdocs/AWWASTAT.cfm**.

113 American Water Works Association. "Water Conservation Programs-A Planning Program, M52." 2006.

114 Chesnutt, Thomas W. et al, "Designing, Evaluating, and Implementing Conservation Rate Structures," July 1997. Handbook sponsored by the California Urban Water Conservation Council.

User Fees

Evanston could choose to establish a fee to fund the implementation of this plan. Typically, a fee is directly added to the existing water bill and can range from a few cents upwards to several dollars or more depending on the needs of the community. The revenue collected from the fee funds conservation measures (rebates, education, etc.) and staff. Conservation surcharge, water fee, and conservation fee are a few examples of name variations of a user fee. In Albuquerque, New Mexico a water bill surcharge created a $2.4 million budget for water conservation. The City returned over 50 percent of this revenue to its customers in the form of residential and commercial rebates, public education workshops, and demonstration gardens.[115] Furthermore, user fees can be targeted to specific water sectors to fund related programs as was the case in Pleasanton, California where a $0.05/ccf (cubic feet) surcharge was applied to irrigation accounts to create irrigation equipment upgrade sponsorships that improve efficiency.[116] In some cases, a water conservation fee ordinance can be passed to define fees and direct revenue as was implemented in Santa Fe, New Mexico.[117]

In addition, water conservation fees associated with connecting new developments and major renovations to water service or expanded water service can fund water conservation. The fee can be calculated by number of connections or by total square footage. In Lincoln, Massachusetts, a water conservation fee was calculated based on the total new or renovated built square footage ranging between $0.50 and $2.00 per square foot.[118]

Partnerships with Electricity Utilities

In order to share the benefits and costs of water conservation, electricity utilities will often partner with water utilities to offer rebates, outreach, or appliances. High-efficiency clothes washers and low-flow showerheads provide both water and energy savings. In 2009, the City of Austin, Texas offered residents a $150 rebate for purchasing a high-efficiency clothes washer. Austin Water provided $100 and local energy companies, either Austin Energy (for households with electric water heaters) or Texas Gas Service (for households with gas water heaters), provided the remaining $50 to complete the full rebate amount.[119]

Partnerships with/by Way of Nonprofits

Water conservation can be an initiative for existing nonprofit groups and associations, or new entities can be formed to meet the water conservation needs of a region or community. Although nonprofits do not have local authority to require a user fee, they can have voluntary dues paid by members to provide collective services such as public information and education as well as coordinating efforts between municipalities. The Arizona Municipal Water Users Association (AMWUA), a nonprofit corporation located in Maricopa County, receives dues from 10 municipalities and in turn provides a wide range of services including landscaping brochures, legislative updates, an online library, and educational seminars.[120] Similar partnerships could be formed between Evanston and its wholesale customers.

Discretionary Funds

When permanent funding for water conservation is not available and the needs of a community are apparent, officials can choose to utilize discretionary funds, when available, for water conservation programs. This source of funding should be a short-term solution, as ideally a local government would establish a permanent funding source for water conservation.

Grant Opportunities

Grants provide temporary funding and are not considered a long-term funding source for water conservation and efficiency in a community. Grants can be effectively used to implement specific recommendations in the Plan such as a toilet rebate program for a predetermined period of time. Government agencies such as the U.S. EPA, private foundations, and nonprofits may be sources for grant opportunities. Furthermore the connection between water and energy savings established in this Plan could open up opportunities from energy-related grants.

115 American Water Works Association. "Water Conservation Programs-A Planning Program, M52." 2006. Page 111.

116 Pleasanton, CA. Commercial Irrigation System Rebate Program. **http://www.ci.pleasanton.ca.us/pdf/wcp-rebateprogram.pdf**.

117 Santa Fe, New Mexico. Water Conservation Program Charge, January 9, 2008. **http://www.santafenm.gov/index.aspx?NID=1272&ART=2804&admin=1.**

118 Town of Lincoln Massachusetts. Annual Water Quality Report, 2006. **http://www.lincolntown.org/CCR%202006.pdf**.

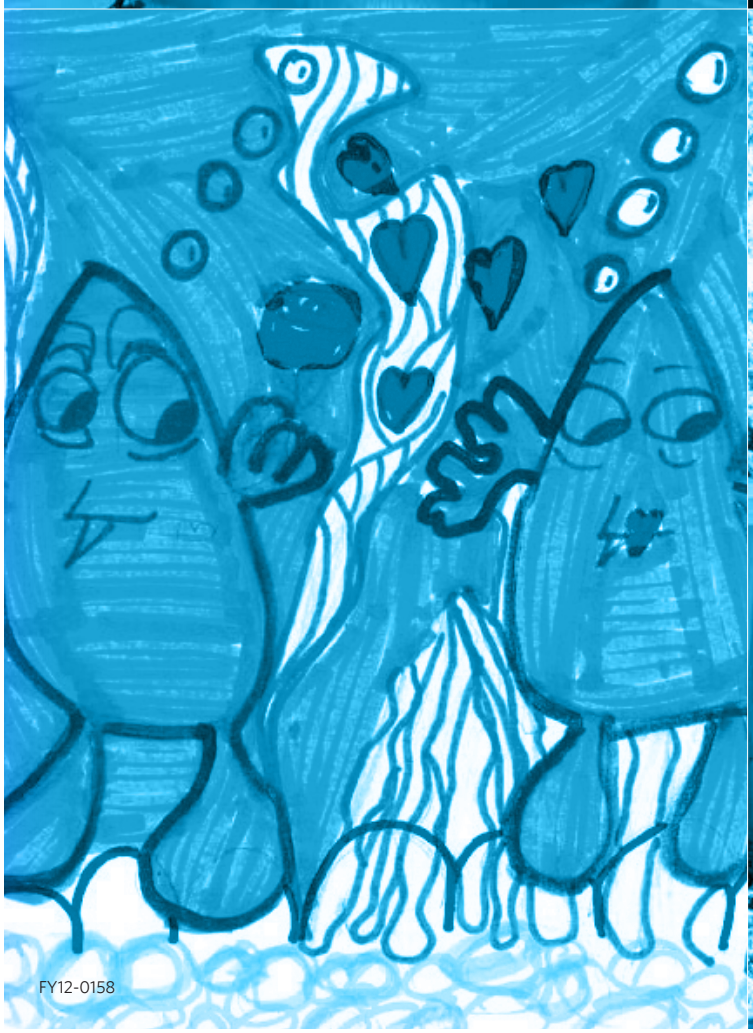
119 City of Austin. 2009. No longer available, orginally referenced in CMAP's Water 2050 Report. **http://www.cmap.illinois.gov/water-2050**.

120 Arizona Municipal Water Users Association, 2009. **http://amwua.org/**.

Recommendation Summary Table

Table 9. Evanston water conservation and efficiency plan recommendations

CATEGORY	#	TYPE	OBJECTIVE	STRATEGY	
Utility	1	Communication and Outreach	Increase water-related information dissemination	Short Term	Link Plan and water-related information on City website upon completion. Continue to include water conservation information in the Consumer Confidence Report.
				Long Term	Incorporate leakage rates and leak detection and repair practices in the Consumer Confidence Report published by Utility.
	2	Activity	Update water billing practices	Short Term	Utilize existing billing software to provide water use information in gallons, comparative use data, and water conservation tips, where possible.
				Long Term	Explore new billing software to provide water use information in gallons, comparative use data, and water conservation tips. Develop web-based water use tracking system that provides real time data.
City	3	Policy	Incorporate sustainable water policies into City departments and functions	Short Term	Develop water conservation and efficiency policy. Review and consider adoption of CMAP's Model Water Use Conservation Ordinance. Complete water use audits of all municipal buildings.
				Long Term	Ongoing review of the cost of municipal services. Work toward incorporating full cost pricing.
	4	Communication and Outreach	Promote communication and outreach on water conservation behaviors	Short Term	Create "Top 5" water saving tips list to post on website, distribute through water bills, and disseminate at public events. Participate in annual water-related event.
				Long Term	Establish widely recognized public information program with varying methods of outreach outlets. Participate in annual water-related event.
	5	Activity	Promote tap water and reduce bottled water use	Short Term	Participate in Only Tap Water Deliver's campaign. Encourage the use of tap water and reusable water bottles. Remove bottled water from vending machines in municipal buildings. Work with Evanston Environment Board to complete life cycle analysis.
				Long Term	Inventory opportunities for new and retrofitted public water fountains in municipal buildings as well as public open spaces. Explore development of a mobile drinking water fountain for public events.
Residents	6	Activity	Reduce indoor water use from toilets	Short Term	Upgrade to high-efficiency toilet if appropriate. Regularly test toilet for leaks using leak detection tablets or food coloring. Evanston should consider distributing leak detection tablets at City events.
				Long Term	To assist with toilet replacement, the City should develop a toilet rebate program if resources are available.
	7	Activity	Reduce outdoor water use	Short Term	Consider alternative watering practices, utilize rain gauges, and transition lawn to native/low water using plants. The City should develop outreach materials on these topics and host related workshops for residents.
				Long Term	Install rain barrel-(s), if locally appropriate. To encourage rain barrel installation, Evanston should provide rebates, if resources are available.
Businesses and Institutions	8	Communication and Outreach	Promote water conservation to customers and incorporate water efficiency internally	Short Term	Distribute informational cards that encourage customers to reduce water use. Evanston should provide card templates to businesses.
				Long Term	Upgrade to high-efficiency pre-rinse spray valves, if appropriate. The City should offer a rebate if resources are available.
	9	Activity	Reduce Top 20 customer water use	Short Term	Partner with Water Department to explore water saving strategies. The Water Department should initiate contact with these users.
				Long Term	Implement cost effective strategies.



Chicago Metropolitan
Agency for Planning

233 South Wacker Drive, Suite 800
Chicago, IL 60606

312 454 0400
info@cmap.illinois.gov

www.cmap.illinois.gov

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