

Clarkdale anticipates it will change out 135 water meters within the next year.

Effluent Use

Clarkdale captures and reuses all the effluent it generates. In 2008, the town generated 126 AF, and delivered 125 AF for recharge. The town is working on upgrading the quality of its effluent, so more reuse options will be available in the future.

Additional Information

The town has submitted grant applications to generate solar electricity for operating the water system.

Lake Havasu City 

Background

Lake Havasu City is located along the Colorado River on the eastern shore of Lake Havasu. The city is the largest municipality in Mohave County, with an estimated population of 55,502 residents.*

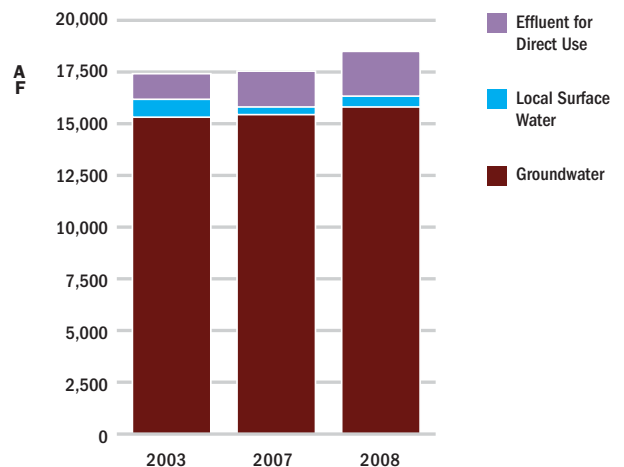
Lying in the Basin and Range physiographic province, Lake Havasu City has a low-elevation, desert climate, with average maximum and minimum temperatures of 86.6 and 63.9 degrees (°F), respectively. Average annual precipitation is 4.2 inches.†

Water Supply and Deliveries

In 2008, 86% of the water supplied to Lake Havasu City was sourced from groundwater wells, with a small amount directly diverted from Lake Havasu. Legally, most groundwater within the Lake Havasu service area is considered Colorado River water and is tracked according to Lower Colorado River decree accounting. Over the time period of 2003-2008, the city’s system-wide potable treated deliveries remained relatively flat, even while population increased 10%. The city attributes

this response to a progressive sewer rate structure based on water consumption (enacted to fund the transition of Lake Havasu City from a septic to a sewer system) and the general economic downturn of the past several years. Approximately half of all deliveries in 2008 went to single-family residential accounts and 10% was delivered for turf management.

SOURCES OF WATER FOR LAKE HAVASU CITY

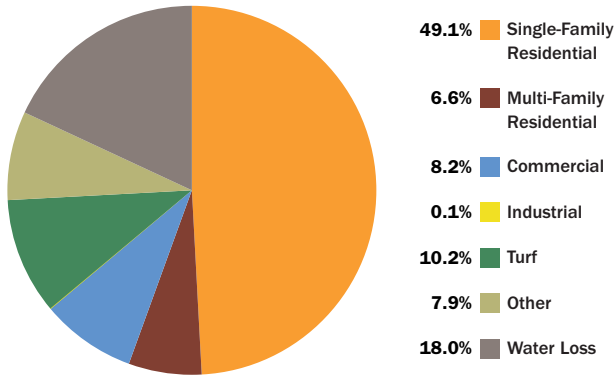


* Arizona Department of Commerce. 2009. *Arizona population estimates, 2009*. Available at: <http://www.azcommerce.com/econinfo/demographics/Population+Estimates.html> (accessed May 5, 2010).

† Personal communication between Doyle Wilson, Water Resource Coordinator, Lake Havasu City Public Works, and Drew Beckwith, July 20, 2010.



2008 WATER USE IN LAKE HAVASU CITY



Per Capita

Lake Havasu City notably reduced its gallons per capita per day (GPCD) water use from 2003 through 2008 across all metrics: single-family residential (-14.9% change), system-wide potable (-14.2% change), and system-wide total (-4.2% change).

Lake Havasu City GPCD

Per Capita Water Use	2003	2007	2008
Single-Family Residential ^a	145	133	124
System-Wide Potable ^b	259	240	222
System-Wide Total ^c	319	290	306

^a Treated water deliveries to single-family accounts ÷ single-family residential population

^b Total treated water delivered ÷ service area population

^c Total raw water from all supply sources + direct effluent use ÷ service area population

Rate Structure

Lake Havasu City uses a four-tier inclining block rate for single-family water accounts, measured in Ccf.

Usage Per Dwelling Unit	Cost
0–9,724 gallons (0–13 Ccf)	\$1.35 per 748 gallons (per Ccf)
9,725–18,700 gallons (13.01–25 Ccf)	\$1.76 per 748 gallons (per Ccf)
18,701–37,400 gallons (25.01–50 Ccf)	\$2.16 per 748 gallons (per Ccf)
Over 37,400 gallons (over 50 Ccf)	\$2.70 per 748 gallons (per Ccf)

Residential accounts have a base service fee of \$5.16, which comprises approximately 28% of an average customer’s monthly bill for 10,000 gallons. The slope of the Lake Havasu City’s average price curve is 0.0135, indicating that the average price of water increases as consumption volume increases.

Conservation Measures

As a Community Water System in the Lake Havasu Basin, Lake Havasu City has prepared a water conservation plan as part of its system water plan. In addition, the city is also in the process of updating its conservation plan, as required by the Bureau of Reclamation (BoR), which will be completed by the end of 2010.

Customer Rebates

Lake Havasu City offered a rebate program in 2008 for replacing high-volume toilets with new low-flow models and a partial rebate on swimming pool covers. BoR grant funds were not available in 2009, but a new grant will initiate another rebate program covering toilets, pool covers, and hot water recirculation pumps in 2010-2011.

Ordinances/Rules

Commercial and Industrial Water Conservation and Sustainability* – Water conservation measures shall be addressed through landscape and irrigation design. Sustainable landscapes are encouraged through actions

* *Id.* § 14.32.030(G).



that conserve, recycle, and reuse the resources that are invested in landscapes. The use of drought-tolerant landscape materials and low-water-flow irrigation systems is encouraged.

Water Conservation^{*} – Bodies of water (e.g., fountains, streams, ponds, lakes, and displays using water) shall be discouraged in single and two-family residential properties. Xeriscape landscaping materials and methods shall be encouraged. All landscaping materials and irrigation practices shall be in compliance with the city’s water conservation plan and water conservation plant material list.

Specific Low-Flow Fixtures and Devices Required[†] – Specific low-flow plumbing fixtures and devices shall be installed in every new building and when a replacement fixture or device is required in any building.

Bodies of Water[‡] – Outdoor bodies of water (e.g., fountains, streams, lakes, and displays using water) shall not be used in multifamily, commercial, or industrial developments, and are discouraged on single- and two-family residential properties.

Waste of Water Prohibited[§] – Wasting water is prohibited during federally declared Colorado River shortages that result in a direct reduction to the city’s annual allocation.

Water Flow Upon Streets[¶] – It is unlawful for any person to willfully or negligently permit or cause the escape or flow of water in such quantity as to cause flooding, impede vehicular or pedestrian traffic, create a hazardous condition to such traffic or to the public in any manner, or cause damage to public streets and other public facilities of the city.

Education

More than 50% of the city’s water is used for landscape irrigation in the residential sector. Consequently, Lake Havasu City has focused its education efforts on reducing outdoor water use for the past several years.

Education and Outreach, “Slow the Flow Campaign” – The city promotes this educational campaign during summer months by utilizing all forms of media advertising. The

^{*} *Id.* § 13.16.090.

[†] *Id.* §§ 12.08.100(A)-(E).

[‡] *Id.* §§ 14.32.020(E),(D).

[§] *Id.* § 7.20.020.

[¶] *Id.* § 9.16.140.

city also has proposed a Water Conservation Community Campaign.

Brochure Program – This program is targeted to different user types, with different methods of education being developed for each class to target the most effective conservation methods for residential, commercial, and school customers.

Customer Audit Program – The city offers free water audits that include water pressure checks, high-water-use complaints, and interior and exterior evaluations, supplemented with the city’s landscape ordinance materials. Lake Havasu City proactively assesses high water users in each customer category and targets these accounts for audits and education.

Landscape Audits – These audits are provided to supplement city landscape ordinance materials.

Water Conservation Webpage – Lake Havasu City has a water conservation webpage with links to its Low-Water Tree and Plant Guide and its Recommended Landscape Plant List for Reduced Water Demand.

Water Conservation Workshops – The city will begin offering water conservation workshops to the general public on a quarterly basis staffed by the city’s water conservation officer. Workshops will cover how to read a water meter and how to properly use irrigation systems, especially during the winter.

Water Conservation Classes – The water conservation officer provides education to second- and fourth-grade public school students.

Implementation of Conservation Measures

The city maintains a measurement and accounting system to provide quantitative and qualitative tracking and assessment of its conservation plan programs. Each year, Lake Havasu City completes about 1,000 water audits and reaches 1,200 students through its programs.

Funding for Conservation

In 2008, Lake Havasu City had a conservation budget of \$70,000, approximately 1.4% of the total water utility’s budget. The city has two employees in the water conservation department and each year spends about \$1.30 per customer.



Goals for Conservation Savings

In 2005, Lake Havasu adopted goals to reduce water use by 10-30 GPCD over a five-year period. New goals are still being formalized in the 2010 water conservation plan, but generally include plans to:

- Convert as many potable nonresidential irrigators to effluent as possible.
- Better educate residential customers about landscape irrigation practices and maintenance.
- Develop an effluent injection program that will allow the city to retrieve the water without it counting against its Colorado River allocation.

Water Loss

In 2008, the city recorded 2,952 AF (961 million gallons) of water loss, representing 18% of total supplies. In 2007, the city reported 8.6% water loss. Lake Havasu City has experienced several challenges with metering inflows to its potable water treatment plant—replacing the meter on the 48” intake pipe four times in the past decade. The city recognizes that losses occur between the treatment plant and utility customers, estimating these losses to be between 8% and 10%. Through the summer of 2010, the utility will recalibrate its meters and be able to more accurately report water loss.

Supply-Side Efficiency Measures

The city has an active water distribution system audit program and uses leak detection equipment to identify and repair leaks. Program elements include water main replacements, replacing plastic pipes with more durable copper pipe, and line leak detection—where over 200 miles of line has been checked in the last five years.

The city has constructed a flexible effluent system that allows transport of treated and untreated wastewater to or from any of the three wastewater facilities. This promotes the use of effluent for golf courses, highway landscaping, and future non-potable customers.

Effluent Use

The city reused all of the effluent it generated in 2008 (3,327 AF). Turf irrigation directly received 64% of the effluent, and the remainder was recharged. Lake Havasu City increased effluent deliveries for turf by 192% between 2002 and 2009.

The city is also developing a vadose zone recharge program that will allow maximum utilization of effluent. In the Lake Havasu area, water that percolates below the level of the lake (projected underground to the mountains) is considered Colorado River water. The program will recharge effluent above this “accounting surface” so it can be reused by the city without counting against its Colorado River allocation.

Additional Information

Water quality for Lake Havasu City is high in manganese and arsenic. The build-up of corrosive byproducts in water mains necessitated extensive hydrant flushing to keep water acceptable for drinking and clothes washing. The city recently upgraded to a French-designed, bacteria-based, water treatment plant that removes excess manganese from the water. With the improved water quality, water main flushing is no longer required.

From 2006-2008, park irrigation systems were renovated to replace outdated electrical material and install flow meters that would allow the system to shut down automatically when a break or a high flow occurs. Some of the parks will also be converted to effluent use. This program was funded through a 50-50 water conservation fund with the BoR.

Lake Havasu City is also organizing a citizens group to help develop various water conservation education products, including citizen workshops, teacher workshops, and brochures.