



Diversion Dams

Diversion dams divert water from its natural course to supply municipal systems, support irrigation and industrial needs and produce hydroelectric power. Washington County Water Conservancy District owns and operates five diversions.

of pipeline that spans nearly 2,500 square miles. The pipelines are interconnected to hydropower plants, reservoirs, municipal water systems, irrigation canals and more – all of which combine to serve the various needs of our community.

The district delivers its water supplies primarily through a 150-plus mile network

Diversions are monitored and checked daily, 365 days a year.

Quail Creek Diversion Dam

Quail Creek Diversion Dam, the district's largest diversion, consists of a concrete structure and steel roller gate. The 20-foot tall, 40-foot wide roller gate was manufactured in two pieces allowing the plates to separate. The top section can be lowered three feet or raised 10 feet to control the water elevation and flow. The lower section can be raised the full 20 feet to allow an uninterrupted flow of water through the diversion and flush any accumulated sand and silt downstream. During normal conditions, the sections remain closed.

Quail Creek diverts water from the Virgin River through an 8.7-mile steel 66-inch pipeline to the Hurricane Hydropower Plant before emptying into Sand Hollow and/or Quail Creek Reservoirs.

This diversion is of particular importance because of its location on the Virgin River, which allows the district to avoid the highly contaminated waters from the Pah Tempe Hot Springs.



Operational start: 1985 • Cubic feet per second: 170 • Cost: \$4.8 million



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Pah Tempe Hot Springs

Pah Tempe Hot Springs (also known as La Verkin Hot Springs) is a natural hot springs located in Washington County that produces approximately 5,000 gallons per minute, or more than seven million gallons daily, of 107-degree Fahrenheit water. The springs have more than a century of history as a recreational spot for local residents and visitors, but the water's high salinity and contamination levels pose unique challenges to our regional and local water supply.

In 1973, the Bureau of Reclamation and Colorado River Water Quality Improvement Program completed a series of investigations at Pah Tempe. The investigations revealed the springs release an astounding 109,000 tons of salt annually into the Colorado River. This salt content is part of the high total dissolved solids (tds) content of 10,000 parts per million – 10 times the maximum allowed for human consumption. The high temperatures and contamination levels, which have remained consistent through the years, negatively impact water quality and the environment while severely limiting water resource uses.

The need to protect our existing water supplies from blending with the contaminated waters of Pah Tempe has dominated the district's

system designs starting with the Quail Creek Project more than 30 years ago. These design considerations limit the ability to tap into the full flow of the Virgin River for the uses served by the district.

In addition, the district has invested significant time, resources and financing to protect the native, endangered aquatic habitat threatened by Pah Tempe's high temperatures and contamination levels. The district was instrumental in creating the Virgin River Resource Management and Recovery Program (Virgin River Program) and continues to invest as a partner with the program to facilitate recovery actions for fish and other state and federally protected species.

Prior to becoming the sole owner in 2013, the district was a majority owner of the water rights for the springs and surrounding area, having acquired title to the water and land interests in the mid-1990s. The district's primary ownership purpose is to address water quality, environmental issues and water resources posed by the hot springs. The district hopes to see the springs reopened to the public as a community recreational amenity once all the water quality and safety issues have been addressed.



Pah Tempe Hot Springs



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Hydropower Plants

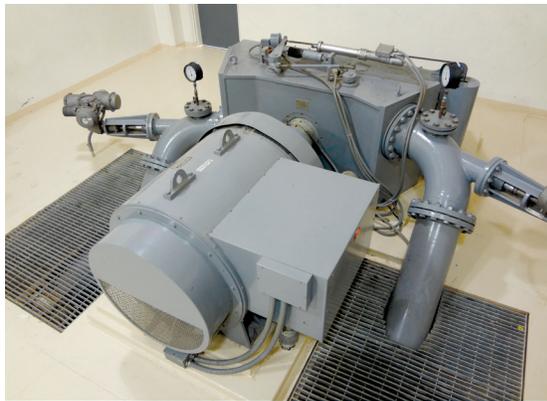
Hydropower plants produce approximately 24-percent of the world's electricity and supply more than one billion people with power annually. It's a domestic, non-polluting, reliable, clean and renewable source of energy – a few of its many advantages compared to other energy sources.

Washington County Water Conservancy District currently owns and operates two hydropower plants: Hurricane and Quail Creek. Construction costs of both plants have been paid in full and now the facilities yield a combined annual revenue of more than \$1 million.

Hurricane Hydro

Hurricane Hydro, a component of the Quail Creek Project, returns water from the plant to the Virgin River near Pah Tempe Hot Springs to satisfy the downstream water rights at

the Washington Fields Diversion. Generated power is sold to Hurricane City to help satisfy its local municipal power needs.

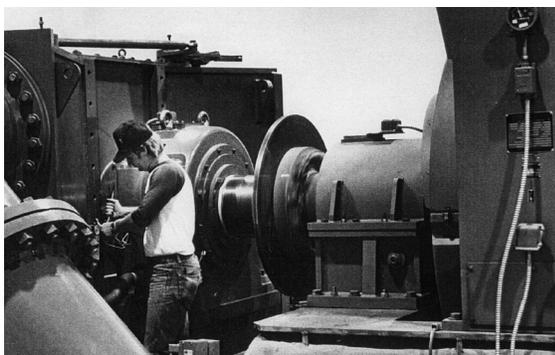


Operational start: 1987 • **Capacity:** 600 kilowatts • **Cost:** \$1.3 million

Quail Creek Hydro

Quail Creek Hydro produces power as a 'run of the pipeline' system, meaning all water that flows through the Quail Creek pipeline travels through this hydropower plant. It uses the pipeline's water pressure, which builds from the 350-foot elevation

difference between the diversion and plant, to generate electricity. After the water flows through the plant, it empties into the Quail Creek or Sand Hollow Reservoirs. Generated power is sold to Dixie Power for local municipal use.



Operational start: 1985 • **Capacity:** 2.4 megawatts • **Cost:** \$2.7 million



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Reservoirs

Washington County Water Conservancy District currently owns and operates seven reservoirs and has plans to construct two more within the next 10 years. Combined, the existing reservoirs have the capacity to store more than 100,000 acre feet (33 billion gallons) of surface water.

The primary function of the reservoirs is to store water to serve the culinary needs of the 150,000 residents of Washington County as well as provide drought and emergency protection. Reservoirs also offer countless recreational, environmental, financial and social benefits.

Quail Creek Reservoir

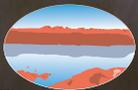
Quail Creek is an off-stream reservoir that receives its water from the Virgin River via a 9-mile underground steel pipeline, which ranges in size from 48 to 66 inches and is capable of moving 170 cubic feet per second (cfs).

In 1986, one year after its completion, the reservoir opened to the public as a state park.

It is a popular boating, camping and fishing area – generating more than \$1 million in state revenue annually. Because of the water's depth (up to 120 feet) and cooler temperature, the reservoir sustains stocked supplies of rainbow trout, bullhead catfish and crappie. Largemouth bass and bluegill thrive in the upper, warmer layers of the reservoir.



Operational start: 1985 • **Storage capacity:** 40,325 acre feet
Cost: \$23.5 million • **Surface water acreage:** 600



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Sand Hollow Reservoir

Sand Hollow is Washington County's largest and most scenic off-stream reservoir. It receives water from the Virgin River via a 13-mile, 60-inch underground steel pipeline capable of moving 120 cubic feet per second (cfs).

Sand Hollow is unique in that it's located on a natural Navajo sandstone aquifer so it constantly percolates and stores water underground. From 2002 through 2012, approximately 100,000 acre feet of water have been put into underground aquifer storage. Scientists estimate there is an underground

storage capacity in excess of 300,000 acre feet. Approximately 8,000 to 10,000 acre feet of water seep into this underground storage area annually, depending on water levels.

In 2003, Sand Hollow opened to the public as a 20,000-acre state park and is one of the state's most visited destinations. The park allows ample opportunities for a wide variety of aquatic recreation, including swimming, skiing, boating and fishing as well as scenic terrain for runners, cyclists, off road vehicle riders and equestrians. It generates more than \$2.8 million in state revenue annually.



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Operational start: 2002 • **Storage capacity:** 51,360 acre feet
Cost: \$37.2 million • **Surface water acreage:** 1,322



Water Treatment Plant

Quail Creek Water Treatment Plant

The Quail Creek Water Treatment Plant is an integral component of Washington County's water system. It provides a safe, reliable water source for the county's 150,000 residents while enhancing the water's taste and smell.

The plant and pipeline system can receive water from three sources: Quail Creek Reservoir, Sand Hollow Reservoir and the Virgin River. The water enters the facility through a 60-inch pipeline capable of transferring 926 gallons per second and flows through multiple treatment processes including filtration and disinfection. Lab technicians and plant operators run multiple water quality tests daily to ensure it meets or surpasses state and federal Safe Drinking Water Act standards for water quality.

During its 20-plus years of production, the plant has undergone a series of expansions to meet increased water demand, improve efficiencies and benefit from new technologies. Following is a summary of major milestones completed to date:

- 1986 – original design complete
- 1989 – plant begins treating/producing up to 10 million gallons of water per day. Cost \$8.5 million
- 1997 – plant enlarged to treat/produce 20 million gallons of water per day. Cost \$15 million
- 2005 – plant enlarged to treat/produce 40 million gallons of water per day. Cost \$26 million
- 2006 – Washington County Water Conservancy District assumes operation and management of the plant
- 2009 – plant expanded to treat/produce



48 million gallons of water per day.
Cost \$200,000

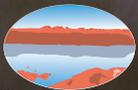
- 2011 – 10-million-gallon storage tank added to improve operational efficiency. Cost \$8.7 million

Washington County Water Conservancy District is currently expanding the plant's filtration system, which will make it possible to treat up to 60 million gallons of water per day beginning in 2014. Estimated project costs are \$2 million.

Operational start: 1989 • **Cost:** \$56.4 million

Current treatment capacity: 48 million gallons of water per day

Design capacity: 80 million gallons of water per day



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