Appendix A

Conservation Plans

Souhegan River Water Management Plan

August 2013

CONSERVATION PLAN

Amherst Country Club (#20190)
Ponemah Green Family Golf Center (#20624)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The Amherst Country Club includes an 18-hole course, while Ponemah Green Family Golf Center includes a 9-hole course, a driving range, chipping and putting greens, and a miniature golf course. Because both golf courses are operated by Amherst Country Club, and the irrigation system for both is managed jointly, this Conservation Plan applies to the combined facilities.

Water Source and Uses

The Amherst Country Club (20190-S01) and Ponemah Green (20624-S01) share an intake on the Souhegan Designated River and withdraw water directly from the river to irrigate the two golf courses (Figure 1). This intake is located in the Town of Amherst, approximately 12 miles upstream of the confluence of the Souhegan and the Merrimack Rivers. The drainage area of the Souhegan River at the point of withdrawal is 142 sq. miles.

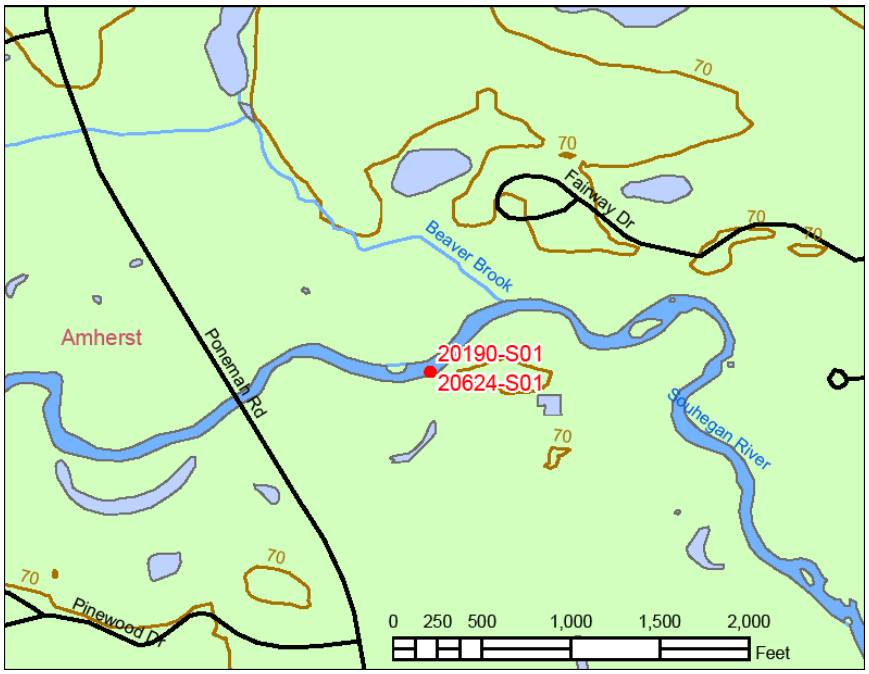

Figure 1 - Location map of the Amherst Country Club – Ponemah Green Family Golf Center withdrawal point

Water is withdrawn from the river by two 7.5 horsepower (hp) sump pumps that rest 8-10 inches off of the bottom of the river, and are connected to two separate 6-inch diameter flexible plastic pipes (Figure 2). The two intake pipes transfer water from the river to the pump house. Just before entering the pump house the intake lines join together and discharge into a manifold pipe that splits the water between three water lines (two 4-inch diameter and one 2-inch diameter) that enter the pump house. Each water line is connected to a pump (two 60 hp and one 17 hp), which discharges into the main distribution pipe for the irrigation system. Flow from the main distribution pipe is regulated electronically and water use is measured using an electronic flow sensor and digitally recorded. Water from the main distribution line is then divided into three subsystems: one each for the front and back 9-holes for the Amherst Country Club and one for the Ponemah Green golf course. Although the subsystems can be turned off individually, this is only done in the case of an emergency (leak); otherwise, the system is operated as a single 27-hole golf course. The timing and length of irrigation for sections of each golf course is further regulated by using 18 programmable satellite controllers.

Figure 2 - Photograph of the Amherst Country Club – Ponemah Green Family Golf Center Souhegan River withdrawal intake.

Water is withdrawn on an "as needed" basis to irrigate 105 acres of fairways, greens and tees at the golf courses. The purpose of irrigating the courses is to ensure that the various grasses used at the courses remain healthy and adequately watered and to meet user expectations in terms of course appearance, condition and "playability."

Neither facility has any available storage capacity in their irrigation systems.

Water Use Patterns

Water use is metered, recorded monthly and reported to the DES on an annual basis. Water use data for Amherst Country Club and Ponemah Green for the years of 1989 through 2008 are summarized in Figures 3 and 4 as well as Tables 1 and 2. The tables include the conversion of water use from thousands of gallons to cubic feet per second (cfs), as well as to cubic feet per second per square mile of the drainage area to allow for comparison with stream flow values reported for the Souhegan Designated River.

Between 1989 and 2008, annual water use has ranged from a low of 8.52 million gallons (1989) to a high of 34.4 million gallons (1999) and has averaged 24.3 million gallons for the reporting period (Figure 3 and Table 1). During this period annual water use increased by 6.86 million gallons or 81 percent. This represents an average increase of 343,300 gallons per year or 4.1 percent per year.

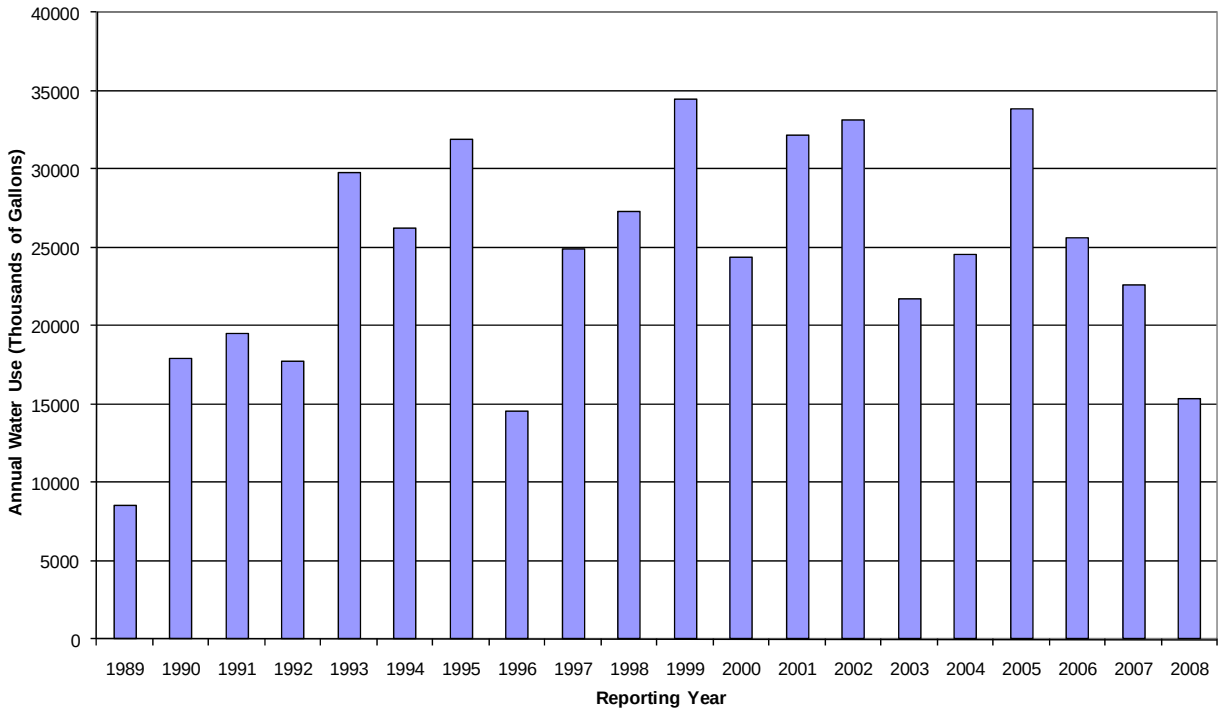

Figure 3 - Amherst Country Club and Ponemah Green Family Golf Center Annual Water Use, 1989-2008

Table 1 - Amherst Country Club and Ponemah Green Family Golf Center Annual Water Use Statistics (1989-2008)

	Low	High	Average
(1,000 gal)	8,520	34,400	24,300
(cfs)	0.0360	0.1460	0.1030
(cfsm at impact point)	0.0003	0.0010	0.0007
(cfsm at Merrimack Gage)	0.0002	0.0009	0.0006

Golf course water withdrawals begin in April, increase to a maximum in July, then decline and end by November (Figure 4). The range in monthly water use reflects the weather conditions that affect the water demand by the golf course turf. Monthly water use for the reporting period has ranged from 0 (multiple occurrences) to 17.1 million gallons (July 2002, a period of drought) and averaged 2.01 million gallons per month over the year (Table 2). When averaged for just the April-October period of water withdrawals, average monthly water use was 3.47 million gallons.

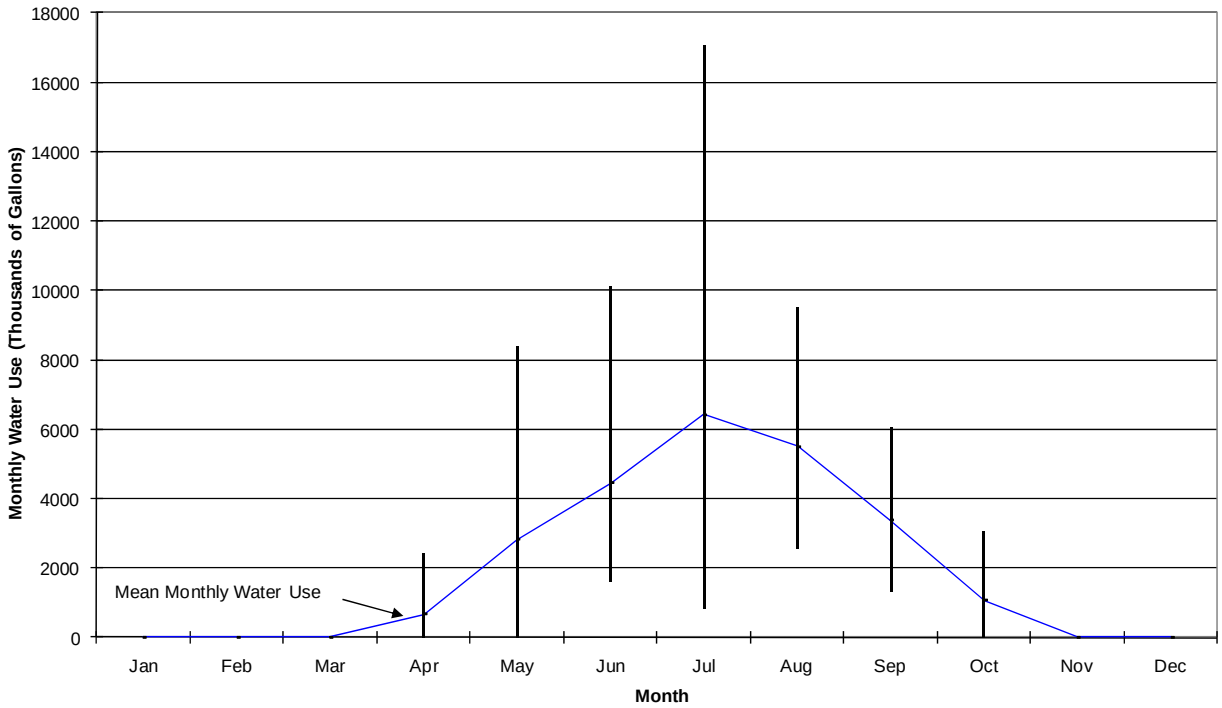

Figure 4 - Amherst Country Club and Ponemah Green Family Golf Center Monthly Water Use, 1989-2008

Table 2 - Amherst Country Club and Ponemah Green Family Golf Center Monthly Water Use Statistics (1989-2008).

	Low	High	Average	Apr - Oct avg
(1,000 gal)	0	17,100	2,010	3,470
(cfs)	0	0.8540	0.1020	0.1760
(cfsm at impact point)	0	0.0060	0.0007	0.0012
(cfsm at Merrimack Gage)	0	0.0050	0.0006	0.0010

Monthly water use data were converted to flow in cubic feet per second by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor. Based on these values, the water use of the Amherst Country Club and Ponemah Green Family Golf Center has

ranged from a minimum of 0 cfs (several months), to a maximum of 0.854 cfs (July 2002) with an average of 0.176 cfs for the April through October period and 0.102 cfs annually during the last 20 years (Table 2).

Env-Wq 2101 Requirements for Water Conservation Plans

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use. As a commercial water user, the Amherst Country Club and Ponemah Green need to maintain its source water meter in accordance with the ”Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing and Maintenance” (AWWA 1999), follow water conservation best management practices developed for golf courses, and use best available water conservation technologies.

Existing Water Conservation Measures

Water use is measured using an electronic flow sensor on the main irrigation distribution line and recorded digitally. The flow measurement sensor is checked annually.

Irrigation is conducted only when needed. The need to irrigate is based on daily checks of the greens, tees and fairway soil moisture and visual turf grass stress. Daily temperature, precipitation and projected local evapotranspiration rates from local weather stations are also used to gage the need for watering.

Water quantities to be applied are controlled by an automatic controller system with timers and automatic shut-off valves. Only greens, fairways and tees are targeted for irrigation. Irrigation is performed overnight (evening to early morning for 10 to 12 hours) to limit water loss to evapotranspiration, although some day-time spot irrigation is conducted. Leaks from the irrigation water distribution are checked constantly from the start up of the system in the spring (April) until it’s shut down (blow out) in the fall (November). A water system maintenance program is in place and sprinkler heads and valves are checked regularly. Drought-resistant turf grasses such as the L93 variety of creeping bent grass have been incorporated on some tee areas. On greens, wetting agents are used to hold moisture during hot periods.

Water Conservation Alternatives and Costs

Amherst Country Club and Ponemah Green Family Golf Center employ most of the water conservation practices recommended by DES in its Environmental Fact Sheet WD-DWGB-26-6, Water Efficiency: Golf Courses. These practices should be continued and, as appropriate, improved on in the future to further conserve water as part of its normal business operations.

Conservation Implementation Schedule

By June 1, 2014, the Amherst Country Club and Ponemah Green Family Golf Center will jointly finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the

Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document the Amherst Country Club's and Ponemah Green Family Golf Center's existing water conservation activities.

Water User Contact Information

Water User: Amherst Golf Club and Ponemah Green Family Golf Center
Address: 72 Ponemah Rd, Amherst, 03031
Contact: Steve Wilson, Golf Course Superintendent
Phone: 673-9908 ext. 20
Email: SWilson@AmherstCountryClub.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

American Water Works Association (AWWA) 1999. Water Meters – Selection, Installation, Testing and Maintenance. Manual of Water Supply Practices M6, Fourth Edition.

Department of Environmental Services (DES) 2013. Water Efficiency: Golf Courses. Environmental Fact Sheet WD-DWGB-26-6 (http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-26-6.pdf).

Personal communication with Jamin Warren, Amherst Country Club.

Personal communication with Steve Wilson, Amherst Country Club.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed by Steve Wilson, Amherst Country Club and Ponemah Green Golf Course.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Chamberlain Falls Dam (#20230)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Chamberlain Falls Dam is located on the main stem of the Souhegan River in Greenville, New Hampshire (Figure 1). The dam is a privately owned hydropower facility licensed by the Federal Energy Regulatory Commission (FERC Project No. 7922) and registered with the DES Dam Bureau (#101.03). According to DES Dam Bureau records, the concrete, stone and masonry dam is 82 feet long and 20 feet high (Figure 2). The dam creates a small impoundment downstream of the Souhegan River Dam.

Water Source and Uses

The hydropower operations at Chamberlain Falls Dam are dependent upon the streamflow of the Souhegan River, thus the hydropower operations are registered as a water user (20230) with DES. Water use is reported quarterly. The dam is operated as run-of-river, meaning that the operation of the dam does not alter the flow of the river and all of the water diverted through the hydroelectric turbines is returned to the river via a penstock 20 feet downstream of the dam, into a bedrock-underlain pool.

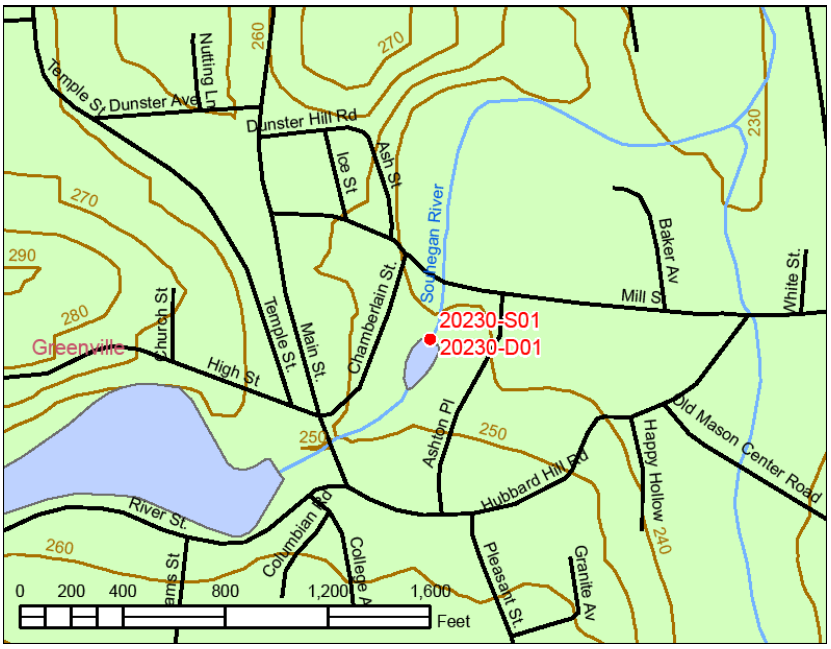

Figure 1 - Location map of the Chamberlain Falls Dam, Greenville, New Hampshire.

If sufficient flow is available, the hydroelectric operations at Chamberlain Falls Dam can produce power 24 hours a day, seven days a week, 365 days a year. Under the terms of its license to operate the facility must allow for a minimum outflow of 10 cubic feet per second (cfs) during the summer (June through September) and 15 cfs during the fall, winter and spring (October through May). When the hydropower facility is not operating, all of the water flows over the top of the dam.

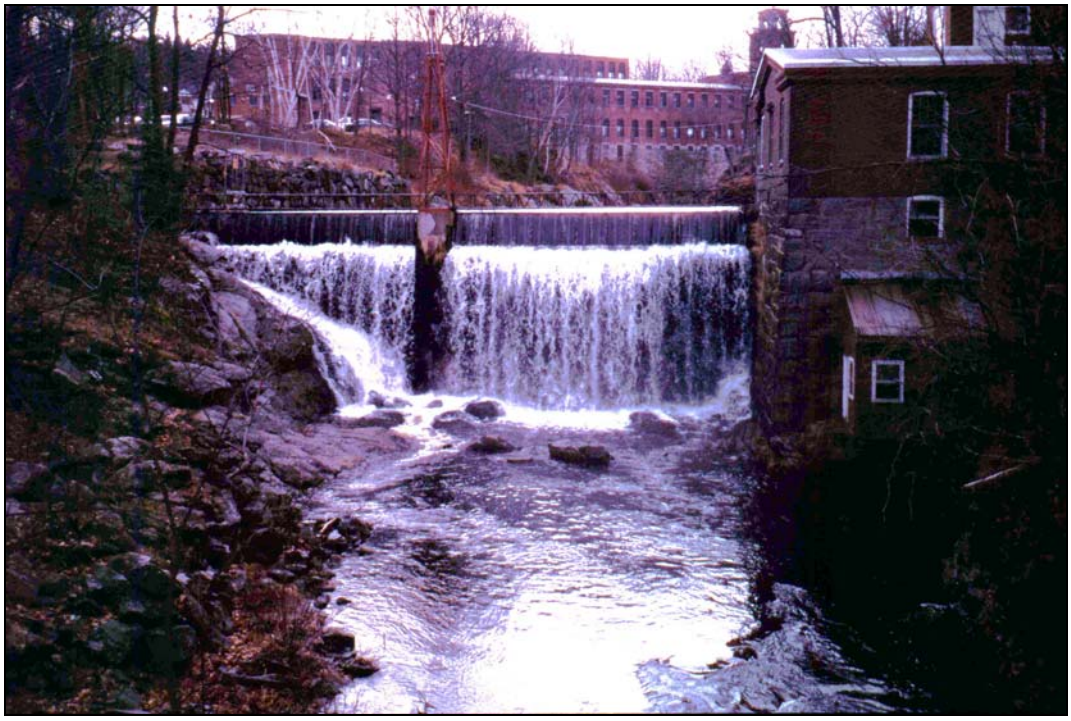

Figure 2 - Photograph of the Chamberlain Falls Dam, Greenville, New Hampshire looking upstream from the Mill Street Bridge (2004)

Water Use Patterns

Water use data for the Chamberlain Falls Dam, from 1989 to 2008 are shown graphically in Figures 3 and 4 and summarized in Tables 1 and 2.

Water use is dependent on river flow. On an annual basis, Chamberlain Falls Dam water use has ranged from a low of 2,100 million gallons (2001) to a high of 7,470 million gallons in 2003 (Figure 3 and Table 1). Average annual water use was 4,680 million gallons for the fifteen years that a complete record was available (1991-1996, 1998, 2000-2006, 2008). Annual water use has not shown significant upward or downward trends and has mirrored water usage at other Souhegan River dams.

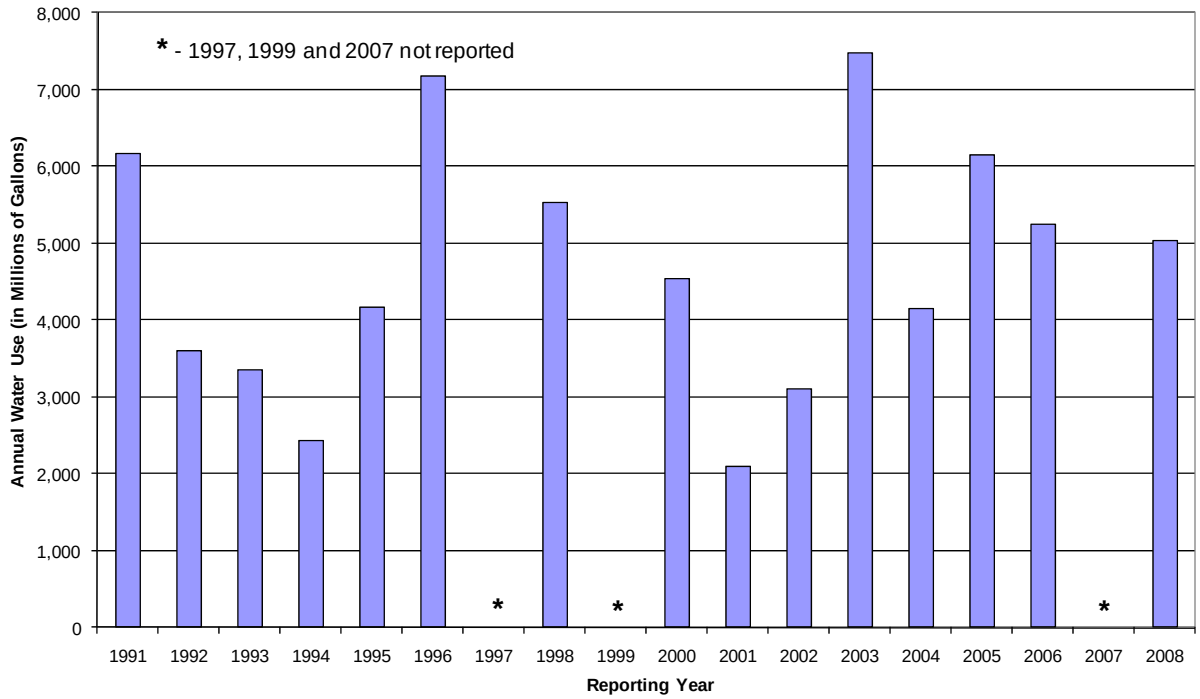

Figure 3 - Chamberlain Falls Dam Annual Water Use 1991 through 2008.

Table 1 - Annual Water Use Statistics (1991-2008).

	Low	High	Average
(million gal)	2,100	7,470	4,680
(cfs)	8.93	31.70	19.90
(cfsm at impact point)	0.301	1.070	0.670
(cfsm at Merrimack Gage)	0.052	0.190	0.116

Chamberlain Falls Dam reported a minimum monthly water use of 0 gallons in June 2008. Maximum monthly water use was 1,170 million gallons (April 2008) and the average monthly usage was 393 million gallons (Figure 4 and Table 2). Generally, monthly water use is consistent, varying between 350 and 500 million gallons per month. Greatest monthly usage is typically during April, when river flows are highest, consistent with other run-of-river dams in New Hampshire.

The monthly use data were converted to cubic feet per second by dividing the monthly totals by days and multiplying them by a flow unit conversion factor. Based on these converted values, daily water use by the Chamberlain Falls Dam has ranged from a minimum of 0 cfs (June 2008) to a maximum of 60.2 cfs (April 2008), and average use was 20.0 cfs for the period of 1989 to 2008 (Table 2).

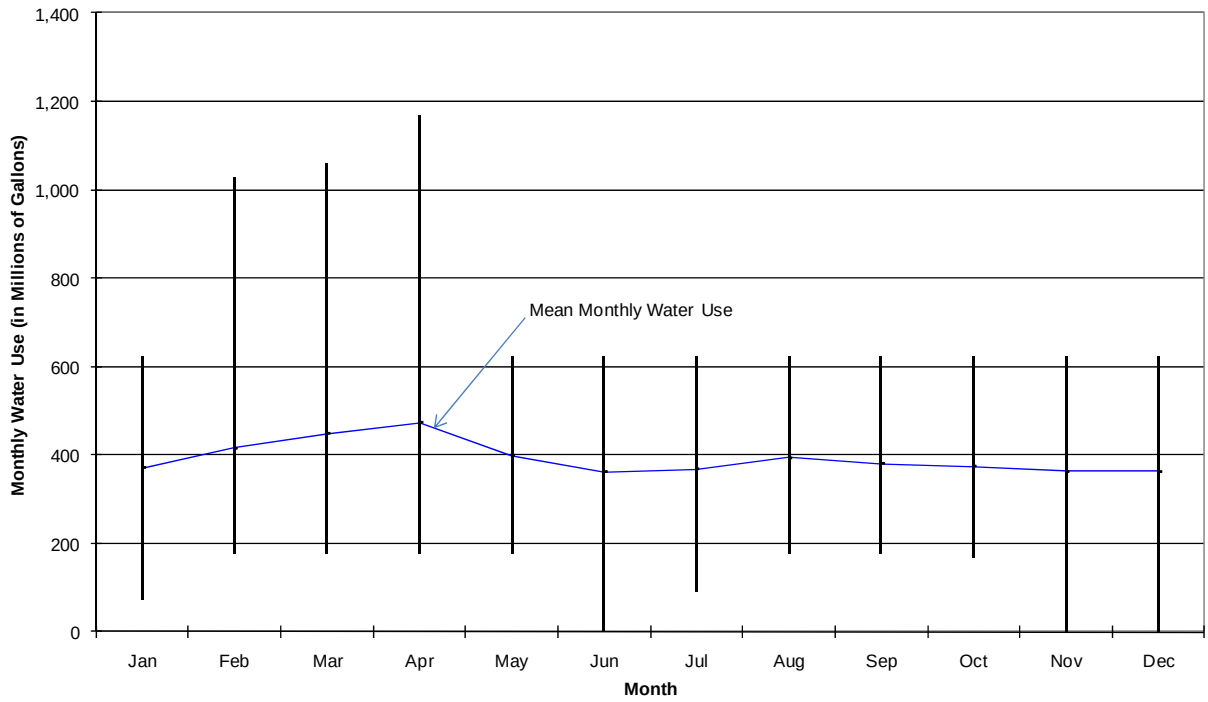

Figure 4 - Chamberlain Falls Dam Monthly Water Use, 1991-2008

Table 2 - Monthly Water Use Statistics (1989-2008)

	Low	High	Average
(million gal)	0	1,170	393
(cfs)	0	60.20	20.00
(cfsm at impact point)	0	2.030	0.676
(cfsm at Merrimack Gage)	0	0.352	0.117

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. Since Chamberlain Falls Dam is hydroelectric power facility with no consumptive water use, a Water Conservation Plan is not required.

Existing Water Conservation Measures

Since Chamberlain Falls Dam is managed as a run-of-river operation, no water conservation measures are required at this facility.

Water Conservation Alternatives and Costs

Since the facility is operated on a run-of-river basis and since there are no consumptive losses associated with its operations, no additional water conservation measures are currently required.

Conservation Implementation Schedule

Because no additional water conservation measures are currently required, there is no conservation implementation schedule.

Water User Contact Information

Water User: Kathleen R. Dolan
Address: PO Box 605, Hillsboro, NH 03244
Contact: Kathleen R. Dolan
Phone: 478-7828
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
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Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

New Hampshire Dam Bureau, NHDAMS Data Sheet for Chamberlain Falls Dam.

Personal communication with Robert Greenwood, Alden Hydro, LLC.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed with input from Robert Greenwood, Alden Hydro, LLC.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Greenville Water Works (#20047)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The water source Greenville Water Works is the Tobey Reservoir. Water pumped from the reservoir is treated and distributed for domestic use in the Town of Greenville, New Hampshire and is used by Pilgrim Foods (#20681) as industrial process water for the production of canned/bottled food products.

Water Source and Uses

The Town of Greenville's water supply is the Tobey Reservoir (20047-S01), which is located in Temple, New Hampshire just off of Route 45 (Figure 1). The Tobey Reservoir is a constructed impoundment created by two dams, one to the north on an unnamed tributary of Temple Brook and a second to the south on Richardson Brook, a tributary of the Souhegan River. To the north, Temple Brook flows into Blood Brook in Wilton, which discharges into the Souhegan River near

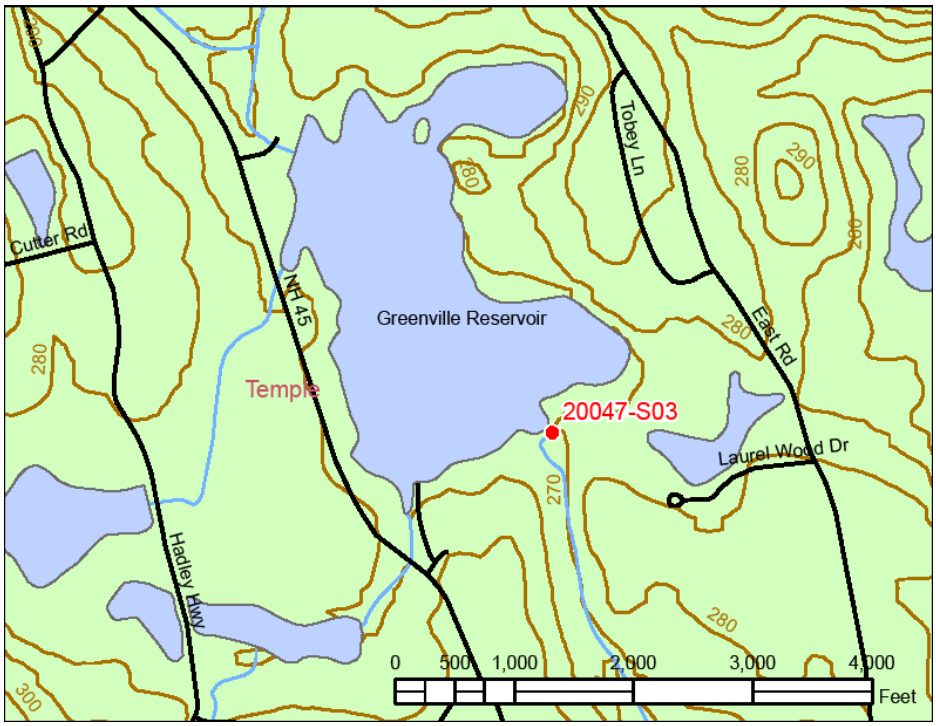

Figure 1 - Location map of the Greenville Water Supply (Tobey Reservoir), Temple, New Hampshire

the Town of Wilton's water supply wells, approximately 4 miles downstream of Greenville. Only a small drain pipe is located at the base of the north dam and water is not continuously released from this outlet structure. At the south dam, water is continuously released through an outlet structure to Richardson Brook (Figure 2). Richardson Brook then flows to the south and discharges into the Souhegan River approximately 1.3 miles downstream of Greenville. The major source of water for the reservoir is two small unnamed tributaries located west and southwest of the impoundment.

Figure 2 - Photograph of Tobey Reservoir Dam (south), the water supply withdrawal point and outlet structure, 2008

Water withdrawn from the reservoir is pumped to a water treatment plant. The water treatment facility is capable of treating 0.25 million gallons of drinking water per day, and storing 750,000 gallons of treated water. Treated water is distributed to residents and businesses in the town.

Water Use Patterns

Water is used daily and represents common community and industrial water supply needs moderated by system storage. Daily water demand follows a diurnal pattern, with the greatest water demand during the day and less overnight. Water is pumped from the reservoir and treated prior to storage. Water is distributed from storage to meet demand and to maintain system water pressure for fire suppression. Water use at the treatment facility and at Pilgrim Foods (20681) is metered and monthly totals are recorded and reported quarterly to DES.

Water use data for the Greenville Water Works for the years of 1999 through 2008 are summarized in Figures 3 and 4 as well as in Tables 1 and 2. Water use records were incomplete for 1998, so 1998 was not included in the annual use summaries. The monthly summaries include all available data from 1998 through 2008.

Between 2000 and 2008, annual water use by Greenville Water Works ranged from a high of 67.4 million gallons (2001) to a low of 41.4 million gallons (2004), with and average annual use of 54.0 million gallons (Figure 3 and Table 1). During this period, annual water use declined by 19.86 million gallons or 30 percent. This represents an average decrease of 2.21million gallons per year or 3.4 percent per year over this nine year period. The lack of growth in water use is attributed minimal new development in the town combined with improvements made to the water distribution system to reduce leakage.

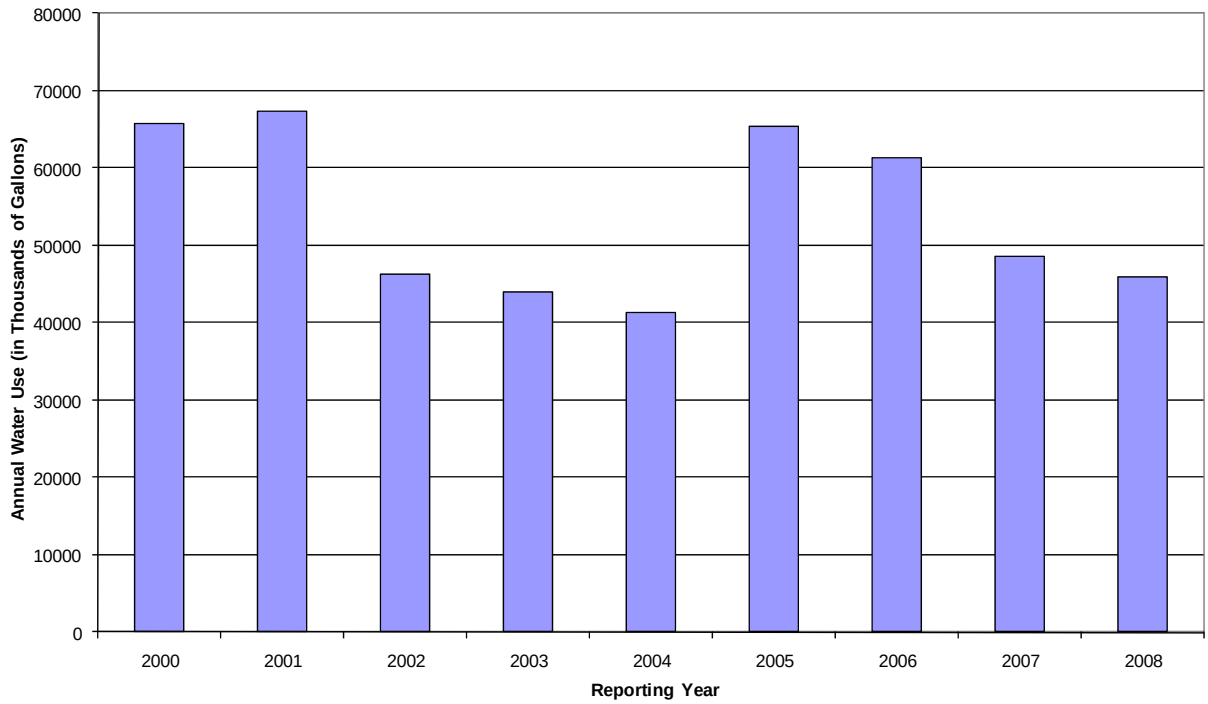

Figure 3 - Town of Greenville Water Works Annual Water Use 2000-2008

Table 1 - Town of Greenville Water Works Annual Water Use Statistics (2000 - 2008)

	Low	High	Average
(thousand gal)	41,400	67,400	54,000
(cfs)	0.1760	0.2860	0.2290
(cfsm at impact point)	0.0045	0.0074	0.0059
(cfsm at Merrimack Gage)	0.0010	0.0017	0.0013

Monthly water use records for the system begin in March 1999. Monthly water use varies in response to weather conditions and changes in seasonal demand. The total and average monthly water usage was highest during summer and lowest during winter (Figure 4). This seasonal

pattern reflects increased outdoor water usage (lawn irrigation, garden watering, vehicle washing, etc.) during the summer months. The highest total monthly water use was 7.54 million gallons (April 2005), the lowest total monthly water use was 1.92 million gallons (May and June 2004), while the average monthly water use was 4.56 million gallons (Figure 4 and Table 2). Approximately 12 million gallons of the annual water use is by Pilgrim Foods (20681), an industrial facility in the Town of Greenville. Pilgrim Foods' monthly water use varies in the range of 1.10 to 1.70 million gallons per year.

Monthly water use data for Greenville Water Works were converted from thousand gallons per month to cubic feet per second by dividing the monthly totals by days and multiplying them by a flow unit conversion factor. These values were also divided by the drainage basin area (171 sq. miles) relative to the location of the United States Geological Survey gage station (01094000) on the Souhegan Designated River in Merrimack, New Hampshire, and normalized to the drainage area (38.8 sq. miles) of the Designated Reach above the impact point of the withdrawal.

Based on these values, the average daily water use by Greenville Water Works has ranged from a minimum of 0.099 cfs (63,986 gallons per day, June 2004) to a maximum of 0.389 cfs (251,419 gallons per day, April 2005), and average use was 0.232 cfs (149,946 gallons per day) for the period of 1999 to 2008 (Table 2).

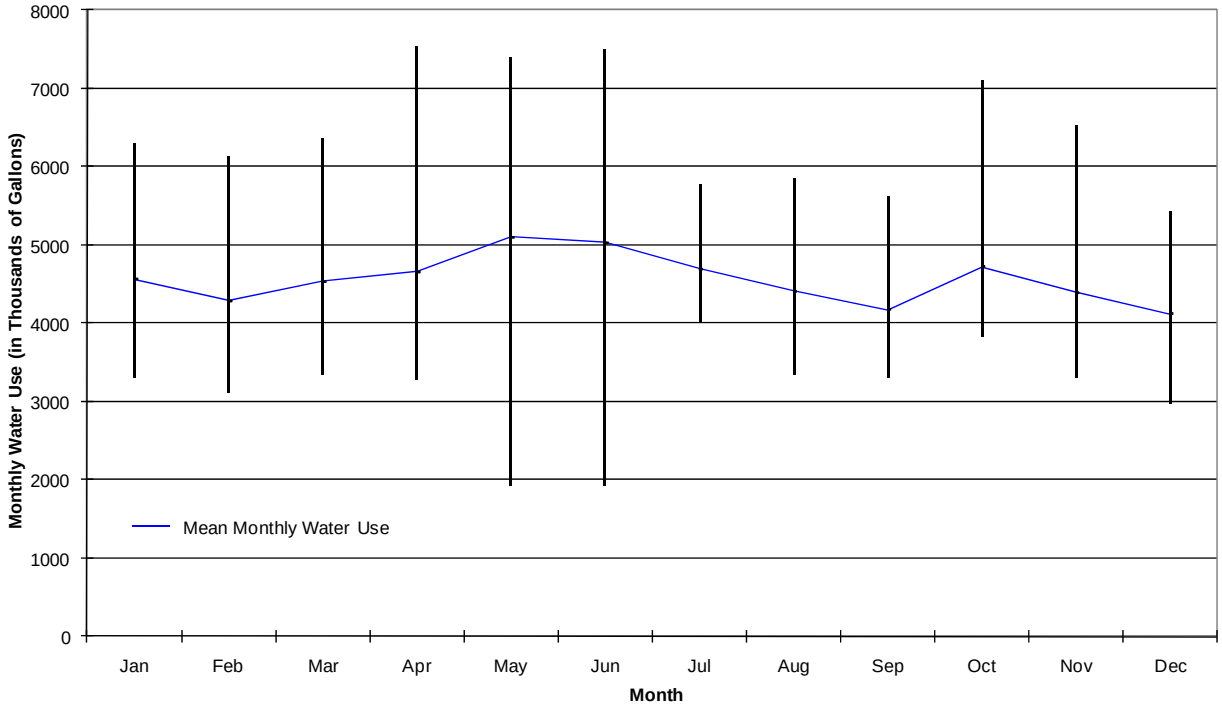

Figure 4 - Town of Greenville Water Works Monthly Water Use 2000 through 2008

Table 2 - Town of Greenville Water Works Monthly Water Use Statistics (1999 -2008)

	Low	High	Average
(thousand gal)	1,920	7,540	4,560
(cfs)	0.0990	0.3890	0.2320
(cfsm at impact point)	0.0026	0.0100	0.0060
(cfsm at Merrimack Gage)	0.0006	0.0023	0.0014

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use. Conservation plans for public water supplies require inclusion of the following components:

- Installation, maintenance, and use of appropriately selected meters;
- Maintaining low levels of unaccounted-for water;
- Performing water audits to assess losses;
- A comprehensive plan for leak detection surveys of the distribution system;
- System pressure reduction, as necessary;
- A water conservation educational outreach initiative;
- Adopting a rate structure that promotes water conservation; and,
- On-going water conservation compliance reporting.

Greenville Water Works will be in compliance with the water conservation plan requirements of the Instream Flow Program by completing a Water Conservation Plan and receiving approval on it from the DES Groundwater and Drinking Water Bureau.

Existing Water Conservation Measures

Greenville Water Works has implemented several of the water conservation measures recommended by DES for water utilities and required in the state's Water Conservation Rules (Env-Wq 2101) for existing large community water systems. The water source (water treatment plant for Tobey Reservoir) is metered and the meters are tested every six months, and are calibrated if they do not meet their operational requirements. Service meters are tested if users have questions regarding their recorded water use or if they are identified as high usage water users. Water is priced at a flat rate per 1,000 gallons that Greenville Water Works believes supports water conservation. Water bills are issued on a semi-annual basis, which limits the detection of service line leaks. Greenville is planning on replacing the existing water meters with wireless recording meters and may consider changing the billing schedule.

Greenville does not have a formal leak detection plan in place, but the Water Works responds to individual leakage problems and checks any services with increasingly high water use. Greenville has replaced some of their water distribution piping system, which appears to have contributed to a reduction in water use (Figure 3). The minimum system water pressure is 35 psi, while the maximum water pressure is 125 psi. Homes with water pressure greater than 80 psi have pressure regulators.

Greenville writes an annual consumer confidence report, which includes conservation educational material, and mails the report to water users and makes the report publicly available by it posting at the town hall.

Water Conservation Alternatives and Costs

The existing water conservation measures employed by Greenville Water Works should be expanded to include measures to better identify water losses and to increase water use efficiency, along with providing greater access to information on water conservation. As required under by the Water Conservation Rules for existing large community water systems (Env-Wq 2101.05) the Town will determine its unaccounted-for water use annually. If the amount of unaccounted-for water use exceeds 15 percent, a response plan will be submitted to DES within 60 days. The response plan will identify how the water system will reduce the percentage of unaccounted for water below 15 percent within two years. In addition, a regularly scheduled leak detection program should be developed and implemented for the system to identify water losses. Water conservation educational outreach will be increased by posting information on water conservation and efficiency practices on the Town's web site to provide reference information for water users.

If the Town needs to implement or maintain more restrictive water conservation measures due to diminished supply from its source(s) or storage, then those actions take precedent over this Conservation Plan. Nothing in this Plan precludes the Town from further conservation actions on its own initiative.

Conservation Implementation Schedule

By June 1, 2014, Greenville Water Works will finalize a Water Conservation Plan as required by Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers. The Plan will document compliance with the requirements for Existing Large Community Water Systems (Env-Wq 2101.05) and will be administered by the DES Drinking Water and Groundwater Bureau under the authority of the Instream Flow Program.

Water User Contact Information

Water User: Town of Greenville
Address: P.O. Box 343, Greenville, NH 03048
Contact: Carla Mary
Phone: 878-1338
Email: cmary@woodardcurran.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
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Sources of Information

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Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Department of Environmental Services (DES) 1998. Developing a Utility Water Conservation Program. Environmental Fact Sheet WD-WSEB-6-1.

Department of Environmental Services (DES) 2001. Implementing a Water Efficiency and Conservation Program for Public Water Utilities. Environmental Fact Sheet WD-WSEB-26-9.

Personal communication with Carla Mary, Woodard and Curran, contractor for the Town of Greenville.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed with input from Carla Mary, Woodard and Curran, contractor for the Town of Greenville.

Woodard & Curran, Inc. 2009. Town of Greenville Water Treatment Facility Emergency Action Plan.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Milford Fish Hatchery (#20218)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The New Hampshire Fish and Game Department Milford Fish Hatchery has two overburden water supply wells located north of the Souhegan Designated River and west of the Milford Town center. The wells are accessed off of North River Road in Milford, New Hampshire. The water pumped from these wells is the source water for the hatchery, which raises trout for stocking in New Hampshire streams.

Water Source and Uses

The Milford Fish Hatchery has two registered ground water wells, Well #4 (20218-S01, also known as the River Well) and Well #1 (20218-S02, also known as the Field Well). Much of the water used by the fish hatchery is returned to the Souhegan Designated River via an outfall (20218-D01) into Purgatory Brook, a tributary to the Souhegan. Figure 1 depicts the location of

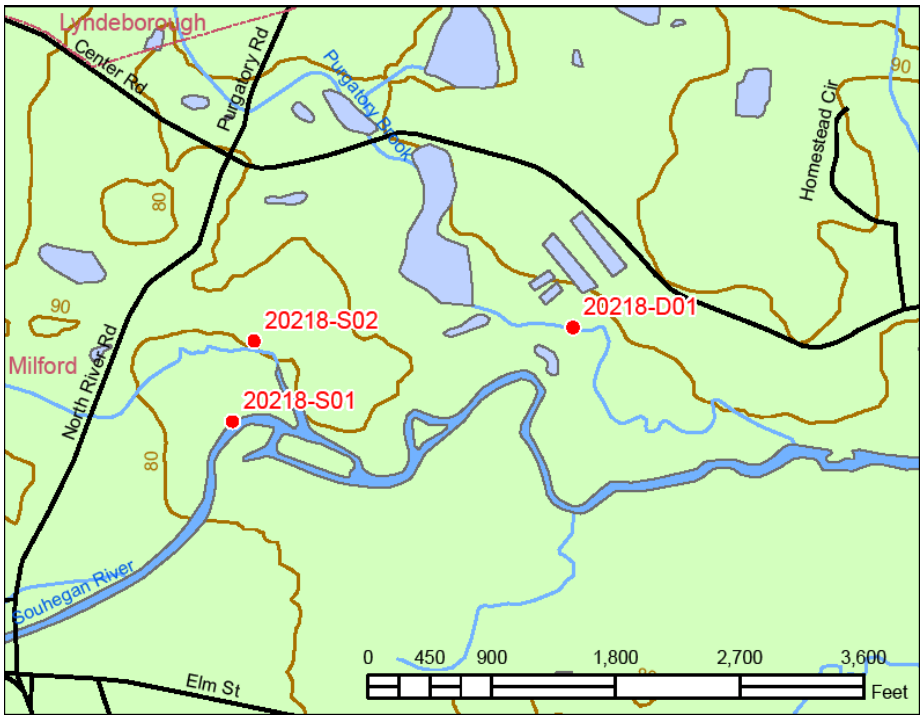

Figure 1 - Location of the Milford Fish Hatchery Withdrawals (S01 and S02) and Discharge (D01) in Relation to the Souhegan River

the wells and outfall. The overburden wells are 273 feet (River) and 668 feet (Field) from the Souhegan Designated River. The drainage area of the Souhegan River at the location of these wells is approximately 117 sq. mi.

Groundwater is withdrawn almost continuously since the wells are the water supply source for the fish hatchery and fish are cultivated year round. A separate water supply well is used to provide potable water to the hatchery facility. There is no reserve water storage at the fish hatchery.

Although the water source is groundwater, due to the fact that these wells are located in a stratified drift formation that is connected to the Souhegan Designated River, the wells intercept water that would be flowing into or just beneath the river. An analysis of induced recharge for these wells indicates that for average pumping rates, the River Well induces 22 percent of its extraction from the river and the Field Well induces 35 percent of its extraction from the river.

Water Use Patterns

Water use is continuous and supports the needs of the aquaculture production at the fish hatchery. The groundwater pumped from the aquifer is free of fish pathogens, thereby limiting the potential for disease, and its nearly constant temperature provides cooling conditions for the fish in the summer and warmth during the winter.

The River Well (20218-S01) is pumped at a constant rate of 1,100 gallons per minute (gpm), while the Field Well (20218-S02) pumping rate varies between 400 and 800 gpm. Groundwater pumping is metered, recorded weekly and reported quarterly to DES.

Milford Fish Hatchery withdrawals for 1988 through 2008 are presented graphically in Figures 2, 3, and 4, while annual water use statistics are summarized in Tables 1, 2, and 3. The first complete year of reported use was 1989. These tables include the conversion of annual water use from thousands of gallons to cubic feet per second (cfs) and cubic feet per square mile (cfsm) of drainage area to allow for their comparison with streamflow values reported for the Souhegan Designated River.

Between 1989 and 2008, annual pumpage from the Milford Fish Hatchery wellfield ranged from a high of 1,030 million gallons (2000) to a low of 236 million gallons (1992), and average use was 803 million gallons (Figure 2 and Table 1). During this period, water use increased from 1989 to 1999, but then stabilized around 900 million gallons per year (Figure 2). From 1989 through 2008, water use increased by 357 million gallons or 67 percent. This represents an increase of 17.8 million gallons a year or 3.3 percent a year over the 20 year period.

The flattening of annual water use beginning in the early 2000s is due to the implementation of a stable production target of trout for fisheries management in southwestern New Hampshire rivers. There are no plans to expand production at this time, and annual water use is not expected to increase in the near future.

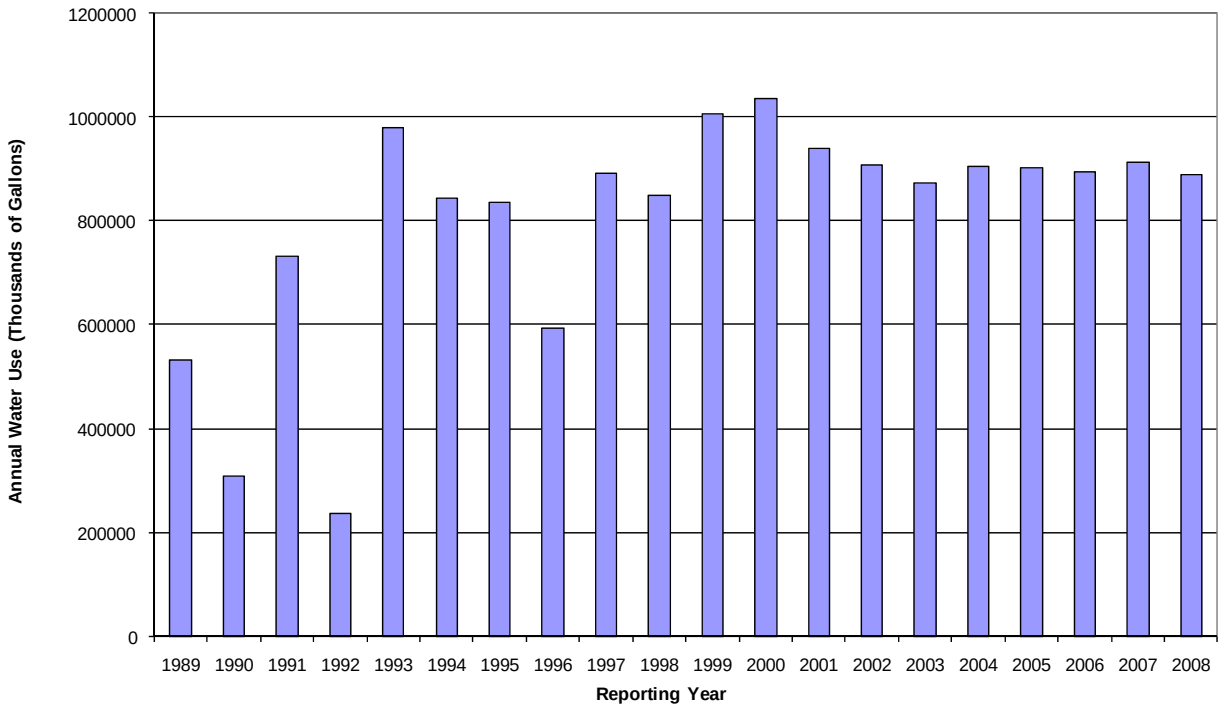

Figure 2 - Milford Fish Hatchery Annual Water Use 1989-2008

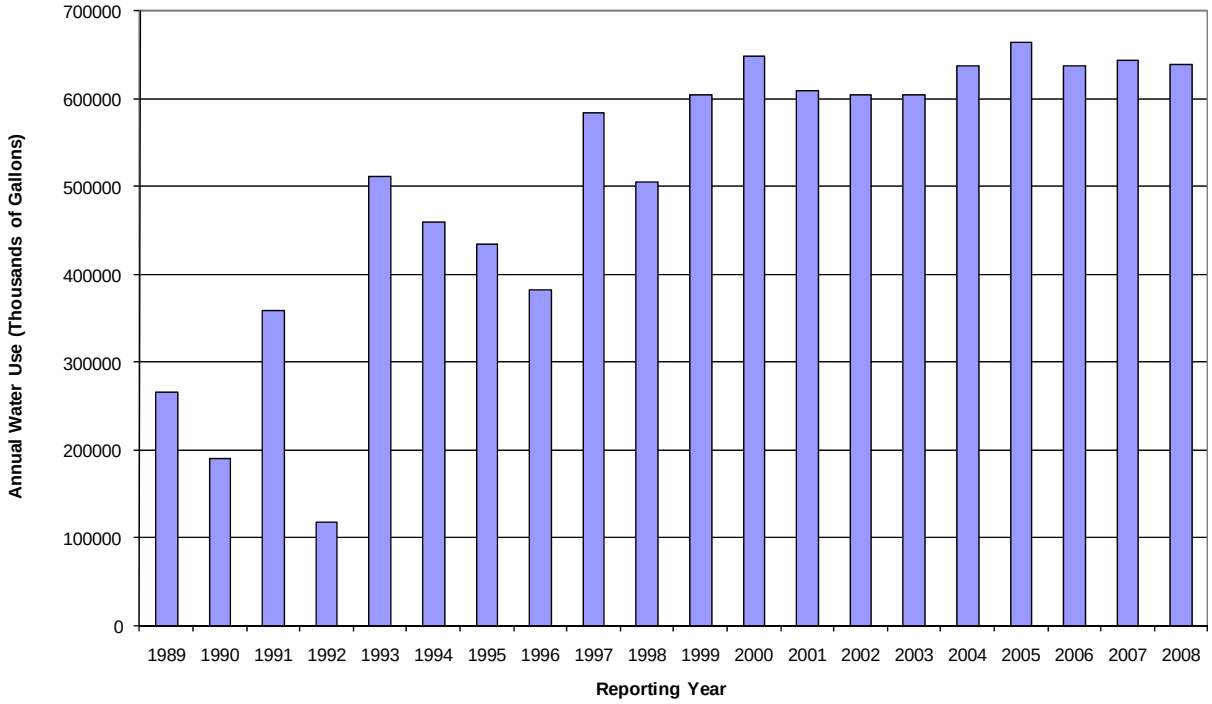

Figure 3 - Milford Fish Hatchery River Well Annual Water Use 1989-2008

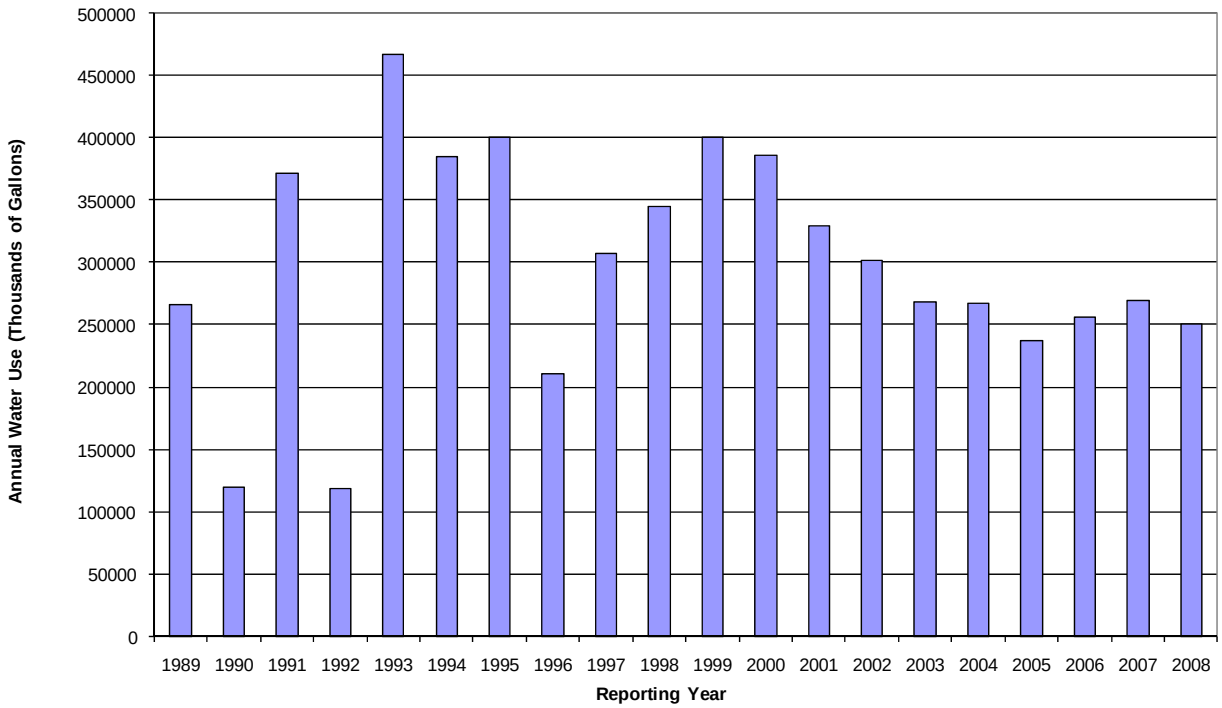

Figure 4 - Milford Fish Hatchery Field Well Annual Water Use 1989-2008

Table 1 - Annual Water Use Statistics (Combined Wells 1989-2008)

	Low	High	Average
(thousand gal)	236,000	1,030,000	803,000
(cfs)	1.000	4.390	3.410
(cfsm at impact point)	0.009	0.037	0.029
(cfsm at Merrimack Gage)	0.006	0.026	0.020

Table 2 - Annual Water Use Statistics (River Well 1989-2008)

	Low	High	Average
(thousand gal)	118,000	663,000	505,000
(cfs)	0.500	2.820	2.140
(cfsm at impact point)	0.004	0.024	0.018
(cfsm at Merrimack Gage)	0.003	0.016	0.013

Table 3 - Annual Water Use Statistics (Field Well 1989-2008)

	Low	High	Average
(thousand gal)	118,000	663,000	505,000
(cfs)	0.500	2.820	2.140
(cfsm at impact point)	0.004	0.024	0.018
(cfsm at Merrimack Gage)	0.003	0.016	0.013

Monthly water use records for the Milford Fish Hatchery begin in October 1988. Average monthly water use varies in a narrow range (Figures 5, 6, and 7), but follows seasonal trends. This seasonal variation reflects the growing season pattern, fish biomass, and the water needs for loading capacity. Higher water use during the late winter (March) coincides with the peak of fish biomass at the hatchery. Fish are distributed out of the facility from April through June, resulting in a lower biomass and lower water use. The next generation (year-class) of trout grows from July to September, with a concurrent increase in biomass, and the growth corresponds with an increase in water use.

The high variability (maximum versus minimum) in monthly water use shown in Figures 5, 6, and 7 is related to the period of increasing use from 1988 to 1999. Since 1999, the variability in annual water use along with monthly water use has lessened considerably due to a more stable production target of trout. Monthly water use statistics are shown in Tables 4, 5, and 6. The highest total monthly water use by the fish hatchery wells was 1,104 million gallons (December 2000), the lowest total monthly use was 3.24 million gallons (November 1991), with an average monthly use of 73.4 million gallons (Figure 5 and Table 4).

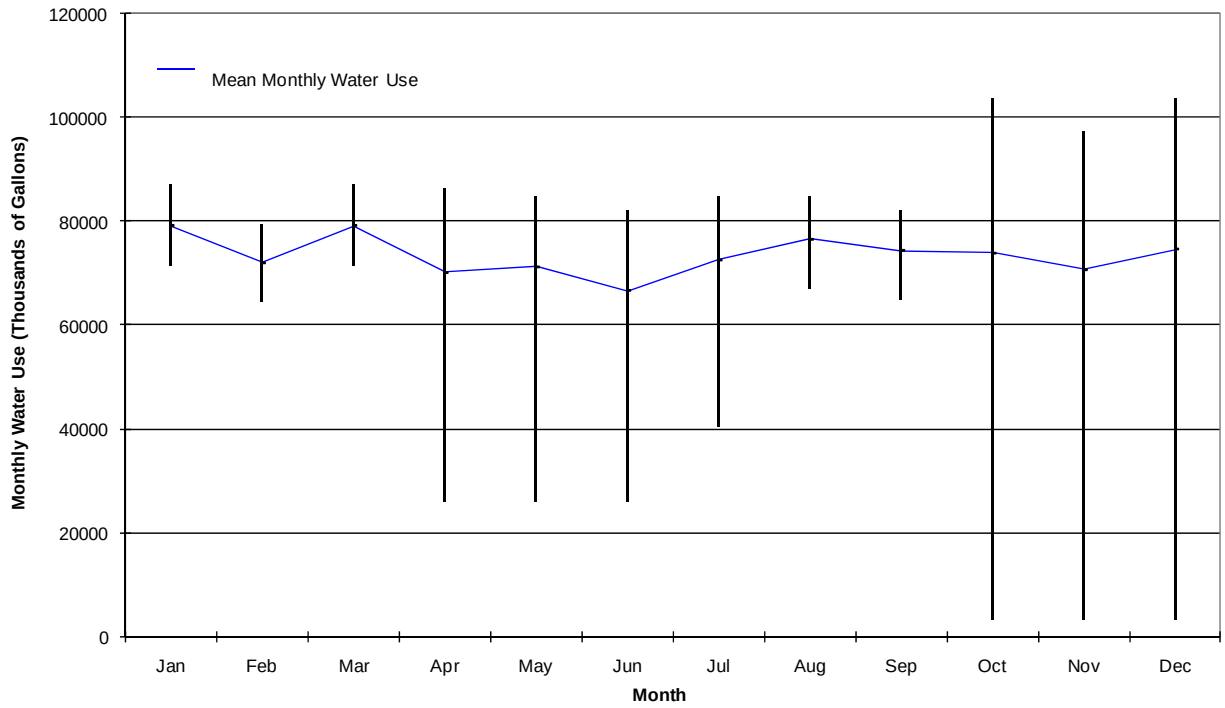

Figure 5 - Milford Fish Hatchery Monthly Water Use 1988-2008

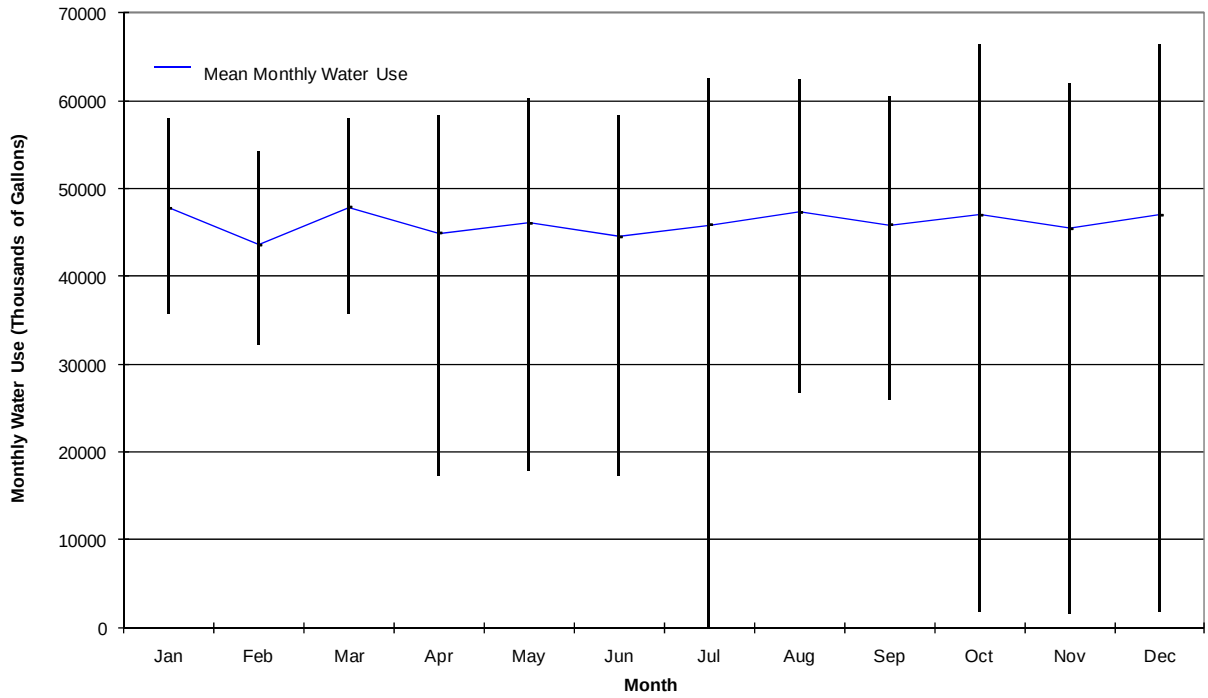

Figure 6 - Milford Fish Hatchery River Well Monthly Water Use 1988-2008

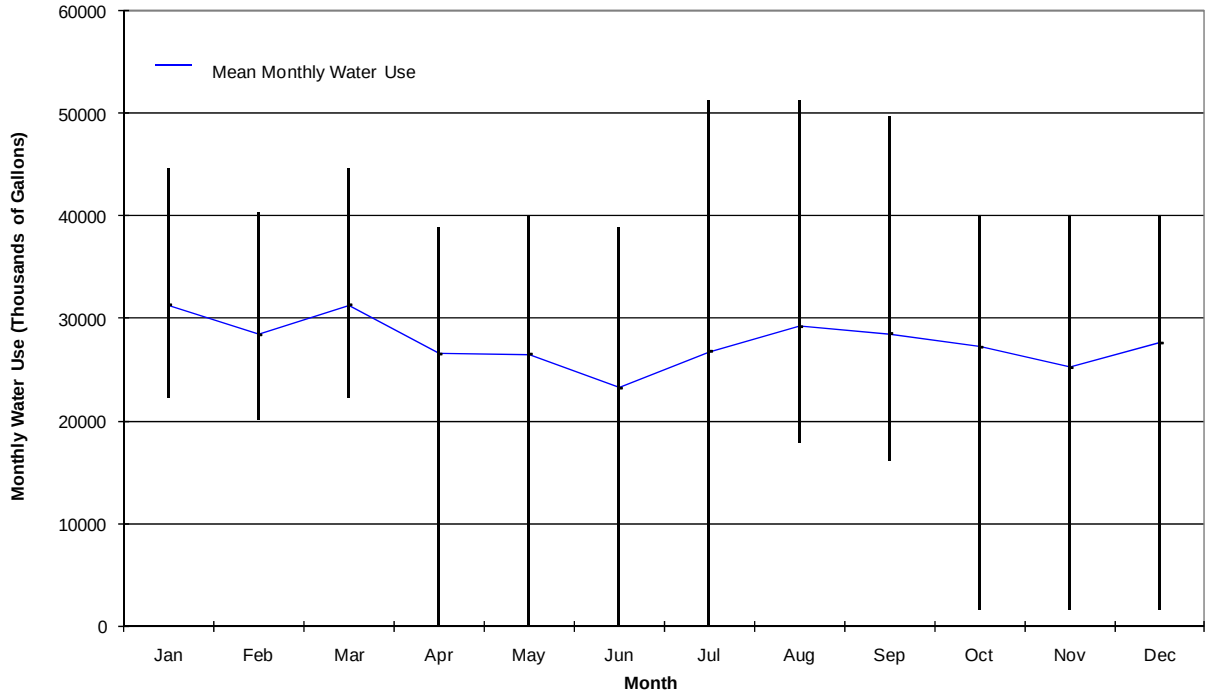

Figure 7 - Milford Fish Hatchery Field Well Monthly Water Use 1988-2008

Table 4 - Monthly Water Use Statistics (Combined Wells 1988-2008)

	Low	High	Average
(thousand gal)	3,240	104,000	73,400
(cfs)	0.167	5.190	3.740
(cfsm at impact point)	0.001	0.044	0.032
(cfsm at Merrimack Gage)	0.001	0.030	0.022

Table 5 - Monthly Water Use Statistics (River Well 1988-2008)

	Low	High	Average
(thousand gal)	0	66,300	46,000
(cfs)	0	3.310	2.340
(cfsm at impact point)	0	0.028	0.020
(cfsm at Merrimack Gage)	0	0.019	0.014

Table 6 - Monthly Water Use Statistics (Field Well 1988-2008)

	Low	High	Average
(thousand gal)	0	51,300	27,600
(cfs)	0	2.560	1.410
(cfsm at impact point)	0	0.028	0.020
(cfsm at Merrimack Gage)	0	0.015	0.008

Monthly water use data for the Milford Fish Hatchery were converted from thousand gallons per month to cubic feet per second by dividing the monthly totals by days and then multiplying them by a flow unit conversion factor These values were also divided by the drainage basin area (171 sq. miles) relative to the location of the United States Geological Survey gage station (01094000) on the Souhegan Designated River in Merrimack, New Hampshire, and were also normalized to the drainage area (117 sq. miles) of the Designated Reach above the impact point of the withdrawals.

Based on these values, the average daily water use by the Milford Fish Hatchery has ranged from a minimum of 0.167 cfs (107,935 gallons per day, November 1991) to a maximum of 5.19 cfs (3.35 million gallons per day, December 2000), and average use was 3.74 cfs (2.4 million gallons per day) for the period of 1988 to 2008 (Table 4).

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Water Conservation Rules require different activities depending on the type of water use. Water conservation requirements for agricultural water users focus more on crop irrigation and farm animals as opposed to aquaculture. At a minimum, Milford Fish Hatchery is required to measure each source withdrawal separately, measure its water use with accuracy within 10 percent, and implement applicable best management practices.

Existing Water Conservation Measures

The Milford Fish Hatchery is a vintage (1973) facility, with a few recent modifications for improved function. Since it is not a modern re-circulation hatchery, many of the water efficiency practices recommended by DES are impractical for the design of the existing facility. However, the hatchery has implemented several basic water conservation practices, including:

- metering the water supply wells;
- performing water use and conservation audits;
- determining and monitoring the minimum flow rates needed to maintain temperature and dissolved oxygen conditions;
- installing weirs and recording flow measurements;
- minimizing water use for tank and facility washing;
- repairing pipes and tanks to minimize leaks;
- establishing a routine maintenance program; and,
- reusing water as much as possible.

Water Conservation Alternatives and Costs

Without major modifications in the design of the facility, the potential for the implementation of additional water conservation measures is limited. The Milford Fish Hatchery should develop and implement a meter testing and calibration program for the two water supply wells to ensure the accurate measurement of water use. The estimated cost for meter testing is approximately $2,000. Calibration, if necessary, would be an additional cost ranging from $600 to $1,200 for both meters. At a minimum, the water meters should be tested every two years.

In addition, the facility should directly measure discharge from the facility so that water balance calculations can be performed to identify systematic water losses (or gains). These measurements should be made at the discharge point from the holding tanks and into the holding pond.

Conservation Implementation Schedule

By June 1, 2014, the Milford Fish Hatchery will finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document the Milford Fish Hatchery's existing water conservation activities, maintenance of the source water meters in accordance with the provisions of the Water Conservation Rules, and use of water conservation best management practices and best available technologies where economically feasible.

Water User Contact Information

Water User: New Hampshire Fish and Game Department
Address: 408 North River Road, Milford, NH 03055
Contact: Jason Smith
Phone: 271-2501
Email: Jason.Smith@Wildlife.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Department of Environmental Services (DES) 2010. Water Efficiency Practices for Aquaculture. Environmental Fact Sheet WD-DWGB-26-12.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Milford Water Works (#20100)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The Milford Water Works has two overburden water supply wells located north of the Souhegan Designated River in the neighboring town of Amherst, New Hampshire. While the Curtis Wellfield is the principal source of drinking water for the Town of Milford, the community also has an interconnection with Pennichuck Water for additional water.

Water Source and Uses

The Milford Water Works supply source consists of three wells, Curtis Wells #1, #2 and #2A as a wellfield under one registration (20100-S01). Figure 1 depicts the location of the registered combined withdrawal with respect to the Souhegan Designated River. These overburden wells are 213 feet, 74 feet and 98 feet from the Souhegan River. The drainage area of the Souhegan River at the location of these wells is approximately 139 sq. mi.

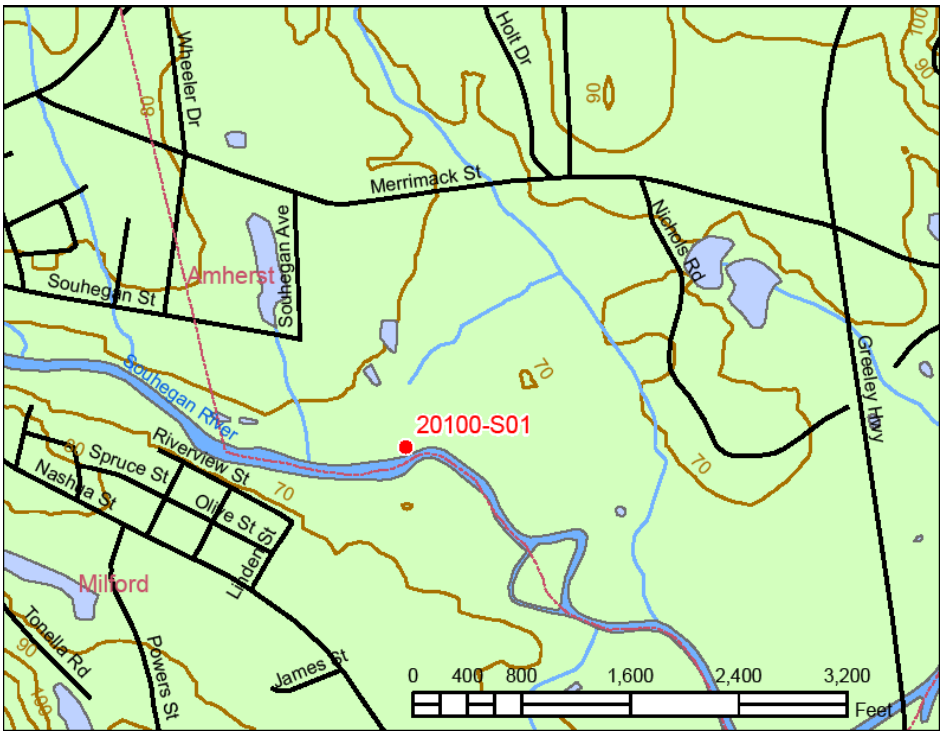

Figure 1 - Location Map of Milford Water Works Well Field, Amherst, New Hampshire

Groundwater is withdrawn continuously from the wells since the water is the principal water supply for the Town of Milford. When demand exceeds supply from the wellfield, the Town purchases additional water from the Pennichuck Water distribution system. In 2008, the Curtis Wells supplied 88.6 percent of the water needed and the remaining 11.4 percent was purchased from Pennichuck Water. The Town water system also includes 1.25 million gallons of storage.

The Town of Milford has also applied to DES for approval of a new drinking water supply well for their system. The new well (Curtis Well #2A) is being developed as a backup to the existing Well 2 at the Curtis Wellfield. Well 2 has declined in specific capacity in recent years and this backup well will allow for full utilization of the wellfield production.

Although the water source is groundwater, because these wells are located in a stratified drift formation connected to the Souhegan River, the wells intercept water that would be flowing into or just beneath the Souhegan River. An analysis of induced recharge by these wells was performed as part of the Instream Flow Study (DES 2005). The results of the analysis indicated that Curtis Well #1 does not induce Souhegan River water recharge at its average or maximum reported extraction rates. However, approximately 60 percent of the Curtis Well #2 extraction is induced recharge for its long-term average pumping rate.

Water Use Patterns

Water use is continuous and the Curtis Wells provide sufficient water to supply most of the community water supply needs. The wells are pumped at a uniform rate of 700 gallons per minute (gpm). When pumping exceeds demand, excess water fills storage, and when pumping is less than demand, stored water makes-up the difference. Groundwater pumping is metered, recorded monthly, and reported to DES quarterly.

Water use data for the Milford Water Works for 1988 through 2008 are summarized in Figures 2 and 3 as well as in Tables 1 and 2. Unfortunately, each well does not have its own meter and therefore the withdrawal data are for the combined well pumping. Water use records were incomplete for 1988, so are not included in the annual use summaries. The first complete year of water use was reported for 1989.

Between 1989 and 2008, annual pumpage from the Curtis Wellfield ranged from a high of 374 million gallons (1998) to a low of 211 million gallons (1990), and average use was 307 million gallons (Figure 2 and Table 1). During this period, annual water use from the Curtis Wellfield increased by 87.6 million gallons or 36.2 percent. This represents an increase of 4.4 million gallons a year or 1.8 percent per year over the 20 year period. As shown in Figure 2, water use increased from 1989 to its maximum in 1998 and since then has ranged from 305.9 million gallons (2006) to 364.4 million gallons (2007). The plateau in water use reflects the supply limitation of the Curtis Wellfield and a contracted cap on the water available from Pennichuck Water. As a result, the Town of Milford is exploring the development of an additional water supply well for the system.

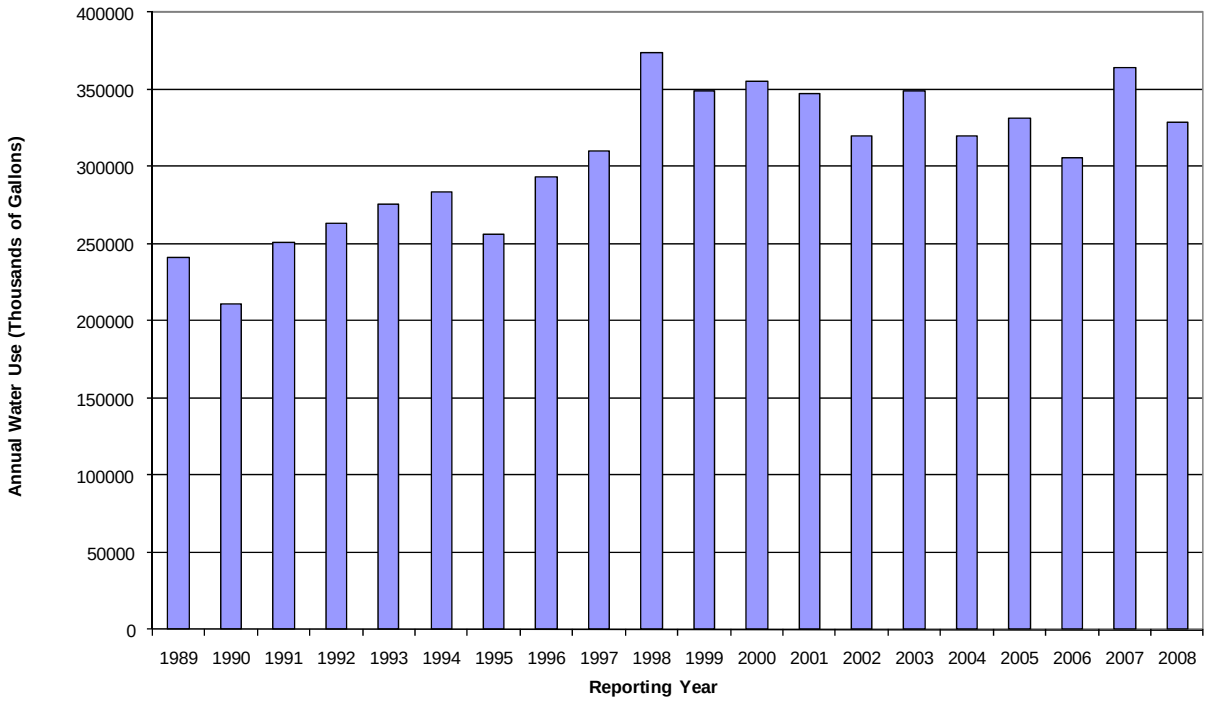

Figure 2 – Milford Water Works Annual Water Use, 1989-2008

Table 1 – Milford Water Works Annual Water Use Statistics (1989 - 2008)

	Low	High	Average
(thousand gal)	211,000	374,000	307,000
(cfs)	0.894	1.590	1.300
(cfsm at impact point)	0.006	0.011	0.009
(cfsm at Merrimack Gage)	0.005	0.009	0.008

Monthly water use records for the Curtis Wellfield begin in October 1988. Monthly water use varies in response to weather conditions and changes in seasonal demand. The total and average monthly water usage is highest during the summer and lowest during winter. This seasonal pattern reflects increased outdoor water usage (lawn irrigation, garden watering, vehicle washing, etc.) during the summer months, which declines during the fall, remains low during the winter, and begins to increase again in the spring. The highest total monthly use for the Curtis Wellfield was 38.4 million gallons (August 2006) and the lowest total monthly use was 8.41 million gallons (March 2002), with an average monthly use of 25.5 million gallons (Figure 3 and Table 2).

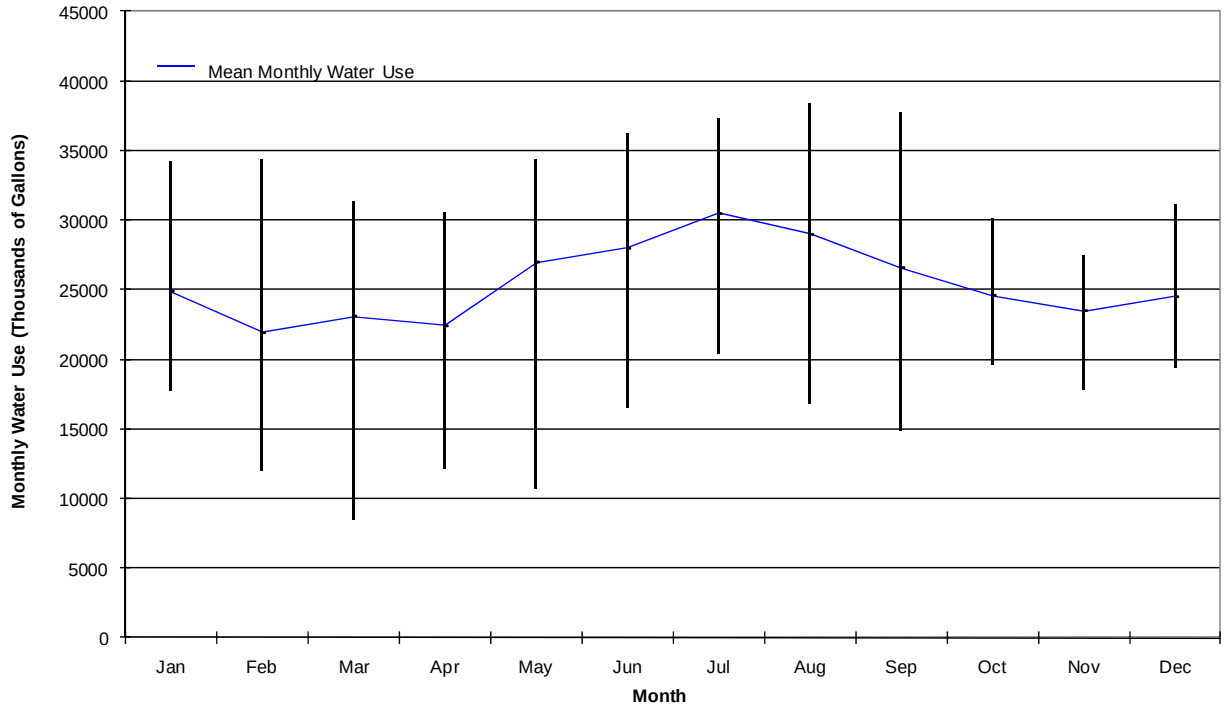

Figure 3 – Milford Water Works Monthly Water Use 1989 through 2008

Table 2 – Milford Water Works Monthly Water Use Statistics (1988 - 2008).

	Low	High	Average
(thousand gal)	8,410	38,400	25,500
(cfs)	0.420	1.920	1.300
(cfsm at impact point)	0.003	0.014	0.009
(cfsm at Merrimack Gage)	0.002	0.011	0.008

Monthly water use data for the Curtis Wellfield were converted from thousand gallons per month to cubic feet per second by dividing the monthly totals by days and then multiplying them by a flow unit conversion factor. These values were also divided by the drainage basin area (171 sq. miles) relative to the location of the United States Geological Survey gage station (01094000) on the Souhegan Designated River in Merrimack, New Hampshire, and they were also normalized to the drainage area (139 sq. miles) of the Designated Reach above the impact point of the withdrawals.

Based on these values, the average daily water use for the Curtis Wellfield has ranged from a minimum of 0.42 cfs (271,454 gallons per day, March, 2002) to a maximum of 1.92 cfs (1.24 million gallons per day, August, 2006), and average use was 1.30 cfs (840,216 gallons per day) for the period of 1988 to 2008 (Table 2).

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use. Conservation plans for public water supplies require inclusion of the following components:

- Installation, maintenance, and use of appropriately selected meters;
- Maintaining low levels of unaccounted-for water;
- Performing water audits to assess losses;
- A comprehensive plan for leak detection surveys of the distribution system;
- System pressure reduction, as necessary;
- A water conservation educational outreach initiative;
- Adopting a rate structure that promotes water conservation; and,
- On-going water conservation compliance reporting.

Milford Water Works will be in compliance with the water conservation plan requirements of the Instream Flow Program by completing a Water Conservation Plan and receiving approval on it from the DES Groundwater and Drinking Water Bureau.

Water Conservation Measures

Milford Water Works has implemented metering of all private users, including automated residential water meters. The Curtis Well water meters are tested annually and calibrated as necessary. Milford Water Works does not routinely test commercial or residential meters, but will provide a meter check if high water use is recorded.

Estimated unaccounted-for water use has been as high as approximately 21 percent of total water pumped. This value includes losses due to hydrant flushing, fire fighting and water breaks, and may overstate actual unaccounted-for water use. Unaccounted-for water use will be re-estimated with recalibration of the source wells.

During the summer of 2010, 15 miles of water distribution lines were surveyed for leaks and only one notable leak was discovered. Milford Water Works has also upgraded its leak detection equipment and plans on continuing the leak detection surveys annually.

Milford Water Works does not have to perform pressure reduction in its water distribution system. The Town charges a flat rate for water.

Information on water conservation is available through the Town's website and is broadcast on the community cable television channel. Information on water conservation is also distributed to water users in mailings.

Water Conservation Alternatives and Costs

Approval of the attached Water Conservation Plan (dated August 2011) by DES Drinking Water and Groundwater Bureau meets the Instream Flow Program's Conservation Plan requirements. The Water Conservation Plan will be administered by the Drinking Water and Groundwater Bureau under their existing authority or the authority of the Instream Flow Program.

Conservation Implementation Schedule

The Town will continue to implement its Water Conservation Plan (dated August 2011). The first three-year compliance report from the Town of Milford to the DES Drinking Water and Groundwater Bureau is due in 2014.

Water User Contact Information

Water User: Milford Water Works
Address: Town Hall, 1 Union Square, Milford, NH 03055-4240
Contact: Dave Boucher, Superintendent
Phone: 249-0660
Email: dboucher@milford.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Department of Environmental Services (DES) 1998. Developing a Utility Water Conservation Program. Environmental Fact Sheet WD-WSEB-6-1.

Department of Environmental Services (DES) 2001. Implementing a Water Efficiency and Conservation Program for Public Water Utilities. Environmental Fact Sheet WD-WSEB-26-9.

Department of Environmental Services (DES) 2005. Souhegan River Instream Flow Task 2 Report. Prepared by Dr. Tom Ballestero, University of New Hampshire.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed by Mr. Larry Anderson, superintendent of the Town of Milford Water Utilities Department.

Water use reports on file with the Department of Environmental Services (DES).

WATER CONSERVATION PLAN

Prepared Pursuant to

NHDES Administrative Rule Env-Wq 2100,
Water Conservation Rules; Use Registration and Reporting

As Required for a Proposed

0.58 MGD Municipal Water Supply Well
Curtis Well # 2A

Milford Water Utilities Department

Milford, New Hampshire

August, 2011

Milford Water Utilities Department, Milford, NH

Curtis Well # 2A Water Conservation Plan

I. INTRODUCTION

The Milford Water System provides domestic water and fire protection to the residents and businesses in Milford, New Hampshire. The water system consists of 2 (two) gravel wells, well pump house, distribution piping and water storage tanks. A new gravel packed well is currently being installed as a back up to Well No. 2. The Final Report for Well No. 2A was submitted to NHDES on 8/5/2011.

A. Contact Information

1. *Name and location of system.*

   Milford Water Utilities Department
   EPA PWID # 1561010
   Milford, NH 03055

2. *Owner of system and mailing address.*

   Name: David Boucher, Superintendent.
   Address: 564 Nashua Street, Milford, NH 03055
   Company: Milford Water Utilities Department
   Phone Number: 603-249-0660 FAX: 603-672-1071
   Email: dboucher@milford.nh.gov

3. *Name and mailing address of designer of Water Conservation Plan.*

   Name: James Hewitt, P.E., Project Engineer
   Address: 230 Commerce Way, Suite 302, Portsmouth, NH
   Company: Wright-Pierce
   Phone Number: 603-430-3728 FAX: 603-430-4083
   Email: jah@wright-pierce.com

In accordance to NHDES Administrative Rule Env-Wq 2100, "*Water Conservation; Use Registration and Reporting", e*ffective May 13, 2005, (formerly Env-Ws 390) the Milford Water Utilities Department will conduct the following water conservation measures subsequent to approval of the proposed 0.58 MGD well (Curtis Well # 2A).

B. System Overview

1. Reason for new source.

Curtis Well 2A is being developed as a new source to serve as a backup to existing Well 2 at the Curtis Wellfield. Well 2 has declined in specific capacity in recent years and backup Curtis Well 2A will allow for full utilization of the Curtis Wellfield's permitted total daily volume (1400 gpm).

2. Number of existing and proposed connections for each of the following classes:

a) Residential;

2,204

b) Industrial/commercial/institutional; and

529

c) Municipal.

Included in municipal customer count

3. Description of any connections that currently receive or will receive more than 20,000 gpd.

There are currently no connections that receive greater than 20,000 gpd

C. Water Use Trends and Supporting Data / Population Trends:

3. Existing and anticipated seasonal fluctuation in population.

Milford has minimal population fluctuation throughout the year. We do not anticipate this changing significantly in the future.

4. Anticipated growth in population.

1.8% per year based on prior billing records

5. *Maximum day yield of existing sources based on 24-hour pumping.*

1.584 MGD

6. *Average daily water use.*

0.924 MGD

7. *Maximum daily water use.*

1.26 MGD

8. Minimum hourly flows (if available).

N/A

II. SYSTEM SIDE MANAGEMENT

A. Source Meters

1. Name designation of each water source.

Curtis Well Field Wells and Pennichuck Water Works Interconnection.

2. Meter make, model, size, flow range, and date of last calibration for each existing water source.

Meter Parameter	**Curtis Well Field Wells**	**Pennichuck Water Works Interconnection**
Make	**Badger**	**Neptune**
Model	**PMT-I**	**HPT**
Size	**8"**	**6"**
Flow range	**0-1250 gpm**	**20-2500 gpm**
Date of last calibration	**8/4/10**	**Meter is replaced with a new meter annually. Last install: 1/5/11**

3. Meter make, model, size, and flow range of each proposed source meter (if known).

Proposed Well 2A will be metered using the existing Curtis Well Field Wells flow meter.

4. Frequency that source meters will be tested.

Annually

5. Frequency that source meters will be read (at least every 30 days).

Curtis Well Field Wells Meter: Daily

Pennichuck Water Works Interconnection: Weekly

6. Statement that source meters will be selected, installed, and maintained in compliance with "Manual of Water Supply Practices, Water Meters-Selection, Installation, Testing, and Maintenance," document identification number AWWA M6, American Water Works Association, 1999.

All source meters will be selected, installed and maintained with the procedures and protocols described in the "Manual of Water Supply Practices, Water Meters-Selection, Installation, Testing and Maintenance", document identification number AWWA M6, American Water Works Association, 1999.

B. Service Meters

1. How many un-metered connections exist?

Zero

2. Proposed timeframe for installing meters on unmetered connections (no later than within three years of source water approval).

N/A

3. Will separate irrigation meters be installed?

Offered upon request.

4. Frequency that service meters will be read (at least every 90 days).

Every 90 Days

5. Description of all methods that will be used to read service meters.

The meters are read using a Neptune AMR system.

6. Expected number of days needed to read all service meters.

It takes approximately 8 days to read all service meters

7. Statement that all service connections will be metered prior to system startup.

All service connections will be metered prior to system start up. All services are current metered.

8. Statement that service meters will be selected, installed, and maintained in accordance with "Manual of Water Supply Practices, Water Meters-Selection, Installation, Testing, and Maintenance," document identification number AWWA

M6, American Water Works Association, 1999. The report must reflect the recommendations of this manual and include the rate of service meter change out.

All service meters are selected, installed and maintained with the procedures and protocols described in the "Manual of Water Supply Practices, Water Meters-Selection, Installation, Testing and Maintenance", document identification number AWWA M6, American Water Works Association, 1999. The Milford Water Utilities Department began a customer meter replacement program in 2003. A total of approximately 3,000 meters have been / will be changed out by the end of 2012. The Milford Water Utilities Department will continue to replace meters at a rate of approximately 10% per year.

C. Estimating Unaccounted for water (non-revenue water)/ Water Audit

1. Most recent water audit, differentiating between apparent and real losses, and estimate of unaccounted for water and the year it was estimated.

An in-house water audit was completed on the Milford Water Utilities Department in July, 2011. The results are as follows:
Total gallons supplied = 337,902,000.
Total gallons billed = 335,245,103.
Apparent loss = 2,656,897 gallons or 0.8% of system input.

This value seems lower than the expected minimum given Milford's water system size and pressure based on the AWWA M6 manual but given the information available at this time, this is the unaccounted for water value the Water Utilities Department is reporting. The Water Utilities Department will be conducting annual meter calibration, water auditing, and leak detection. Unaccounted for water will be revised annually as part of the conservation plan requirements.

2. Frequency that water audit will be conducted (at least annually).

Annually

3. Statement that the water system shall prepare and submit a response plan to the department within 60 days if the percentage of unaccounted for water in the water system exceeds 15 percent of the total water introduced to the water system. The response plan shall identify how the water system intends to reduce the percentage of unaccounted-for water to below 15 percent within two years.

The water system shall prepare and submit a response plan to the department within 60 days if the percentage of unaccounted for water in the water system exceeds 15 percent of the total water introduced to the water system. The response plan shall identify how the water system intends to

reduce the percentage of unaccounted-for water to below 15 percent within two years.

4. Frequency that water audit will be conducted (at least annually per "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999). **Annually**

5. Statement that water audit will be calculated in accordance with "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999.

Water audits will be calculated in accordance with "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999.

2. *D. Leak Detection*

1. Summary of findings for the most recent leak detection surveys including the following information:

a) Year(s) conducted.

2010

b) Number of leaks found.

One leak was found on a bleeder on a fire hydrant.

c) Estimated losses recovered.

N/A.

d) Percent of system surveyed.

Approximately 25%

2. Are pipe locations known?

Yes

3. Breakdown of pipe material, age, and length.

This was not completed as part of the survey

4. Availability of contact points and adequacy of spacing.

Valves and Hydrants are adequately spaced for proper leak detection throughout the distribution system.

5. Is pipe material non-metallic? If yes, as leaks are difficult to acoustically detect in non-metallic systems, what additional measures will be taken to detect leaks?

There is minimal non-metallic pipe in the system. No additional measures are being taken at this time to detect leaks on non-metallic pipe.

6. Will future leak detection surveys be conducted in-house or contracted out?

Both in-house and contracted.

7. If in-house, what equipment will be used and what training will be required?

A Metrotect acoustic microphone The Department staff is already trained in the use of this piece of equipment.

8. If in house, describe the leak detection method to be used.

Acoustical Detection

9. Will zone meters be installed to assist with leak detection identification and location?

No

10. Statement that a comprehensive leak detection survey will be conducted every two years.

A comprehensive leak detection survey will be conducted a minimum of every two years

11. Will leak detection be done all at one time or staggered throughout the two years? If staggered, what is the timeline and what percentage of the system will be surveyed during each initiative?

Leak Detection will be staggered over the two year period. The Water Utilities Department plans on 50 percent surveying 50 percent on the system during each initiative.

12. Statement that leak detection will be conducted in accordance with "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999.

Leak detection will be conducted in accordance with "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999.

13. Statement that leaks will be repaired within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.09.

Leaks will be repaired within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.09.

E. Pressure Management

1. Existing minimum distribution pressure.

25 psi

2. Existing maximum distribution pressure.

114 psi

3. How is or will pressure be monitored and what will be done to reduce pressures in zones found to be in excess of 80 psi?

Milford has homeowner's install pressure reducing valves.

4. What will be the timeframe for reduction (at least within 1 year of source water approval)?

The pressure reduction to customers is currently in place.

5. If pressure reduction is not technically feasible, what additional steps will the water system take to monitor and repair leakage within these zones?

The Water Utilities Department will conduct leak surveys in this area of the system on a biannual basis.

F. Intentional Water Loss

1. Are there "bleeders" used within the system at dead ends to improve water quality or prevent freeze-up? If yes, what looping opportunities exist?

No

2. Are storage tanks intentionally allowed to overflow because of system hydraulics or water quality concerns? If yes, what opportunities exist for the installation of altitude valves or tank mixing systems?

No

III. CONSUMPTION SIDE MANAGEMENT

A. CONSERVATION RATE STRUCTURE AND BILLING

1. Description of proposed rate structure and timeline for implementation (no later than 5 years from source water approval). If unknown, provide a statement that the water system will adopt a rate structure that complies with 2101.05 (o) and that DES will be notified of the new structure no later than the first billing cycle after source water approval.

The Milford Water Utilities Department bills all its customers the same rate regardless of quantity used, namely, $ 1.97 for each 100 cubic feet of water (748 gallons). There are no plans to change this rate structure.

2. If irrigation meters are installed, will irrigation water be billed at a different rate?

No

3. Will a seasonal rate structure be utilized in addition to the general rate structure?

No

4. Proposed billing frequency (minimum is quarterly).

Quarterly

5. Informative billing practices to be used (ex. water use in gallons / usage history).

The Water Utilities Department provides a courtesy customer notification based on prior billing history if water usage increases significantly in a given billing cycle.

B. Educational Outreach Initiative

1. Informational materials that will be used.

The Milford Water Utilities Department has an on-going water conservation outreach program that includes the distribution of a poster that lists the top ten ways to minimize indoor and outdoor water use. These posters were posted in several Milford department offices, on the Town of Milford website, and on the local public access cable channel.

2. Rate of dissemination.

Materials are available online and at the Water Utilities Department Office.

3. Does the water system intend on becoming a WaterSense partner? http://www.epa.gov/watersense/

Not at this time

4. Will a rebate program be offered to replace older fixtures with WaterSense certified fixtures?

No

5. Will customer audits be offered?

No

6. Other outreach plans?

None

IV. ZONING ORDINANCE / BYLAWS

A. Are connections to the water system subject to any of the following water efficiency ordinances or bylaws?

1. Indoor

a) Water efficient fixtures beyond the existing plumbing code.

No

2. Landscaping

a) Minimum topsoil requirements.

No

b) Use of native/drought tolerant plants and grasses.

No

c) Area and slope restrictions for turf grass.

No

3. Irrigation System

a) Prohibition or restrictions to irrigation systems.

Outdoor Water Use Restriction during the "odd even day lawn watering program" during periods of drought.

b) Require soil moisture sensors.

No

c) Require rain sensors.

No

4. Other water efficiency ordinances?

None

V. WATER USE RESTRICTIONS

A. What is the water system's plan relative to implementing water restrictions?

The Milford Water Utilities Department supplies notification of the water restriction to its customers. A bulletin is distributed to all customers, broadcast on local cable television and on the Department's Website.

B. Who is responsible for enforcing restrictions?

Milford Water Utilities Department

VI. REPORTING AND IMPLEMENTATION

1. **"The water system will submit a form supplied by DES once every three years documenting how compliance with the requirements of Env-Wq 2101 is being achieved."**

2. **"Activities outlined in the water conservation plan will be completed by water system personnel under the supervision of a certified water system operator."**

Public Notification

Within seven days of submitting the conservation plan to DES, the Milford Water Utilities Department shall provide a copy of the application and report via certified mail to the governing board of the department in which a proposed source is located, all municipalities that will receive water from the water system and the regional planning commission serving the location of the proposed source. All signed copies of the Certified Mail Return Receipt will be forwarded to DES.

The Milford Water Utilities Department will forward the Final conservation plan to the governing boards:

Nashua Regional Planning Committee
9 Executive Park Drive, Suite 201
Merrimack, NH 03054

Fred Kind
Milford Conservation Commission
1 Union Square
Milford, NH 03056-04240

Additional Attachments
A summary of the requirements of Env-Wq 2101 is included as an attachment to this plan.

CONSERVATION PLAN

Monadnock Mountain Spring Water, Inc. (#20621)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Monadnock Mountain Spring Water, Inc. is a water bottling company. It has two overburden water supply wells located near its water bottling plant in Wilton, New Hampshire. One is located off Intervale Road and the other is near Mansur Road. Water pumped from these wells is either bottled on site or shipped by truck to another bottling facility located in Massachusetts.

Water Source and Uses

Monadnock Mountain Spring Water, Inc. has two registered ground water wells, the Mansur Road (20621-S01) and the Intervale Road (20621-S02) wells. Figure 1 shows the location of these wells with respect to the Souhegan River, while Figure 2 is a picture of the Mansur Road well. These overburden wells are 84 feet and 529 feet from the Souhegan River. The drainage area of the Souhegan River at the location of these wells is approximately 64.6 sq. miles.

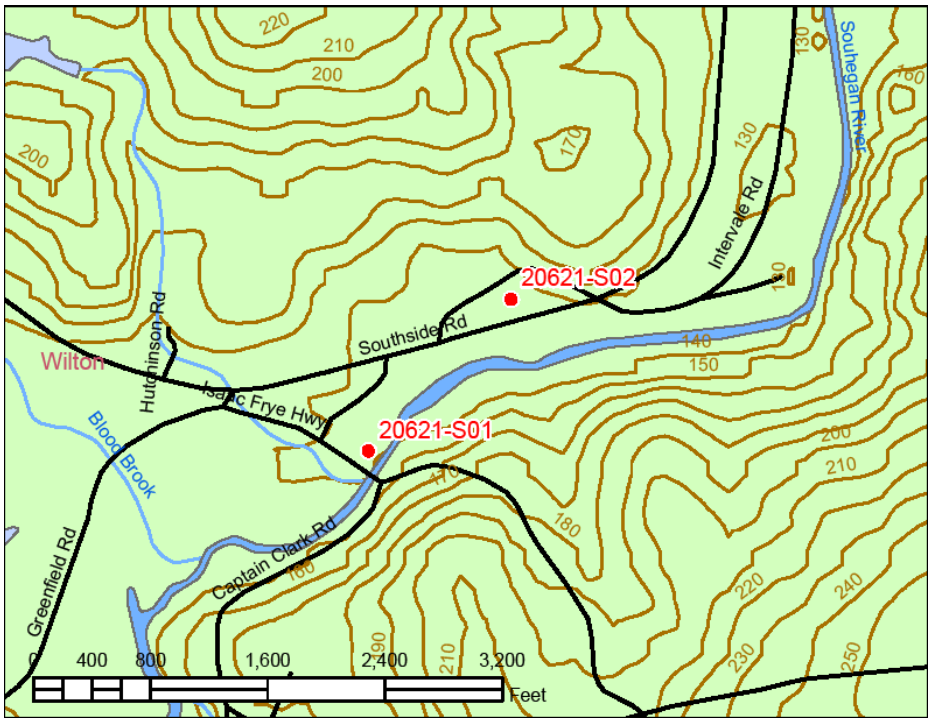

Figure 1 - Location map of Monadnock Mountain Spring Water, Inc. wells in Wilton, New Hampshire

Figure 2 - Monadnock Mountain Spring Water, Inc. Mansur Road well (2004)

Groundwater is withdrawn primarily during business hours (9 AM – 6 PM). Monadnock Mountain Spring Water, Inc. has 40,000 gallons of storage at the bottling facility, 30,000 gallons for spring water and 10,000 gallons for distilled water. Water is pumped from the wells to storage and from there to the bottling operations. Once a week 8,000 gallons of water are shipped via truck to another bottling operation located in Massachusetts, otherwise the spring water produced on site is used on site.

Although the water source is groundwater, because these wells are located in a stratified drift formation connected to the Souhegan River, the wells could intercept water that would be flowing into or just beneath the Souhegan River. An analysis of induced recharge by these wells was performed as part of the Instream Flow Study (DES 2005). The results of the analysis indicated that the wells do not induce river recharge at normal or maximum pumping rates.

Water Use Patterns

Although water use has been reported for each well, over 90 percent of the reported data from 1995 – 2008 is identical for each well. That is because prior to the fall of 2008 the water use was estimated based on bottling production and the total water use was divided by half and reported for each well. In the fall of 2008, Monadnock Mountain Spring Water, Inc. installed recording water use meters on each well and reports this information to DES quarterly.

Water withdrawal is near continuous during normal business hours. The wells are generally pumped at a uniform rate with meter-based water use data showing that the Intervale Well provides two thirds of the total production, while the Mansur Road provides the remainder.

When pumping exceeds demand, excess water fills storage, and when pumping is less than demand, stored water makes up the difference for the bottling operations.

Water use data for Monadnock Mountain Spring Water, Inc. for the years of 1995 through 2008 are presented in a series of graphs (Figures 3 through 8) for each well and for the combined pumping of the two wells. These data are also summarized in Tables 1 through 6. Water use varies from year to year and month to month depending on market demand for bottled water.

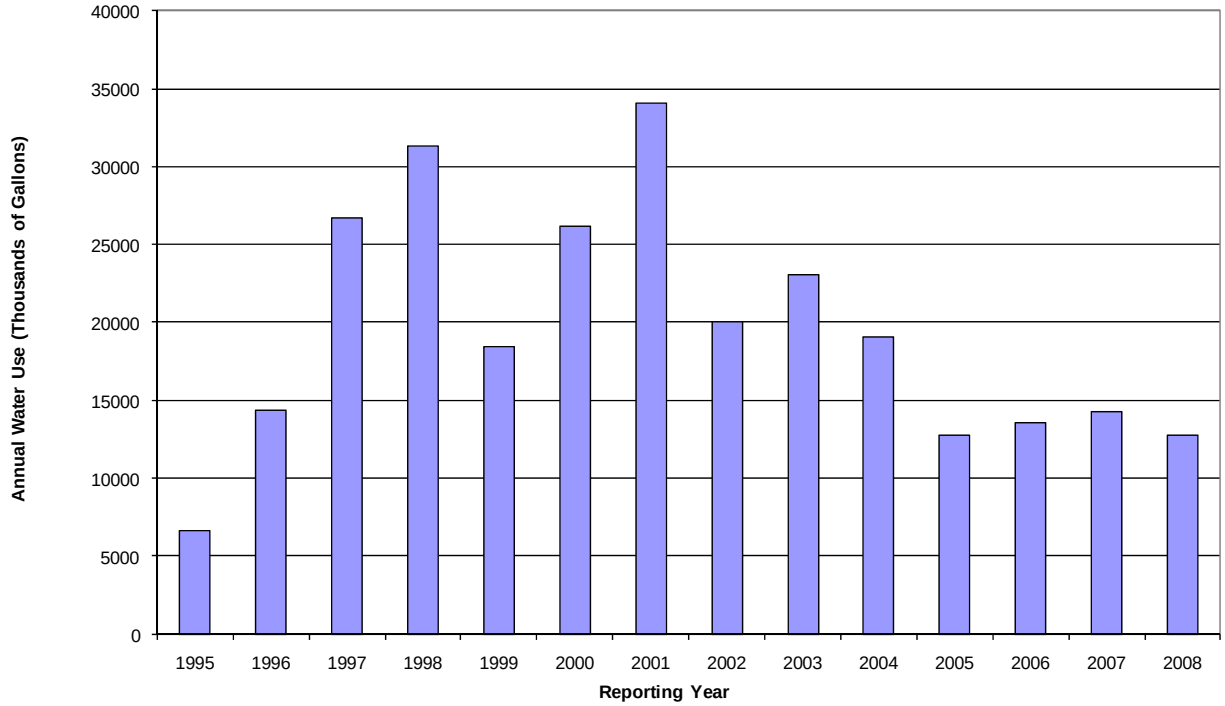

Figure 3 - Monadnock Mountain Spring Water, Inc. Annual Water Use 1995-2008

Between 1995 and 2008, annual water use by Monadnock Mountain Spring Water ranged from a high of 34.1 million gallons (2001) to a low of 6.63 million gallons (1995), and has averaged 19.5 million gallons (Figure 3 and Table 1). During this period, annual water use by Monadnock Mountain Spring Water has increased by 6.16 million gallons or 93 percent (Figure 3). This represents an increase of 440,286 gallons a year or 6.6 percent per year over the 14 year period. Annual water use reached a maximum of 34.1 million gallons in 2001, but has since dropped to within the range of 12.7 million gallons (2005) to 14.3 million gallons (2007), a decline of roughly 63 percent.

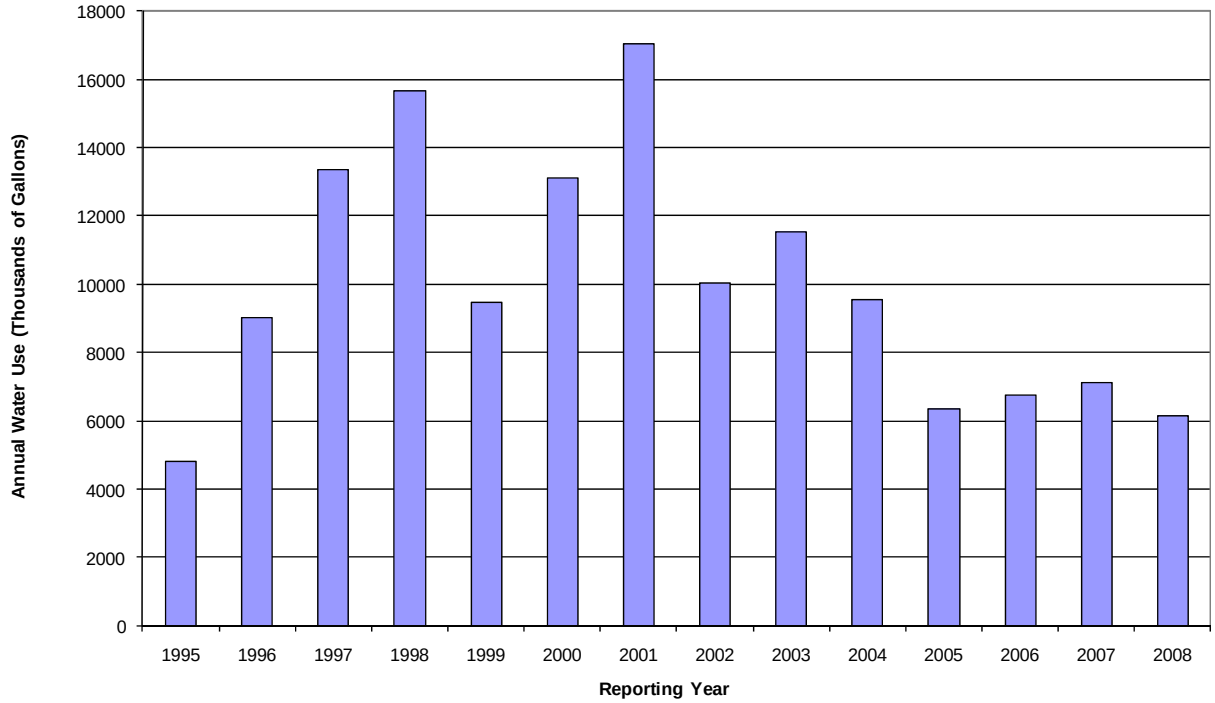

Figure 4 - Monadnock Mountain Spring Water, Mansur Road Well Annual Water Use 1995-2008

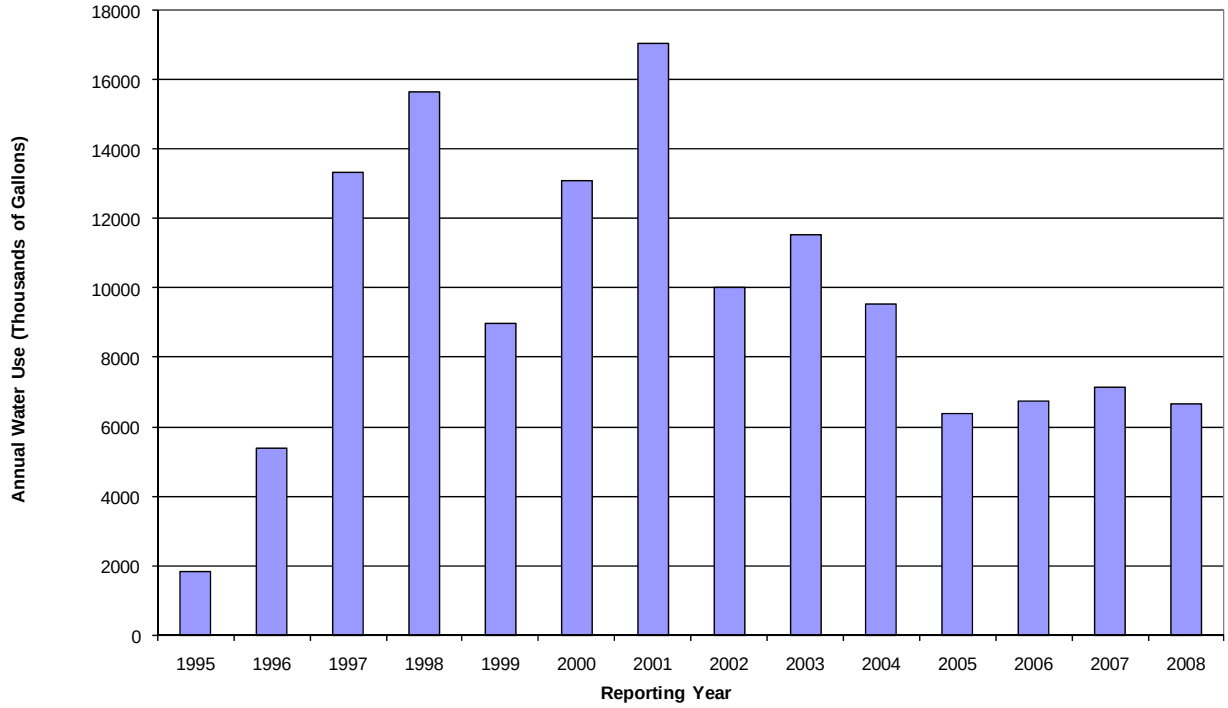

Figure 5 - Monadnock Mountain Spring Water Intervale Road Well Annual Water Use 1995-2008

Table 1 - Monadnock Mountain Spring Water Annual Water Use Statistics (Combined Wells 1995-2008)

	Low	High	Average
(thousand gal)	6,629	34,107	19,515
(cfs)	0.0281	0.1447	0.0828
(cfsm at impact point)	0.0004	0.0023	0.0013
(cfsm at Merrimack Gage)	0.0002	0.0009	0.0005

Table 2 - Annual Water Use Statistics (Mansur Well 1995-2008)

	Low	High	Average
(thousand gal)	4,804	17,054	9,992
(cfs)	0.0204	0.0724	0.0442
(cfsm at impact point)	0.0003	0.0011	0.0007
(cfsm at Merrimack Gage)	0.0001	0.0004	0.0003

Table 3 - Annual Water Use Statistics (Intervale Well 1995-2008)

	Low	High	Average
(thousand gal)	1,824	17,054	9,523
(cfs)	0.0077	0.0724	0.0404
(cfsm at impact point)	0.0001	0.0011	0.0006
(cfsm at Merrimack Gage)	0.0001	0.0004	0.0002

Over the period of record, monthly reported water use was highly variable; however, from month to month, the average extraction rate varies in a narrow range (Figures 6, 7 and 8). The highest mean monthly water use was 1.86 million gallons in the summer (July) while the minimum mean monthly water use was 1.47 million gallons (October), reflecting the seasonal change in demand for bottled water (Figures 6, 7, and 8).

Monthly water use data were converted to flow in cubic feet per second by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor (Tables 4, 5 and 6). Based on these converted values, daily water use by Monadnock Mountain Spring Water has ranged from a minimum of 0.023 cfs (14,736 gallons per day in July, August and September 1995) to a maximum of 1.92 cfs (1.24 million gallons per day in October, November and December 2001), and average use was 0.09 cfs (53,515 gallons per day) for the period of 1995 to 2008 (Table 4).

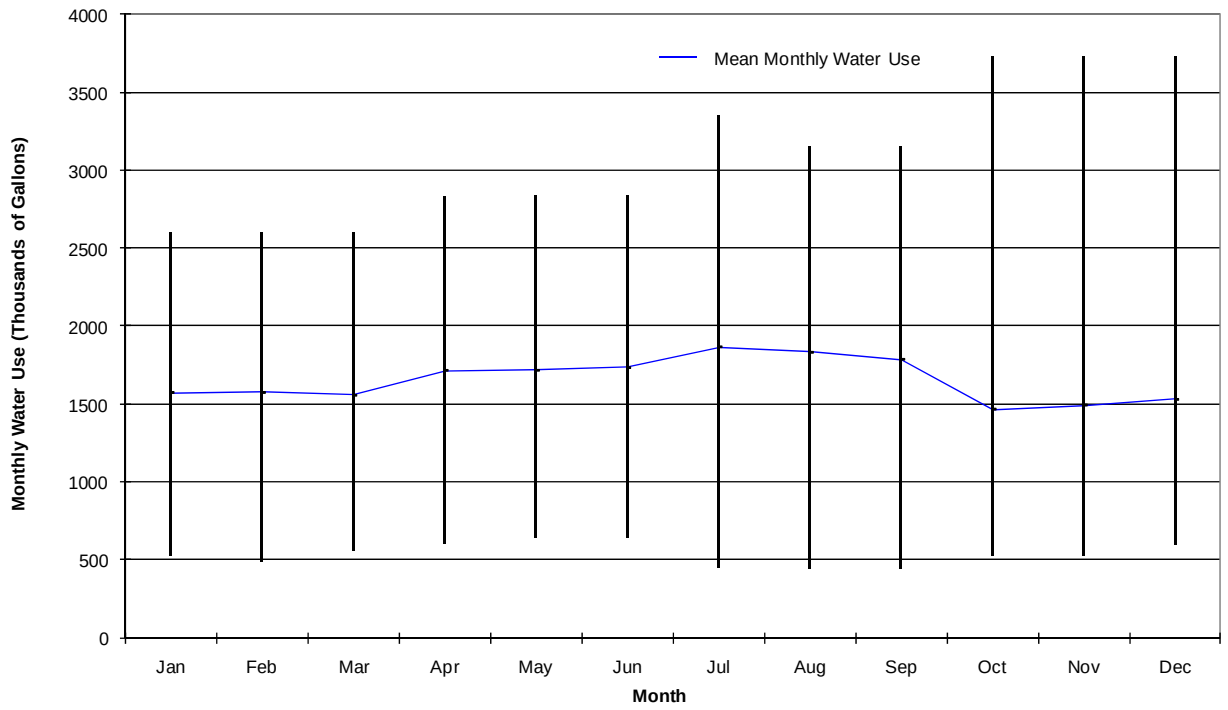

Figure 6 - Monadnock Mountain Spring Water Monthly Water Use 1995-2008

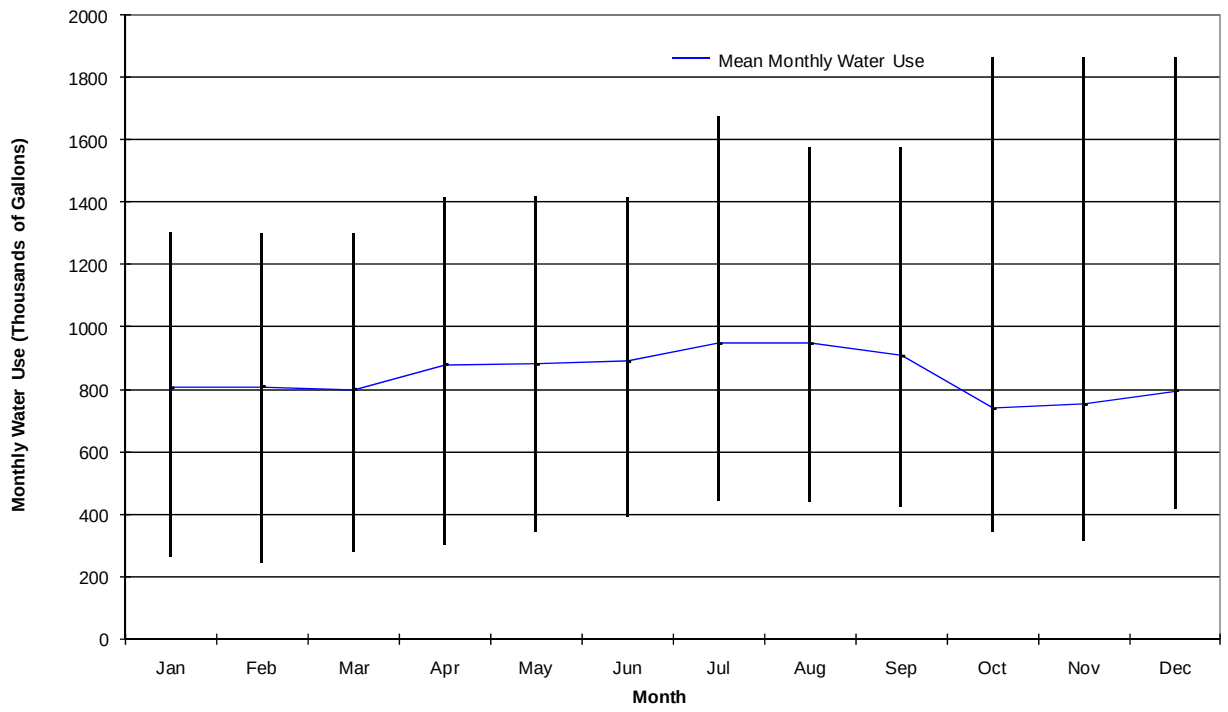

Figure 7 - Monadnock Mountain Spring Water Mansur Road Well Monthly Water Use 1995 -2008

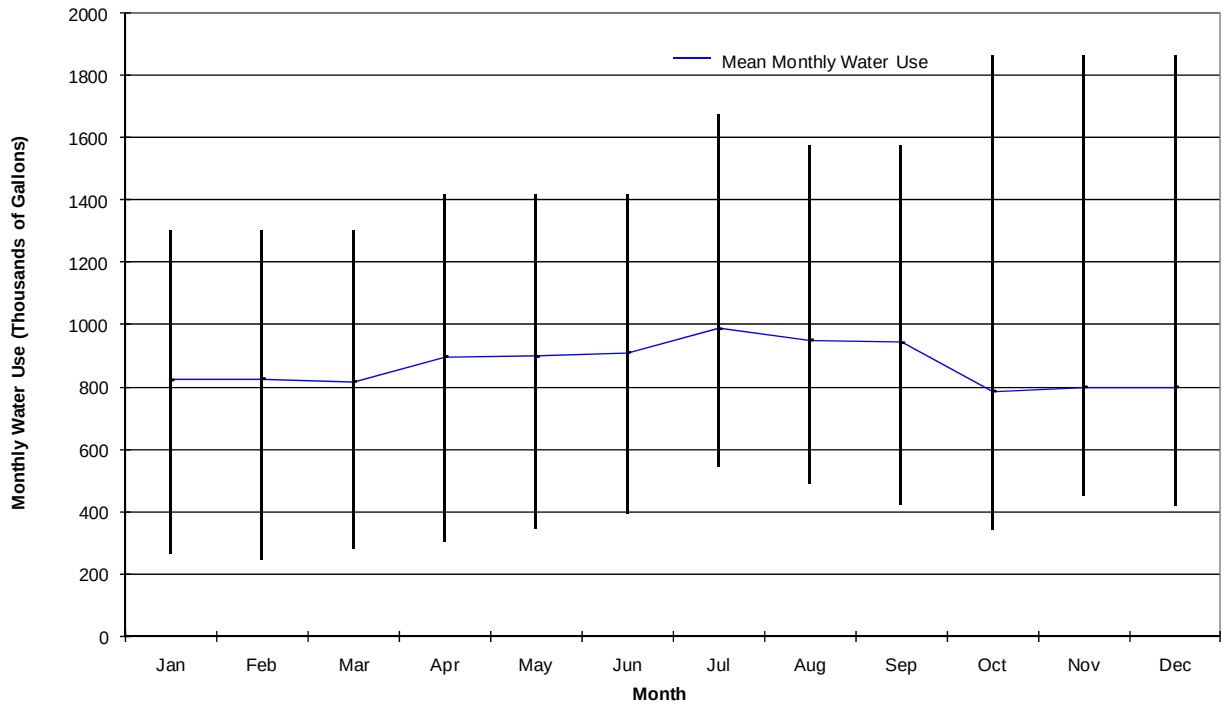

Figure 8 - Monadnock Mountain Spring Water Intervale Road Well Monthly Water Use 1995-2008

Table 4 - Monadnock Mountain Spring Water, Inc. Monthly Water Use Statistics (Combined Wells 1995-2008)

	Low	High	Average
(thousand gal)	442	3,733	1,653
(cfs)	0.0228	0.3250	0.0888
(cfsm at impact point)	0.0004	0.0051	0.0014
(cfsm at Merrimack Gage)	0.0001	0.0019	0.0005

Table 5 - Monthly Water Use Statistics (Mansur Well 1995-2008)

	Low	High	Average
(thousand gal)	245	1,866	846
(cfs)	0.0135	0.1800	0.0454
(cfsm at impact point)	0.0002	0.0028	0.0007
(cfsm at Merrimack Gage)	0.0001	0.0011	0.0003

Table 6 - Monthly Water Use Statistics (Intervale Well 1995-2008)

	Low	High	Average
(thousand gal)	245	1,866	870
(cfs)	0.0135	0.1032	0.0443
(cfsm at impact point)	0.0002	0.0016	0.0007
(cfsm at Merrimack Gage)	0.0001	0.0006	0.0003

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Water Conservation Rules require different activities depending on the type of water use. Water conservation requirements for commercial water users include: documenting the location and amount of water used for commercial production; installing water meters for each water source; maintaining meters in accordance with "Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing, and Maintenance" (AWWA 1999); and, documenting the water conservation best management practices or best available technologies that may be applicable at the facility.

Existing Water Conservation Measures

Recording water meters were installed for each supply well in the fall of 2008, allowing tracking and reporting of individual well production. Meter readings are compared to recorded bottled water production volumes and reported wastewater discharge amounts to detect any variation in expected reported well production and to detect any water leaks. In addition, water storage is checked each day for leaks.

Water Conservation Alternatives and Costs

Monadnock Mountain Spring Water, Inc. has implemented most of the basic water conservation measures expected of a commercial operation as part of their normal operations. The development of a formal program for the testing and calibration of the water use recording meters is recommended along with having a formal water audit performed to identify opportunities for implementing additional water conservation measures.

Conservation Implementation Schedule

By June 1, 2014, Monadnock Mountain Spring Water, Inc. will finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document existing water conservation activities, source water meters maintenance in accordance with the provisions of the Water Conservation Rules, and implementation of water conservation best management practices and best available technologies, where economically feasible.

Water User Contact Information

Water User: Monadnock Mountain Spring Water, Inc.
Address: P.O. Box 518, 8 Mansur Road, Wilton, NH 03086
Contact: Gary Boot
Phone: 654-2728
Email: monadnock3@tellink.net

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

American Water Works Association (AWWA) 1999. Water Meters – Selection, Installation, Testing and Maintenance. Manual of Water Supply Practices M6. Fourth Edition.

Department of Environmental Services (DES) 2005. Souhegan River Instream Flow Task 2 Report. Prepared by Dr. Tom Ballestero, University of New Hampshire.

Department of Environmental Services (DES) 2010. Performing a Business or Industry Water Use and Conservation Audit. Environmental Fact Sheet WD-DWGB-26-16.

Personal communication with Gary Boot, Monadnock Mountain Spring Water, Inc.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

OK Tool Source Area (#20832)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the New Hampshire Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The OK Tool Source Area (OK Tool site) in Milford, New Hampshire, also referred to as operable unit OU1, is one of two remedial efforts associated with the Savage Municipal Water Supply Superfund site (Site ID #0101145). The remedial actions at the OK Tool site are in response to the contamination of groundwater by volatile organic compounds (VOCs) released from the former industrial operations at the site. There is an active groundwater pumping and treatment system at the site, and treated groundwater is re-infiltrated to the aquifer via underground injection. The remediation activities at the OK Tool site are the responsibility of DES and the United States Environmental Protection Agency (EPA), and are defined under an existing remediation plan.

Water Source and Uses

The OK Tool site is the source area of a groundwater contamination plume in the Souhegan River aquifer. The source is now contained by a vertical, circular, subsurface, low permeability

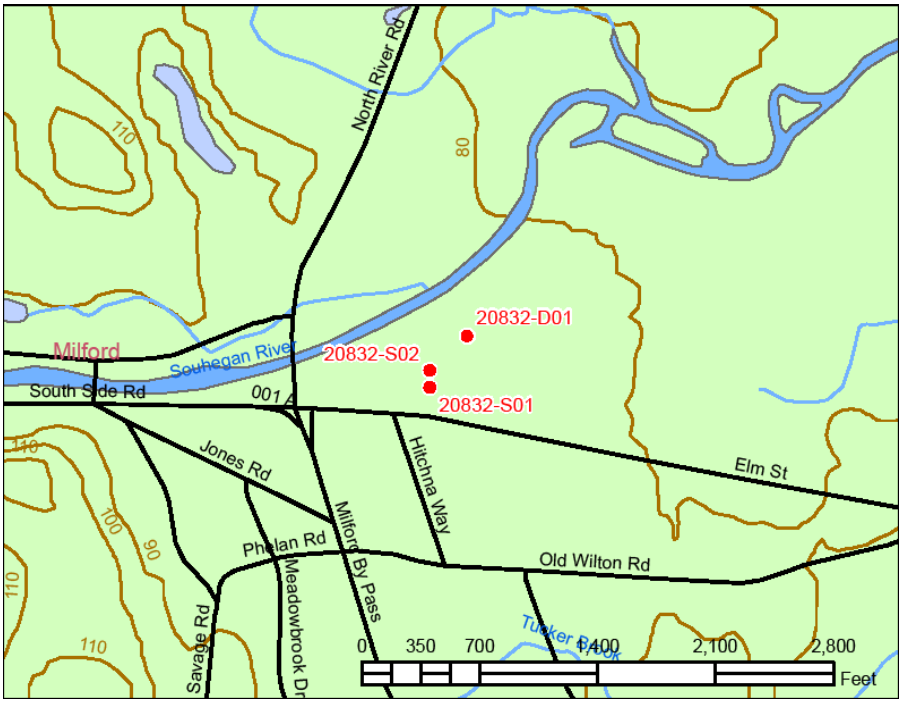

Figure 1 - Location map of OK Tool Source Area at the Savage Municipal Water Supply Superfund Site in Milford, New Hampshire

slurry wall. Groundwater is extracted from two six inch wells (20832-S01 and 20832-S02) within the wall. The water is then treated for VOCs via air stripping and returned to the subsurface through a recharge trench (20832-D01) outside the slurry wall. Figure 1 depicts the location of the wells with respect to the Souhegan River. The drainage area of the Souhegan River at the location of these wells is approximately 103 sq. mi.

Water Use Patterns

Water use is near continuous during normal treatment operations and the wells are generally pumped at a uniform rate of 17 to 20 gallons per minute (gpm). Groundwater pumping is metered, recorded monthly, and reported to DES. Groundwater use data used for this report covered only part of 2008.

According to the water use registration forms on file with DES, the OK Tool site wells are pumped at an average rate of 99,500 gallons per day (gpd) with a maximum rate of 178,560 gpd and an average annual use of 36,317,500 gallons. The water pumped from the extraction wells is returned to the aquifer through a recharge trench down gradient of the extraction wells, thus, there is no net water consumption at this site.

Water use data for the OK Tool site for 2008 are graphically presented in Figures 2, 3, and 4, and summarized in Tables 1, 2, and 3 for the combined well pumping as well as for each well. Monthly water use data were converted to flow in cubic feet per second by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor.

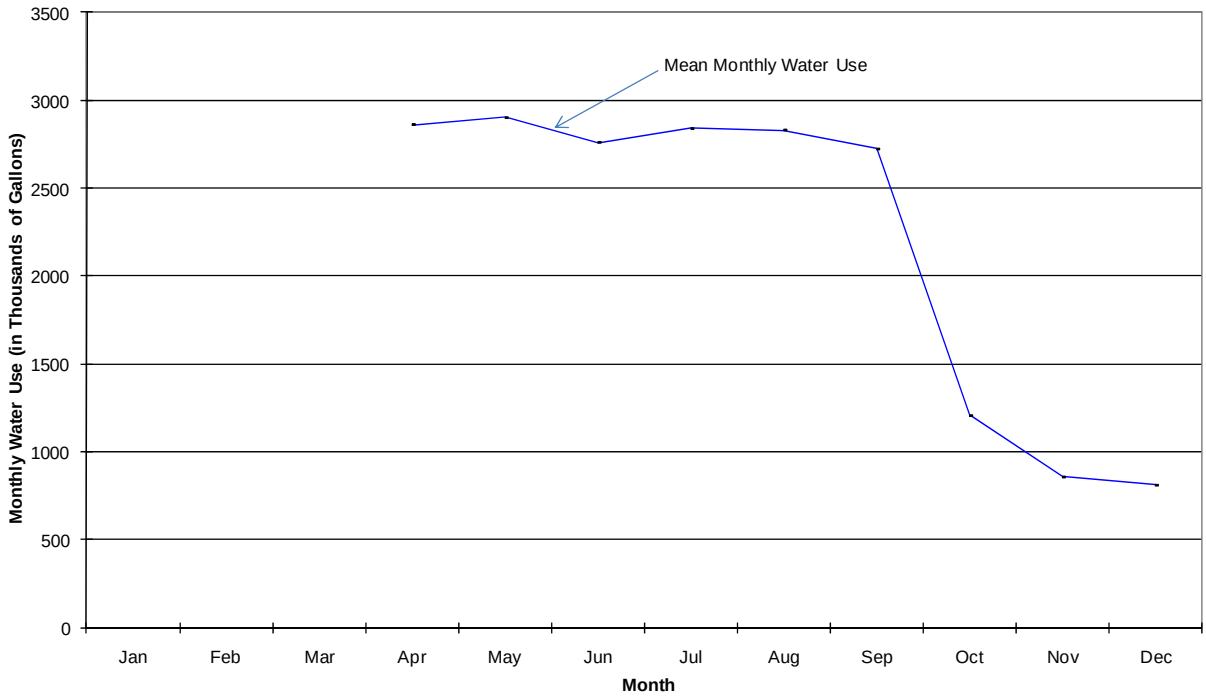

Figure 2 - OK Tool Site Monthly Water Use for 2008

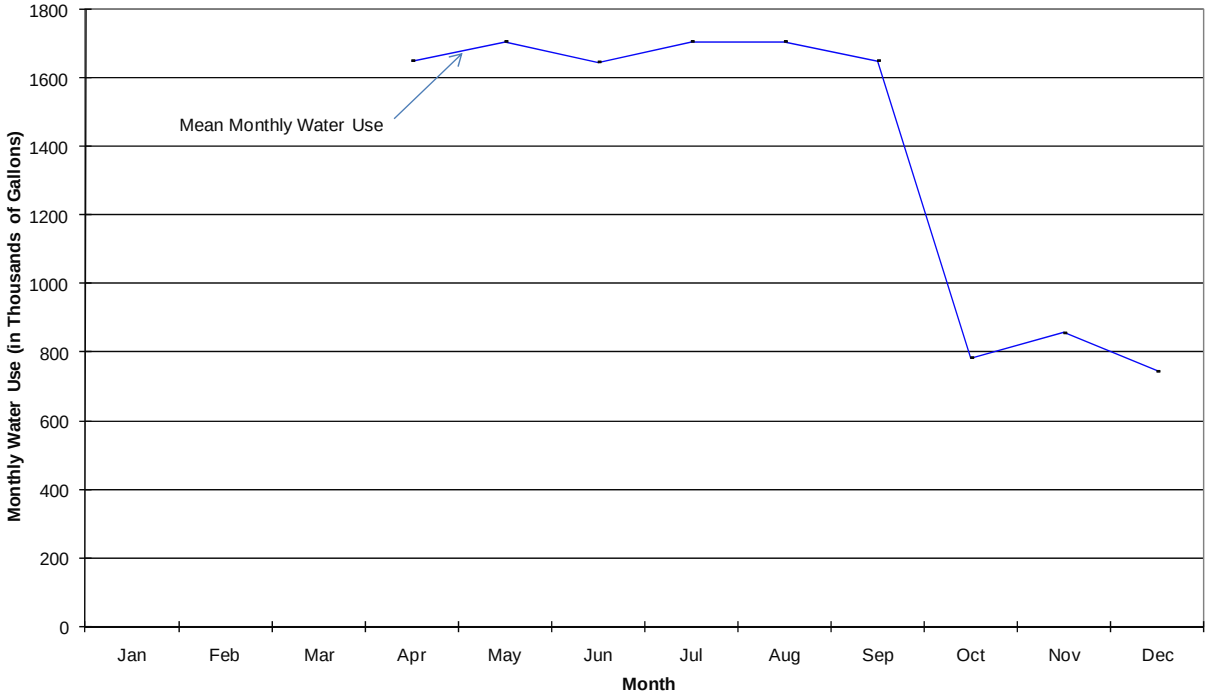

Figure 3 - OK Tool Site Extraction Well No. 1 Monthly Water Use for 2008

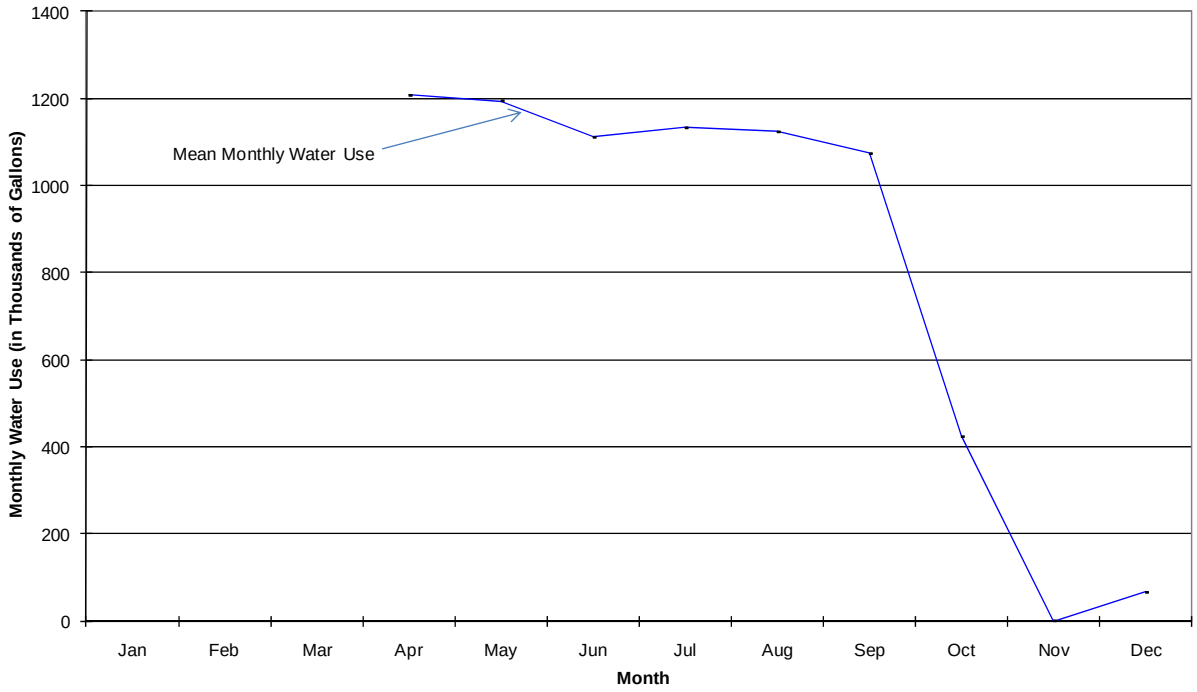

Figure 4 – OK Tool Extraction Well No. 2 Monthly Water Use for 2008

Table 1 - Monthly Water Use Statistics (Combined Wells 2008)

	Low	High	Average
(thousand gal)	811	2,900	2,190
(cfs)	0.0405	0.1450	0.1110
(cfsm at impact point)	0.0004	0.0014	0.0011
(cfsm at Merrimack Gage)	0.0002	0.0008	0.0007

Table 2 - Monthly Water Use Statistics (Extraction Well S01 2008)

	Low	High	Average
(thousand gal)	744	1,710	1,380
(cfs)	0.0372	0.0852	0.0702
(cfsm at impact point)	0.0004	0.0008	0.0007
(cfsm at Merrimack Gage)	0.0002	0.0005	0.0004

Table 3 - Monthly Water Use Statistics (Extraction Well S02 2008)

	Low	High	Average
(thousand gal)	0	1,210	812
(cfs)	0	0.0623	0.0413
(cfsm at impact point)	0	0.0006	0.0004
(cfsm at Merrimack Gage)	0	0.0004	0.0002

Env-Wq 2101 Requirements for Water Conservation Plans

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. Water use at the OK Tool site is for the remediation of contaminated groundwater and the operations are specified in a remedial operations plan.

Existing Water Conservation Measures

Meters are installed on the groundwater extraction wells. Aside from leakage control, there is very little in the way of conservation measures that should be implemented since the withdrawals are returned to the aquifer and the Souhegan River.

Water Conservation Alternatives and Costs

The remediation activities at OK Tool site are the responsibility of DES and EPA and are specified in a remedial operations plan. Water is removed from within a low permeability cylindrical subsurface slurry wall sealed in till or on bedrock and then returned, after treatment, to a recharge trench outside of the wall. The net effect of the water withdrawals when combined with the returned water has no observable effect on stream flow.

Accurate recording of water use at the site is important to document both the water produced by the extraction wells and the amount discharged to the recharge trench, so that water losses can be identified and eliminated. It is recommended that the water meters for the wells and the

discharge to the recharge trench be tested annually, and calibrated if necessary. The cost for this should not exceed $2,000 per year.

Conservation Implementation Schedule

By June 1, 2014, DES will finalize a Water Conservation Plan for the OK Tool site in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Plan will document that the water meters at the site are being maintained in accordance with the Water Conservation Rules.

Water User Contact Information

Water User: State of New Hampshire
Address: P.O. Box 95, 29 Hazen Drive, Concord, NH 03302-0095
Contact: Robin Mongeon
Phone: 271-7378
Email: Robin.Mongeon@des.nh.gov

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Water use registration forms on file with the Department of Environmental Services (DES).

Waste Site Cleanup & Reuse in New England – Savage Municipal Water Supply, United States Environmental Protection Agency, website: http://yosemite.epa.gov/r1/npl_pad.nsf/701b6886f189ceae85256bd20014e93d/83c7d221bb30028c8525691f0063f6f4!OpenDocument

CONSERVATION PLAN

Otis Falls Dam (#20229)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Otis Falls Dam is located on the mainstem of the Souhegan River in Greenville, New Hampshire (Figure 1). The dam is a privately owned hydropower facility licensed by the Federal Energy Regulatory Commission (FERC Project No. 7921) and registered with the DES Dam Bureau (#101.01). According to DES Dam Bureau records, the concrete and stone dam is 150 feet long and 27 feet high (Figure 2). The dam impounds Mill Pond, which is eight acres and used for recreation.

Water Source and Uses

The hydropower operations at Otis Falls Dam are dependent on stream flow in the Souhegan River. Thus, the hydropower operations are registered with the DES as a water user (20229), with water use reported on a quarterly basis. The dam is operated as run-of-river, meaning that

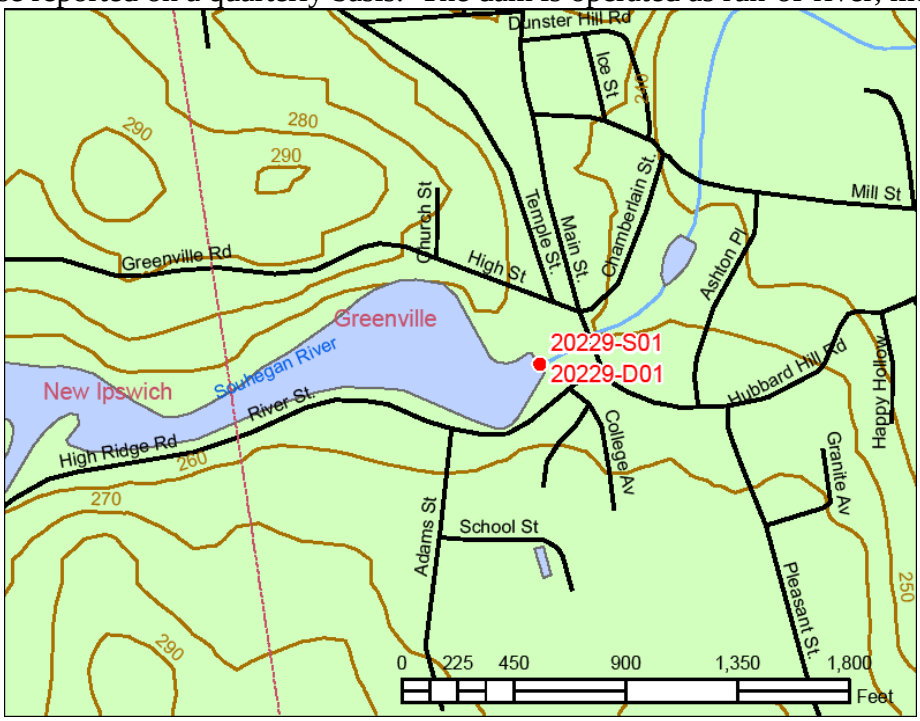

Figure 1 - Location map of the Otis Falls Dam located in Greenville, New Hampshire

the operation of the dam does not alter the flow of the river and all of the water diverted through the hydroelectric operations is returned to the river via a penstock 10 feet downstream of the dam.

If sufficient flow is available, the hydroelectric operations at Otis Falls Dam can produce power 24 hours a day, seven days a week, 365 days a year. Under the terms of its license to operate, the facility must allow for a minimum outflow of 10 cubic feet per second (cfs) during the summer (June through September) and 15 cfs during the fall, winter and spring (October through May). When the hydropower facility is not operating, all of the water flows over the top of the dam.

Figure 2 - Otis Falls Dam looking upstream from the Main Street Bridge in Greenville, New Hampshire (2004)

Water Use Patterns

Water use data for the Otis Falls Dam for the period of 1989 through 2008 are shown graphically in Figures 3 and 4 and are summarized in Tables 1 and 2.

Water use is dependent on river flow. On an annual basis, Otis Falls Dam water use has ranged from a low of 2,480 million gallons (2001) to a high of 7,820 million gallons in 2006 (Figure 3 and Table 1). Average annual water use was 5,380 million gallons for the eighteen years that a complete annual record was available. Annual water use has not shown significant upward or downward trends and has mirrored water usage at other Souhegan River dams.

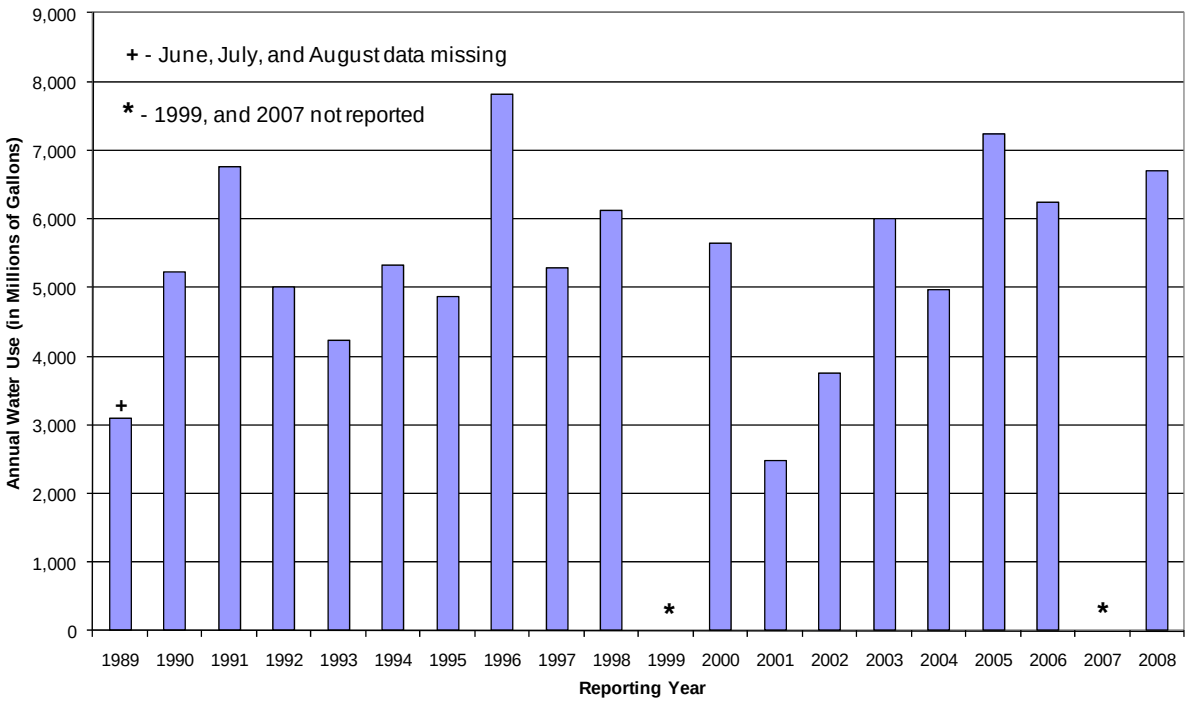

Figure 3 - Otis Falls Dam Annual Water Use 1989-2008

Table 1 - Annual Water Use Statistics (1989-2008)

	Low	High	Average
(million gal)	2,480	7,820	5,380
(cfs)	10.50	33.20	22.80
(cfsm at impact point)	0.3580	1.1300	0.7740
(cfsm at Merrimack Gage)	0.0616	0.1940	0.1330

Minimum monthly water use at Otis Falls Dam between 1989 and 2008 was 192 thousand gallons (September 1989) with a maximum of 1,320 million gallons (April 2008), and an average of 454 million gallons (Figure 4 and Table 2). Generally, monthly water use varies between 420 and 520 million gallons per month. Greatest monthly usage is usually during April when river flows are greatest and is typical for a run-of-river dam in New Hampshire.

Monthly water use data in thousands of gallons were converted to cubic feet per second. Daily water use by the Otis Falls Dam has ranged from a minimum of 0.01 cfs (September 1989) to a maximum of 68.30 cfs (April 2008), and average use was 23.10 cfs for the period of 1989 to 2008 (Table 2).

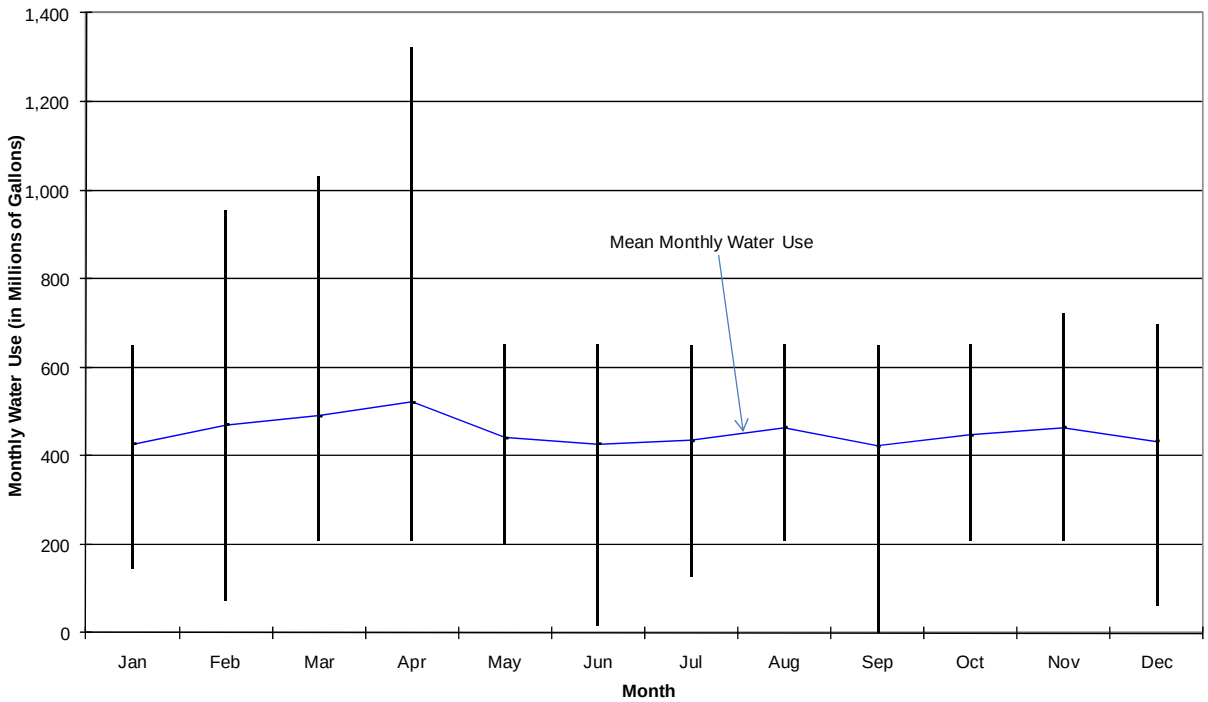

Figure 4 - Otis Falls Dam Monthly Water Use 1988-2008

Table 2 - Monthly Water Use Statistics (1988-2008)

	Low	High	Average
(million gal)	0.192	1,320	454
(cfs)	0.01	68.30	23.10
(cfsm at impact point)	0.0003	2.3200	0.7840
(cfsm at Merrimack Gage)	0.0001	0.4000	0.1350

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. Since the Otis Falls Dam is hydroelectric power facility with no consumptive use, a Water Conservation Plan is not required.

Existing Water Conservation Measures

Since the Otis Falls Dam is managed as a run-of-river operation, no water conservation measures are required at this facility.

Water Conservation Alternatives and Costs

Because there are no consumptive losses associated with the operation of the Otis Falls Dam facility, no additional water conservation measures are required.

Conservation Implementation Schedule

Since no additional water conservation measures are currently required, there is no conservation implementation schedule.

Water User Contact Information

Water User: Kathleen R. Dolan
Address: PO Box 605, Hillsboro, NH 03244
Contact: Kathleen R. Dolan
Phone: 478-7828
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

New Hampshire Dam Bureau, NHDAMS Data Sheet for Otis Falls Dam.

Personal communication with Robert Greenwood, Alden Hydro, LLC.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed with input from Robert Greenwood of Alden Hydro, LLC.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Pennichuck Water/Souhegan Woods (#20659)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Pennichuck Water operates the Souhegan Woods Community Water System (CWS) at a development located off of County Road in Amherst, New Hampshire. The water source is an overburden groundwater supply well located along the Souhegan Designated River. This CWS also has an interconnection with the Merrimack Village District as a supplemental water supply.

Water Source and Uses

Pennichuck Water provides water to the Souhegan Woods CWS from one overburden groundwater supply well (20659-S01). Groundwater is withdrawn from the well on a daily basis to provide drinking water and fire protection to the 115-home, Souhegan Woods subdivision. Since the population served is less than 1,000, Souhegan Woods is a small community water system under the New Hampshire Water Conservation Rules (Env-Wq 2101).

Figure 1 shows the location of the water supply well relative to the Souhegan Designated River. The drainage area of the Souhegan River at the location of this well is approximately 161 sq. miles.

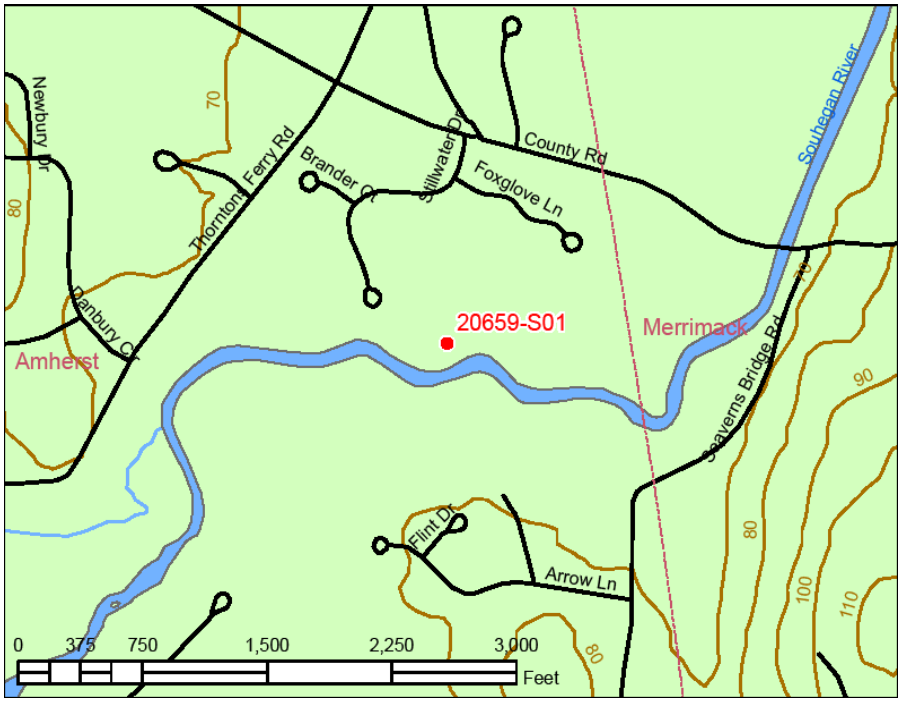

Figure 1 - Location map of Pennichuck Water's Souhegan Woods water supply well in Amherst, New Hampshire

Although the water source is groundwater, because the pumped well is located in a stratified drift formation connected to the Souhegan River, the well intercepts water that supports stream flow in the Souhegan River. An analysis of induced recharge by this well was performed as part of the Instream Flow Study (DES 2005). The results of the analysis indicated that it does not induce Souhegan River water recharge at its average or maximum reported extraction rates.

Water Use Patterns

Water use is daily and represents common community water supply needs moderated by system storage. Daily water demand follows a diurnal pattern, with the greatest water demand during the day. The well pump runs about five hours per day during the low water use season (winter), and about 17 hours per day during the high water use season (summer), with most of the increased water demand for lawn irrigation. The system includes 40,000 gallons of storage in two atmospheric tanks and 11,000 gallons in a hydro-pneumatic tank. When pumping, the well is pumped at a uniform rate (~ 61 gallons per minute); when pumping exceeds demand, excess water fills storage, and when pumping is less than demand, stored water makes up the difference. Groundwater pumping is metered and monthly totals are recorded, with quarterly reporting to DES.

Water use data for the Souhegan Woods CWS well for the years of 1998 through 2008 are summarized in Figures 2 and 3 and in Tables 1 and 2. Water use records were incomplete for 1998, so 1998 was not included in the annual use summaries. The monthly summaries include all available data from 1998 through 2008.

From 1999 through 2008, the annual water use by Souhegan Woods CWS well ranged from a high of 21.6 million gallons (2002) to a low of 7.94 million gallons (2004), and average use was 15.1 million gallons (Figure 2 and Table 1). During this period, annual water use by Souhegan Woods CWS well has decreased by 5 million gallons or 27.5 percent. This represents a decrease of 500,000 gallons a year or 2.8 percent per year averaged over the 10 year period. Pennichuck Water credits the overall decline in water use to the increased use of water saving fixtures by residents and changing demographics within the community.

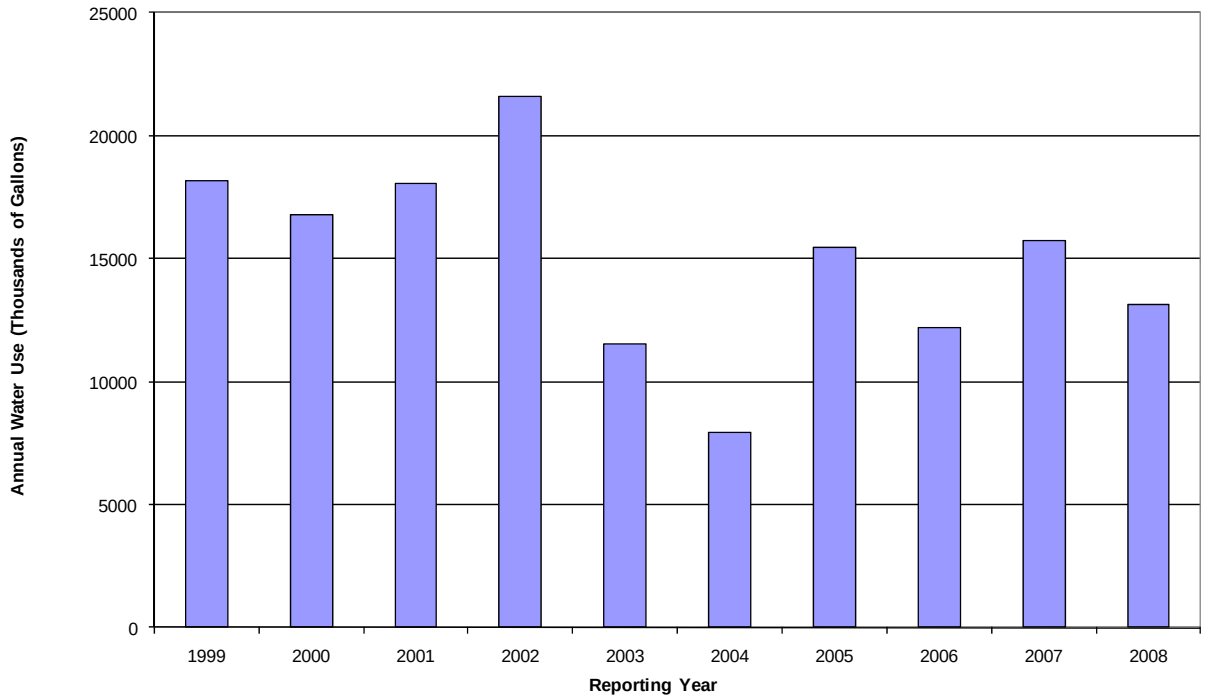

Figure 2 - Pennichuck Water's Souhegan Woods Well Annual Water Use 1999-2008

Table 1 - Pennichuck Water's Souhegan Woods Annual Water Use Statistics (1999-2008)

	Low	High	Average
(thousand gal)	7,940	21,600	15,100
(cfs)	0.0337	0.0916	0.0639
(cfsm at impact point)	0.0002	0.0006	0.0004
(cfsm at Merrimack Gage)	0.0002	0.0005	0.0004

Monthly water use records for the system begin in July 1998. Monthly water use varies in response to weather conditions and changes in seasonal demand. Total and average monthly water use was highest during the summer and lowest during the winter. This seasonal pattern reflects increased outdoor water usage (lawn irrigation, gardening, vehicle washing, etc.) during the summer months, which declines during the fall, remains low during the winter, and begins to increase again in the spring. The highest total monthly use was 3.44 million gallons (August 2001), the lowest total monthly use was 145,000 gallons (December 2003), while the average monthly use was 1.24 million gallons (Figure 3 and Table 2).

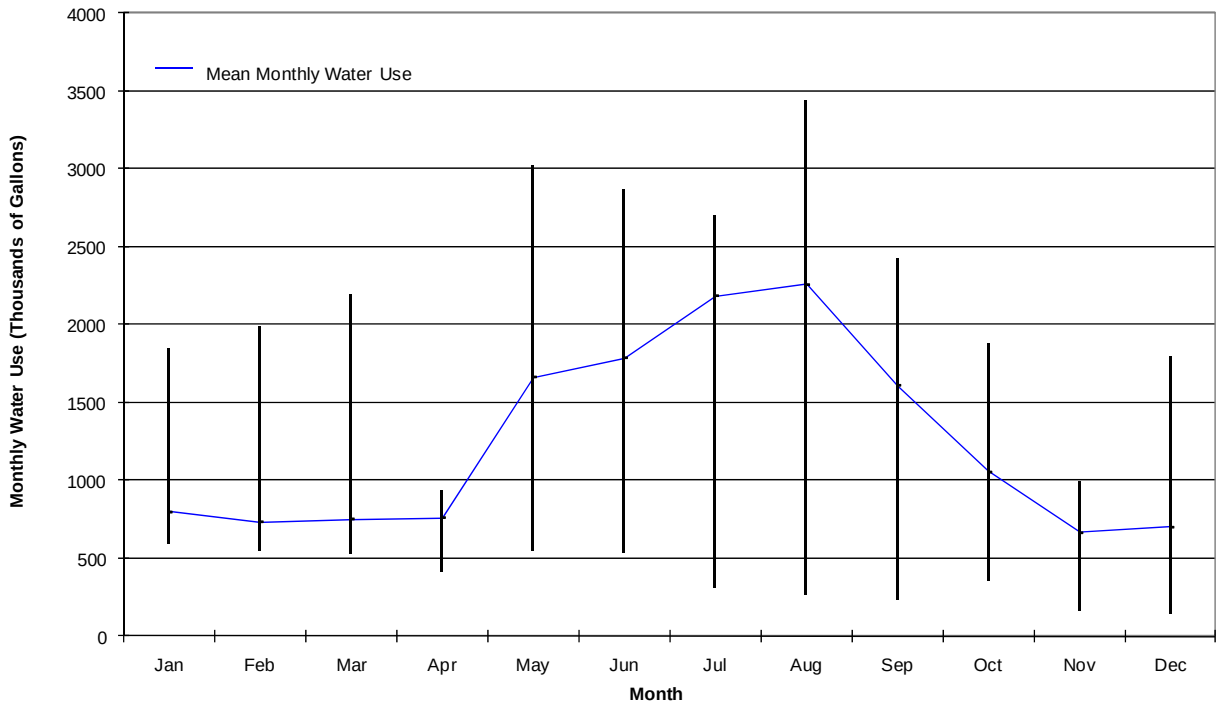

Figure 3 - Pennichuck Water's Souhegan Woods Well Monthly Water Use 1999-2008

Table 2 - Pennichuck Water's Souhegan Woods Monthly Water Use Statistics (1998-2008)

	Low	High	Average
(thousand gal)	145	3,440	1,240
(cfs)	0.0073	0.1720	0.0632
(cfsm at impact point)	0.0001	0.0011	0.0004
(cfsm at Merrimack Gage)	0.00005	0.0010	0.0004

Monthly water use data were converted from thousands of gallons per month to cubic feet per second by dividing the monthly total by days and then multiplying them by a flow unit conversion factor. These values were also divided by the drainage basin area (171 sq. miles) relative to the location of the United States Geological Survey gage station (01094000) on the Souhegan Designated River in Merrimack, New Hampshire and they were also normalized to the drainage area (161 sq. miles) of the Designated Reach above the impact point of the withdrawals.

Based on these values, the average daily water use by the Souhegan Woods CWS well has ranged from a minimum of 0.007 cfs (4,718 gallons per day, December 2003) to a maximum of 0.17 cfs (111,167 gallons per day, August 2001), and average use was 0.06 cfs (40,847 gallons per day) for the period of 1998 to 2008 (Table 2).

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use.

Conservation requirements for existing small community water systems such as Souhegan Woods include:

- Installation, maintenance, and use of appropriately selected meters;
- Maintaining low levels of unaccounted-for-water;
- A comprehensive plan for leak detection surveys of the distribution system;
- System pressure reduction, as necessary; and,
- A water conservation educational outreach initiative.

Pennichuck Water will be in compliance with the water conservation plan requirements of the Instream Flow Program by completing a Water Conservation Plan and receiving approval of the Plan by the DES Groundwater and Drinking Water Bureau.

Existing Water Conservation Measures

Pennichuck Water's Souhegan Woods CWS has implemented most of the water conservation measures recommended by DES for water utilities and required in the state's Water Conservation Rules (Env-Wq 2101) for small community water systems. The water source is metered and maintained per the AWWA (1999) recommendations. Well production is totaled monthly and reported quarterly to DES. All of the water users in the Souhegan Woods CWS are individually metered, water use is recorded monthly, and water users are billed monthly. Pennichuck Water checks well production against water use totals summed from individual meters monthly to determine if there are discrepancies. If the discrepancy is greater than 15 percent, a leak inspection is performed. Pressure reduction has not been needed and system pressure is below the maximum allowable system pressure of 100 psi. Pennichuck Water provides educational mailings on various water conservation measures to all residents.

Souhegan Woods CWS is provided water by one on-site well along with a connection to the Merrimack Village District (MVD) system. Since it only has one on-site well, Pennichuck Water constantly maintains an odd/even water use restriction for this system. On the off days, water use is limited to a hand held watering container to water vegetable and flower gardens (Pennichuck Water 2009).

Since the Souhegan Woods CWS is connected to the MVD system, Pennichuck Water has not had to institute more restrictive water conservation measures. But, in the event of a water system emergency, Pennichuck Water could implement additional measures including an every fourth day ban on water usage or a complete ban on all outside usage (Pennichuck Water 2009).

Additional water use reductions can be imposed by the MVD system when it provides water to the Souhegan Woods CWS. These may include restrictions or a ban on outdoor water use depending on its system capacity.

Water Conservation Alternatives and Costs

Pennichuck Water has implemented most of the recommended water conservation measures recommended by DES as Best Management Practices for water utilities (DES 1998 and 2001) or as outlined in the state's Water Conservation Rules (Env-Wq 2101) for small community water systems. Since the source well does not have a direct impact on the Souhegan Designated River and the supplemental source of water (MVD) is located outside of the Water Management Planning Area, no water conservation alternatives are proposed as part of this Conservation Plan and, as a result, there are no costs.

Water conservation activities expected under this Conservation Plan are currently ongoing in the Souhegan Woods CWS service area. If Pennichuck Water or the MVD (when supplying water to the Souhegan Woods CWS) need to implement or maintain more restrictive water conservation measures due to diminished supply from its source(s) or storage, then those actions take precedence over this Conservation Plan. Nothing in this Plan precludes Pennichuck Water or the MVD from further conservation measures on its own initiative.

Conservation Implementation Schedule

By June 1, 2014, Pennichuck Water will finalize a Water Conservation Plan for the Souhegan Woods CWS as required by Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers. The Plan will document compliance with the requirements for Existing Small Community Water Systems (Env-Wq 2101.06) and will be administered by the DES Drinking Water and Groundwater Bureau under the authority of the Instream Flow Program.

Water User Contact Information

Water User: Pennichuck Water Works
Address: P.O. Box 1947, 25 Manchester Street, Merrimack, NH 03054-1947
Contact: Donald Ware
Phone: 913-2330
Email: donald.ware@pennichuck.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
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Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

American Water Works Association (AWWA) 1999. Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing and Maintenance. Manual M6.

Department of Environmental Services (DES) 1998. Developing a Utility Water Conservation Program. Environmental Fact Sheet WD-WSEB-6-1.

Department of Environmental Services (DES) 2001. Implementing a Water Efficiency and Conservation Program for Public Water Utilities. Environmental Fact Sheet WD-WSEB-26-9.

Department of Environmental Services (DES) 2005. Souhegan River Instream Flow Task 2 Report. Prepared by Dr. Tom Ballestero, University of New Hampshire.

Pennichuck Water 2009. Emergency Action Plan: Souhegan Woods.

Personal communications with Donald Ware, Pennichuck Water.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed by Donald Ware.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Peter de Bruyn Kops (#20383)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Mr. Peter de Bruyn Kops operates a commercial farm located in Amherst, New Hampshire. The farm produces various crops based on market demand. In the past, the farm has relied on irrigation water withdrawn from the Souhegan Designated River for crop watering and occasionally for frost prevention.

Water Source and Uses

Mr. Peter de Bruyn Kops registered with the DES in 1993 and reported his water use from 1994 through 2003. During this period, however, water use only occurred in 1997, 1998 and 1999. The facility has been officially inactive as a water user since 2003 and has not reported water use since that time. At the request of Mr. de Bruyn Kops, his farm operations are being included in the development of the Souhegan River Water Management Plan.

Since the early 2000s, the crops produced at the farm (hay, clover, canola, vegetables and flowers) have not required reportable levels of water use for irrigation. Records for surface water use by Mr. de Bruyn Kops are available from DES for the period of 1994 through 2003.

Water is withdrawn from the Souhegan River via a removable pipe that is connected to an eight inch irrigation pipe. The intake is located in the Town of Amherst, approximately 10 miles upstream from its confluence with the Merrimack River (Figure 1). The drainage area of the Souhegan River is approximately 156 square miles at the point of withdrawal.

Water was withdrawn on an “as needed” basis and used to irrigate a mixture of crops. In the early 2000s irrigation withdrawals from the river ceased, since the majority of the farm is used for the production of hay (alfalfa, alfalfa-grass, clover-grass and grass), sweet clover and honeybee forage. Prior to 2000, six to ten acres were used and irrigated for the production of pumpkins and winter squash. Less than an acre is used for the production of general vegetables utilizing drip irrigation sourced from a domestic well and an oxbow pond.

Water Use Patterns

Water use is on an as-needed basis, potentially seven days per week, and is weather dependent. If less than one inch of water is provided by rainfall during a week, the remaining fraction of water is provided by daytime irrigation. Water use is not metered, but is estimated from the sprinkler flow rates

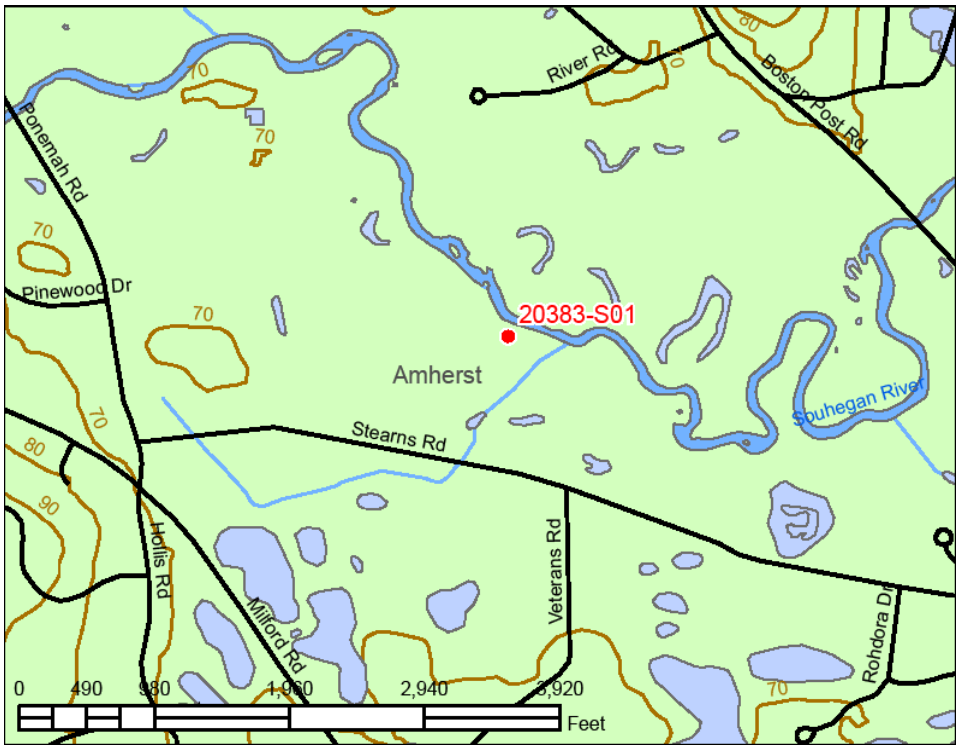

Figure 1 - Location map of Mr. Peter de Bruyn Kops withdrawal from the Souhegan Designated River in Amherst, New Hampshire

Water use data for Peter de Bruyn Kops for the years of 1994 through 2003 are summarized in Figures 2 and 3 as well as in Tables 1 and 2. Between 2003 and 2008, Mr. de Bruyn Kops did not use river water for crop irrigation and therefore stopped reporting withdrawals to DES. Although his registration as a water user is now considered inactive, he may withdraw water from the Souhegan Designated River for irrigation again in the future.

Water use varied from year to year and month to month, depending primarily on rainfall, weather conditions and the growing season. Annually, usage has ranged from a low of 0 gallons (multiple years) to a high of 520 thousand gallons (1997) and has averaged 100 thousand gallons for the reporting period (Figure 2 and Table 1). During this 10 year period (1994 through 2003), water was only withdrawn from the Souhegan Designated River in 1997, 1998 and 1999.

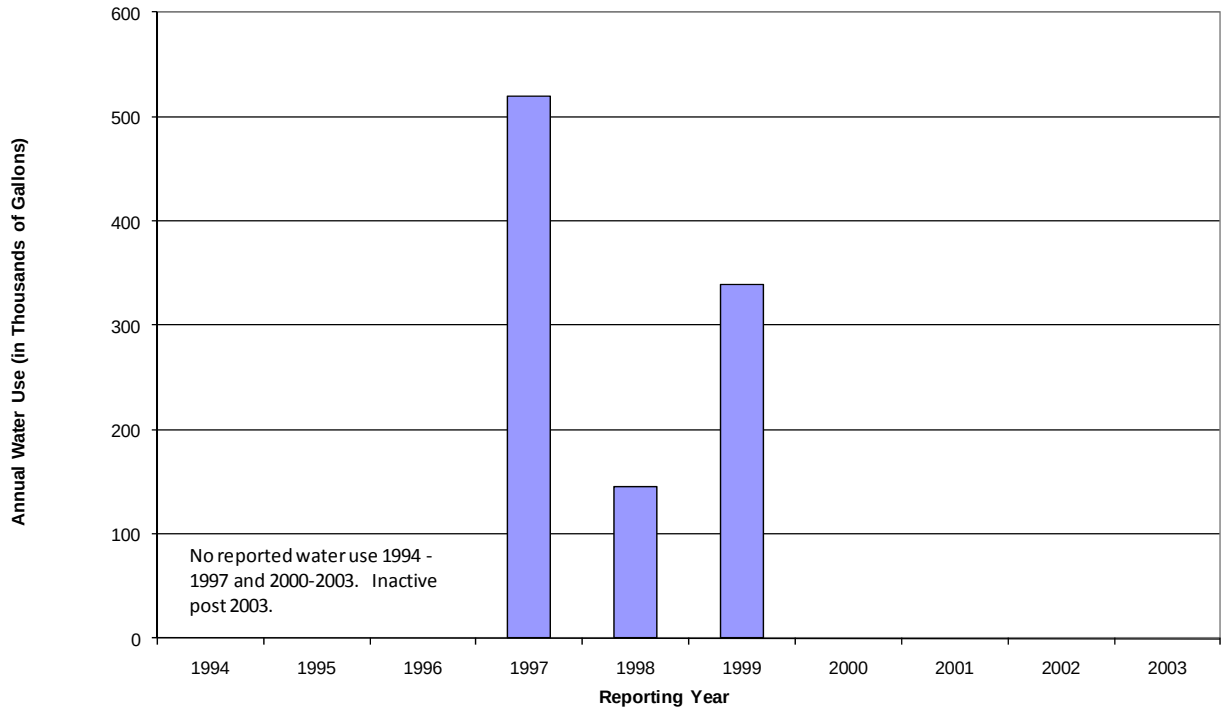

Figure 2 - Peter de Bruyn Kops Annual Water Use, 1994-2003

Table 1 - Peter de Bruyn Kops Annual Water Use Statistics (1994-2003)

	Low	High	Average
(1,000 gal)	0	520	100
(cfs)	0	0.0022	0.0004
(cfsm at impact point)	0	0.00001	0.000003
(cfsm at Merrimack Gage)	0	0.00001	0.000003

Monthly water use changes seasonally with crop irrigation demand and rainfall. There has been no reported water use during the months of October through May due to plant dormancy conditions (Figure 3). Mean monthly water use increases from June through August and then decreases from August to October, which parallels the expected water demand during a growing season. The maximum monthly use for the reporting period was 178 thousand gallons during August 1997. Average monthly water use for the growing season months of April through October was 14,000 gallons (Table 2).

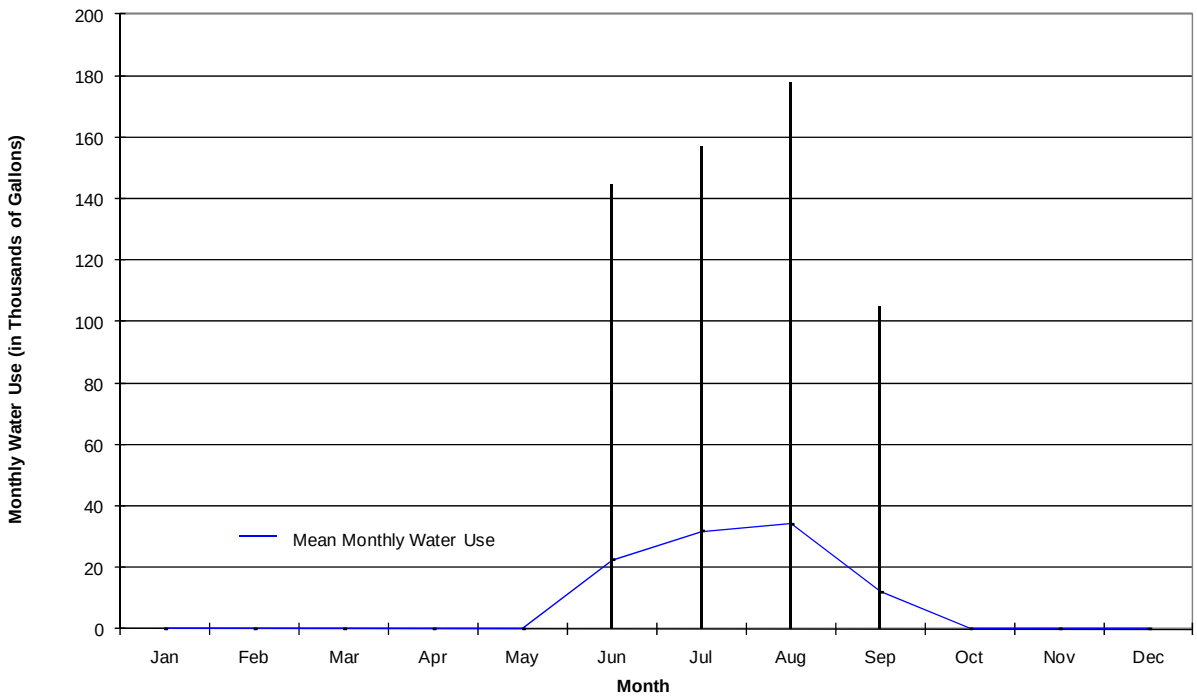

Figure 3 – Peter de Bruyn Kops Monthly Water Use, 1994-2003.

Table 2 - Monthly Water Use Statistics (1994-2003)

	Low	High	Average	Apr - Oct avg
(1,000 gal)	0	178	8	14
(cfs)	0	0.009	0.0004	0.007
(cfsm at impact point)	0	0.00006	0.0000003	0.00004
(cfsm at Merrimack Gage)	0	0.00005	0.0000003	0.00004

Monthly water use data were converted to average monthly flow in cubic feet per second (cfs). Based on these values, monthly water use by Peter de Bruyn Kops has ranged from a minimum of 0 cfs (October through May in all years, all of 1994-1996, and all of 2000 through 2003) to a maximum of 0.009 cfs (August 1997), with an average of 0.007 cfs for the April – October period and 0.0005 cfs annually from 1994 through 2003.

Env-Wq 2101 Requirements for Water Conservation Plans

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Water Conservation Rules require different activities depending on the type of water use. All water users who irrigate crops associated with agriculture shall implement irrigation processes in accordance with the 1998 edition of the Irrigation Best Management Practices for Agriculture in New Hampshire, published by the Department of Agriculture, Markets and Food.

Best Management Practices for irrigation are based on the implementation of the following management techniques in concert with knowledge of site specific variables:

- Scheduling irrigations with appropriate amounts and frequency;
- Measuring current soil water status, rainfall and irrigation water applied; and,
- Balancing rainfall and irrigation applications with crop water use.

Existing Water Conservation Measures

Mr. de Bruyn Kops stopped withdrawing water from the Souhegan Designated River in 2000, reported no water use from 2000 to 2003 and since 2003 has been an inactive water user. Presently, his irrigation use is limited to less than one acre of general vegetables and the sources for the irrigation water include a domestic well and an oxbow pond.

Mr. de Bruyn Kops presently employs several of the recommended water conservation practices for agricultural irrigation. He uses an adaptive irrigation schedule based on crop watering needs and rainfall. When vegetable crops are grown, irrigation is used to supplement rainfall to total one inch of applied water per week. When irrigation is used, he employs a routine inspection and maintenance program and follows the manufacturers recommended sprinkler configuration patterns.

He also uses plastic landscape fabric to eliminate weeds and to reduce the need for irrigation. He is aware of the development and use of polymers that can be mixed with soil to improve water retention. He has not used these due to their expense and his concerns regarding the unintended consequences of using them in a floodplain. In addition, the polymers are tough to remove once incorporated into the soil.

Water Conservation Alternatives and Costs

Mr. de Bruyn Kops water conservation efforts include several of the agricultural irrigation efficiency practices recommended by DES and the New Hampshire Department of Agriculture (1998). Use of these water conservation practices are to be continued under this Conservation Plan.

Mr. de Bruyn Kops was a registered water user, but his water use has been below the reporting threshold of 140,000 gallons in any seven-day period for after 1999. No actions are required under this Conservation Plan as long as water use remains below 140,000 gallons per week. If water use exceeds this amount, Mr. de Bruyn Kops is required to measure and report water use in accordance with the rules for Water User Registration and Water Use Reporting for agricultural facilities (described in Env-Wq 2202.27 through Env-Wq 2202.32). Water use will be reported to the DES Drinking Water and Groundwater Bureau.

As part of this plan, Mr. de Bruyn Kops will also notify the Water Use and Conservation Program, and coordinate access for them to use an ultrasonic flow meter during irrigation to assist in verifying that his water use measurements are accurate within 10 percent as required by Env-Wq 2102.10 of the Water Use Registration and Reporting Rules. If the difference between

the estimated water use and the measured water use is greater than 10 percent, then Mr. de Bruyn Kops will be required to install flow meters on any sources using more than the reporting threshold in order to accurately record his water use reported to DES.

The cost of a recording meter may range from $500 to $1,000. The meter should be tested annually and calibrated if it does not meet the 10 percent accuracy requirement. Annual meter bench testing may cost between $300 and $400, and calibration, if needed, may cost an additional $100 to $200.

If water use increases to levels greater than the reporting threshold, Mr. de Bruyn Kops will document and use more objective crop demand irrigation criteria based on soil moisture and plant condition to determine when irrigation is needed, as opposed to a general rule of one inch of water per week. The use of soil moisture, crop canopy or a water budget approach is recommended Best Management Practices for irrigation scheduling (New Hampshire Department of Agriculture 1998). In addition, the state recommends replacing existing oscillation sprinkler heads with micro-irrigation devices, where feasible, to reduce water use and improve water efficiency.

Conservation Implementation Schedule

Compliance with the water use reporting and recording accuracy requirements for agricultural facilities as described in (currently Env-Wq 2102.26 through Env-Wq 2102.30) will be implemented following the acceptance of this Conservation Plan and if water use exceeds the reporting threshold of use of 140,000 gallons in any seven day period. Mr. de Bruyn Kops will request the assistance of DES in testing his withdrawal flow rates within two months of his first exceeding the reporting threshold of 140,000 gallons in any seven day period. If metering is required as determined by the Water Use and Conservation Program, the meter(s) will be installed within three years of that determination. Development and use of more objective irrigation criteria should be implemented within two years of the first incidence of meeting the reporting threshold.

Water User Contact Information

Water User: Mr. Peter de Bruyn Kops
Address: 427-3 Amherst Street 341, Nashua, 03063
Contact: Same as user
Phone: 603-673-8392
Email: dkb@acugen.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot	43,560	cubic feet
1	acre-foot	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information:

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

New Hampshire Department of Agriculture, Markets & Food 1998. Irrigation: Best Management Practices for Agriculture in New Hampshire. pp. 18.

Department of Environmental Services (DES) 2010. Water Efficiency Practices for Agricultural Irrigation. Environmental Fact Sheet WD-DWGB-26-5.

Personal communication with Mr. Peter de Bruyn Kops.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed by Peter de Bruyn Kops.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Pilgrim Foods, Inc. (#20681)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Pilgrim Foods, Inc. (Pilgrim Foods), which is owned by the Old Dutch Mustard Co., Inc., is a food production facility located off of Old Wilton Road in Greenville, New Hampshire. Pilgrim Foods prepares several lines of foods products (mustard, vinegar and fruit juices) for sale under the "Old Dutch" name brand. This facility uses water from several sources as part of its operations. These sources include the Town of Greenville water supply system, a well leased from the Town (Souhegan River Well), and two on-site ground water supply wells.

Water Source and Uses

Pilgrim Foods has four registered water sources: the Town of Greenville water supply system (20681-S01); the Souhegan River Well (20681-S02); and two on-site wells (20681-S03 and 20681-S04). Figure 1 shows the location of the wells with respect to the Souhegan Designated River. The Souhegan River Well is located within 100 feet of the designated river, but is no longer used by Pilgrim Foods. One of the on-site wells (20681-S03 or Dube Well) is located

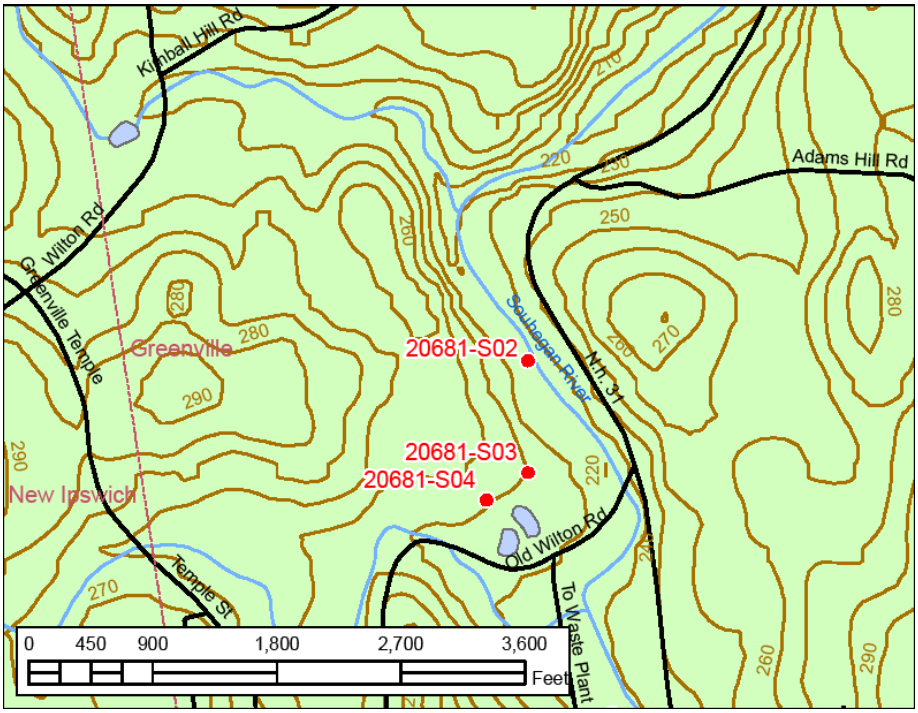

Figure 1 – Location map of Pilgrim Foods, Inc. wells in Greenville, New Hampshire

within 400 feet of the designated river, while the other on-site well (20681-S04 or Davis Well) is located within 400 feet of a stream that flows across the southwest portion of the Pilgrim Foods site and is a tributary to the Souhegan Designated River. The drainage area of the Souhegan River at the location of these wells is approximately 31.6 sq. mi.

The Town of Greenville water system has been used by Pilgrim Foods since it began reporting water use in 1999 and remains its principal source of water. The Souhegan River Well was used along with the water purchased from the Town of Greenville water system until the end of 2006, when the well lease expired. The two on-site wells were inactive from 1999 through 2008, but Pilgrim Foods began using these wells in 2009 to reduce the amount of water purchased from the Town of Greenville. The production of these wells ranges from 4 to 8 gallons per minute (gpm) for the Dube Well (20681-S04) to 12 - 15 gpm for the Davis Well (20681-S03). Pilgrim Foods can also store 20,000 gallons of water in on-site storage tanks.

Water use by Pilgrim Foods is daily, Monday through Friday during normal operating hours (7 am to 4 pm). Water use is metered by each source and is checked weekly. Total monthly water use is reported to DES quarterly.

Water Use Patterns

Water use data for Pilgrim Foods for 1999 through 2008 are presented in Figures 2 through 7 for total water use and for the individual sources. These data are also summarized in Tables 1 through 6. Water use data were available for the period of 1999 through 2008 for the Greenville water supply source and the Souhegan River Well (now inactive), but no water use was reported for the two on-site wells. The monthly water use records are incomplete for 1999 through 2001, with complete monthly records beginning in 2002.

Between 1999 and 2008, annual water use by Pilgrim Foods ranged from a high of 17.3 million gallons (2006) to a low 2.80 million gallons (2002) and has averaged 12.39 million gallons (Figure 2 and Table 1). During this period, annual water use by Pilgrim Foods has increased by 9.50 million gallons or 140 percent (Figure 2). This represents an increase of 951,200 gallons a year or 14 percent per year over the ten year period. The increase in water use by Pilgrim Foods directly reflects the increased production at the facility over this time.

Annual water use by Pilgrim Foods increased steadily from 1999 to 2007, except for the significant drop experienced in 2002 (Figure 2). The dramatic reduction in water use that year is due to a fire at the facility in December 2001 which significantly impacted their business operations. Since its peak in 2007, annual water use declined slightly in 2008.

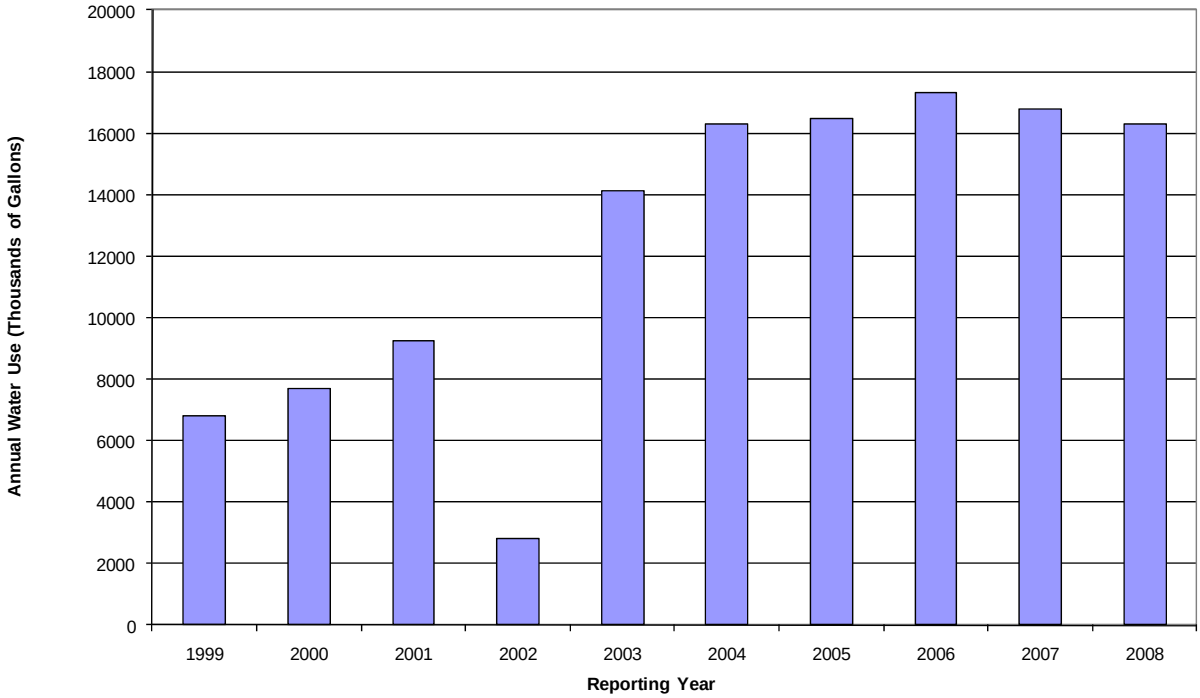

Figure 2 - Pilgrim Foods, Inc. Annual Water Use, 1999-2008

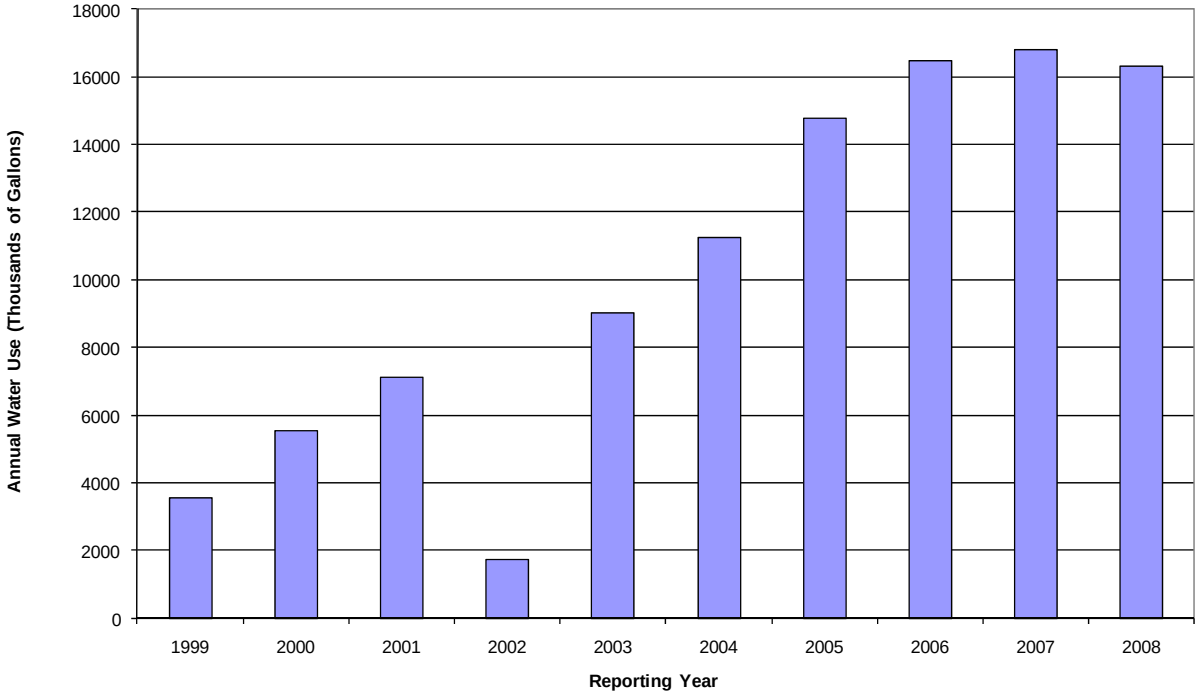

Figure 3 - Pilgrim Foods, Inc. Greenville Supply Annual Water Use, 1999-2008

The principal source of water for Pilgrim Foods has been the Town of Greenville water supply (Figure 3), which has been supplemented by water withdrawn from the Souhegan River Well (Figure 4). The plot of the annual water use from the Greenville water supply source closely parallels the plot of the total water use by Pilgrim Foods (Figure 2). As shown in Figure 4, the annual water use of the Souhegan River Well peaked in 2003 and 2004, and then declined in 2005 and 2006. At the end of 2006, the lease that Pilgrim Foods had with the Town for the use of this well expired and they decided not to continue its use. Pilgrim Foods uses the two on-site wells to replace the water formerly withdrawn from the Souhegan River Well and to reduce the amount of water that they purchase from the Town.

According to Pilgrim Foods, approximately 96 percent of the water used goes into their products. Wastewater produced from the food production operations is discharged to two treatment lagoons located on the Pilgrim Foods property and then discharged the Greenville sewer system. Treated wastewater from the Greenville wastewater treatment facility is discharged to the Souhegan Designated River upstream of the Pilgrim Foods facility.

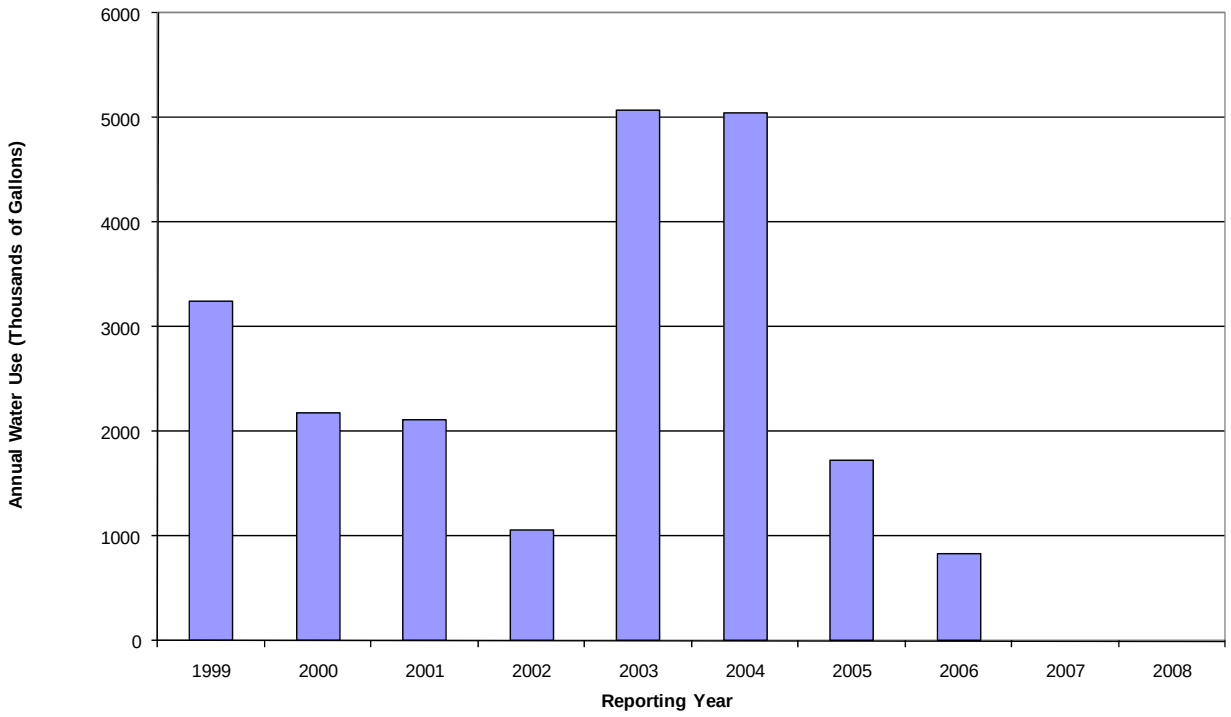

Figure 4 - Pilgrim Foods, Inc. Souhegan River Well Annual Water Use, 1999-2008

Table 1 - Pilgrim Foods, Inc. Annual Water Use Statistics (Combined Sources 1999-2008)

	Low	High	Average
(thousand gal)	2,800	17,300	12,390
(cfs)	0.012	0.073	0.053
(cfsm at impact point)	0.0004	0.0023	0.0017
(cfsm at Merrimack Gage)	0.0001	0.0004	0.0003

Table 2 - Pilgrim Foods, Inc. Greenville Water Supply Annual Water Use Statistics (1999-2008)

	Low	High	Average
(thousand gal)	1,750	16,790	10,260
(cfs)	0.010	0.070	0.040
(cfsm at impact point)	0.0003	0.0022	0.0013
(cfsm at Merrimack Gage)	0.00004	0.0004	0.0003

Table 3 - Pilgrim Foods, Inc. Souhegan River Well Annual Water Use Statistics (1999-2008)

	Low	High	Average
(thousand gal)	0	5,080	2,130
(cfs)	0.000	0.020	0.010
(cfsm at impact point)	0.000	0.0006	0.0003
(cfsm at Merrimack Gage)	0.000	0.0001	0.0001

From 1999 through 2008, the average monthly water use has varied over a narrow range (500,000 gallons), while the difference between the maximum and minimum monthly water use has been much larger (Figure 5). The main reason for the low minimum monthly water use for the months of January through September is due to the extremely low water use in 2002, the year following the fire at the facility. Historically, the lowest mean monthly water use occurs from November through February because production is reduced is response to a seasonal decline in the demand for their food products.

Since the Greenville water supply is the principal source of water for the facility, its mean monthly water use (Figure 6) and the range of the monthly water use closely parallels that of the use for facility (Figure 5). The average monthly water use from the Souhegan River Well (Figure 7) shows an increasing trend in water use over the year, but within a narrow range (150,000 gallons). Again, Pilgrim Foods stopped using this well as a water supply source after 2006.

Monthly water use data were converted to flow in cubic feet per second (cfs) by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor (Tables 4, 5 and 6). Based on these converted values, daily water use by Pilgrim Foods has ranged from a minimum of 0.00 cfs (several months of no reported water use) to a maximum of 0.11 cfs (71,742 gallons per day, May 2001), and average use was 0.06 cfs (39,426 gallons per day) for the period of 1999 to 2008 (Table 4).

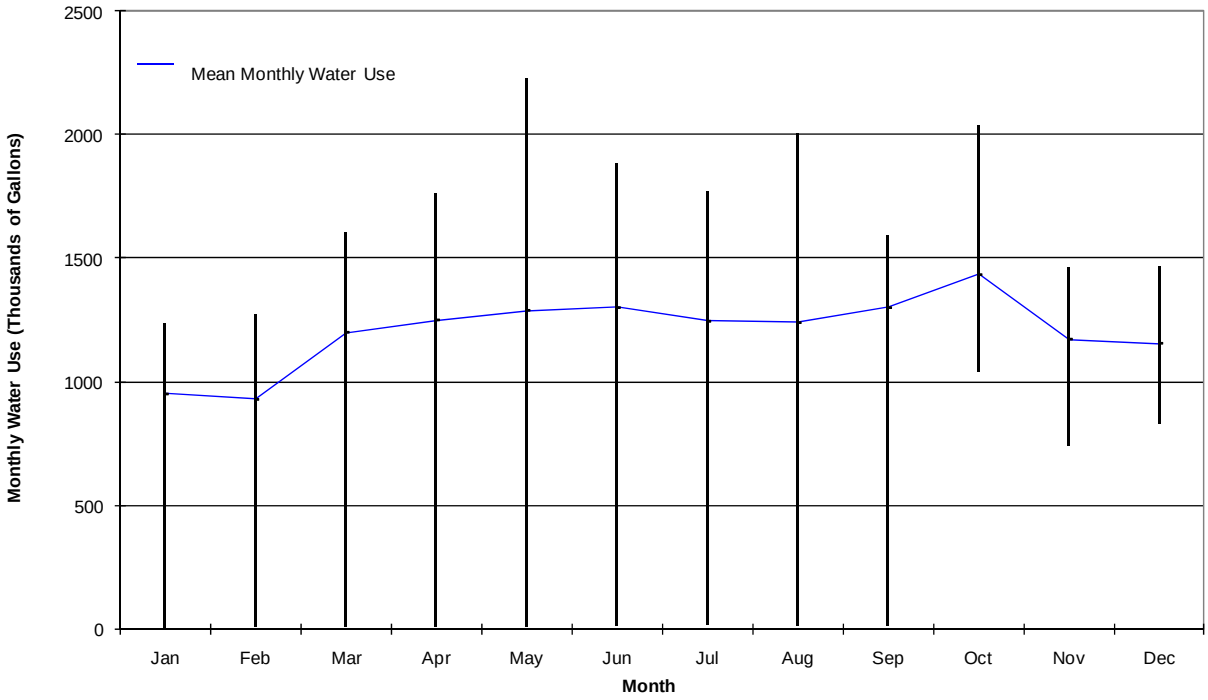

Figure 5 - Pilgrim Foods, Inc. Monthly Water Use, 1999-2008

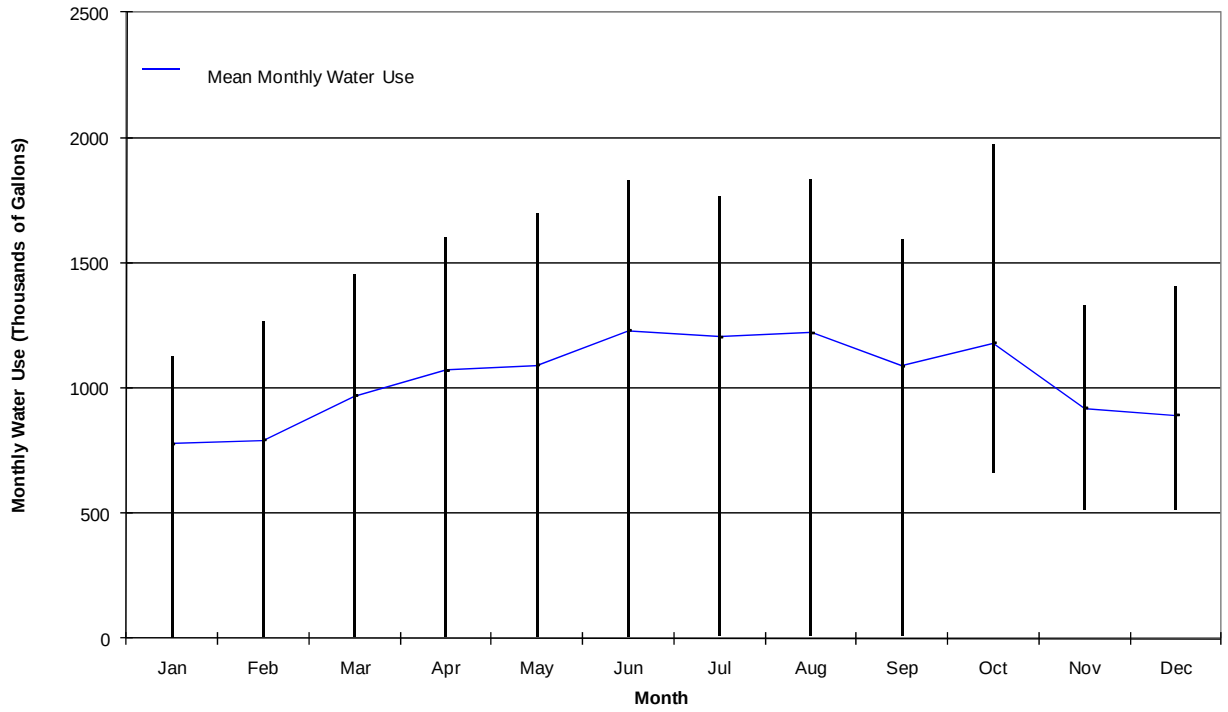

Figure 6 - Pilgrim Foods, Inc. Greenville Water Supply Monthly Water Use, 1999-2008

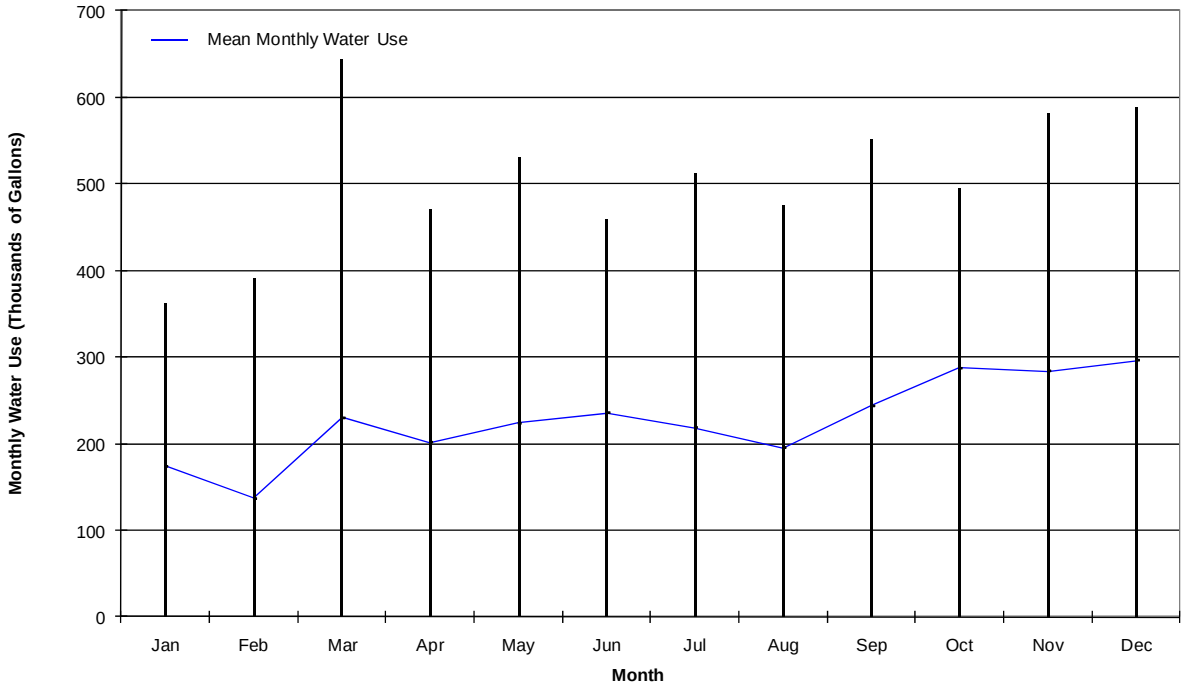

Figure 7 - Pilgrim Foods, Inc. Souhegan River Well Monthly Water Use, 1999-2008

Table 4 - Monthly Water Use Statistics (Combined Sources 1999-2008)

	Low	High	Average
(thousand gal)	0	2,225	1,200
(cfs)	0.000	0.110	0.061
(cfsm at impact point)	0.000	0.0035	0.0019
(cfsm at Merrimack Gage)	0.000	0.0007	0.0004

Table 5 - Monthly Water Use Statistics (Greenville Supply 1999-2008)

	Low	High	Average
(thousand gal)	0	1,970	1,035
(cfs)	0	0.100	0.050
(cfsm at impact point)	0	0.0006	0.0003
(cfsm at Merrimack Gage)	0	0.0006	0.0003

Table 6 - Monthly Water Use Statistics (Souhegan River Well 1999-2008)

	Low	High	Average
(thousand gal)	0	640	230
(cfs)	0	0.030	0.010
(cfsm at impact point)	0	0.0009	0.0003
(cfsm at Merrimack Gage)	0	0.0002	0.0001

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Water Conservation Rules require different activities depending on the type of water use. Water conservation requirements for industrial water users include: documenting the location and amount of water used for production; installing water meters for each water source; maintaining the meters in accordance with the "Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing, and Maintenance" (AWWA 1999); and, documenting use of the water conservation best management practices or best available technologies applicable at the facility.

Existing Water Conservation Measures

Each of Pilgrim Foods water sources is metered. Pilgrim Foods purchases some of its water from the Town and the Town is responsible for the proper operation and maintenance of Pilgrim Foods water meter. In 2009, Pilgrim Foods began using its two on-site water supply wells to supplement the water purchased from the Town. Each well is metered and, pursuant to the Water Use Registration and Reporting Rules (Env-Wq 2102), each meter needs to be calibrated and maintained in accordance with the specifications of the meter manufacturer for the full range

of the withdrawal. All meters must be operated and maintained to within an accuracy of 10 percent.

Pilgrim Foods has not performed a water use and conservation audit of its operations, which is an important tool to determine the present water uses, water losses and conservation practices such that improvements in water conservation and water efficiency can be identified and implemented.

Water Conservation Alternatives and Costs

Pilgrim Foods must operate and maintain its existing water meters to comply with the requirements of the Water Use and Reporting Rules (Env-Wq 2102). To identify potential water efficiency improvements and water conservation measures, Pilgrim Foods should perform a water audit of its operations.

Conservation Implementation Schedule

By June 1, 2014, Pilgrim Foods will finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document Pilgrim Foods' existing water conservation activities, maintenance of the source water meters in accordance with the provisions of the Water Conservation Rules, and implementation of water conservation best management practices and best available technologies where economically feasible.

Water User Contact Information

Water User: Pilgrim Foods, Inc.
Address: 68 Old Wilton Road, Greenville, NH 03048-3100
Contact: Charles Santich
Phone: 878-2100
Email: charlies@pilgrimfoods.net

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 1201 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

American Water Works Association (AWWA) 1999. Water Meters – Selection, Installation, Testing and Maintenance. Manual of Water Supply Practices M6. Fourth Edition.

Department of Environmental Services (DES) 2010. Performing a Business or Industry Water Use and Conservation Audit. Environmental Fact Sheet WD-DWGB-26-16.

Personal communication with Charles Santich, Pilgrim Foods.

Personal communication with Ingrid Sweeney, Pilgrim Foods.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Pine Valley Mill Dam (#20782)

Introduction

Conservation plans under the Instream Flow Program require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Pine Valley Mill Dam is located on the main stem of the Souhegan River in Wilton, New Hampshire (Figure 1). The dam is a privately owned hydropower facility. According to DES Dam Bureau records, the concrete dam is 200 feet long and 23 feet high (Figure 2). The dam impounds a water body less than 10 acres in size used locally for recreation.

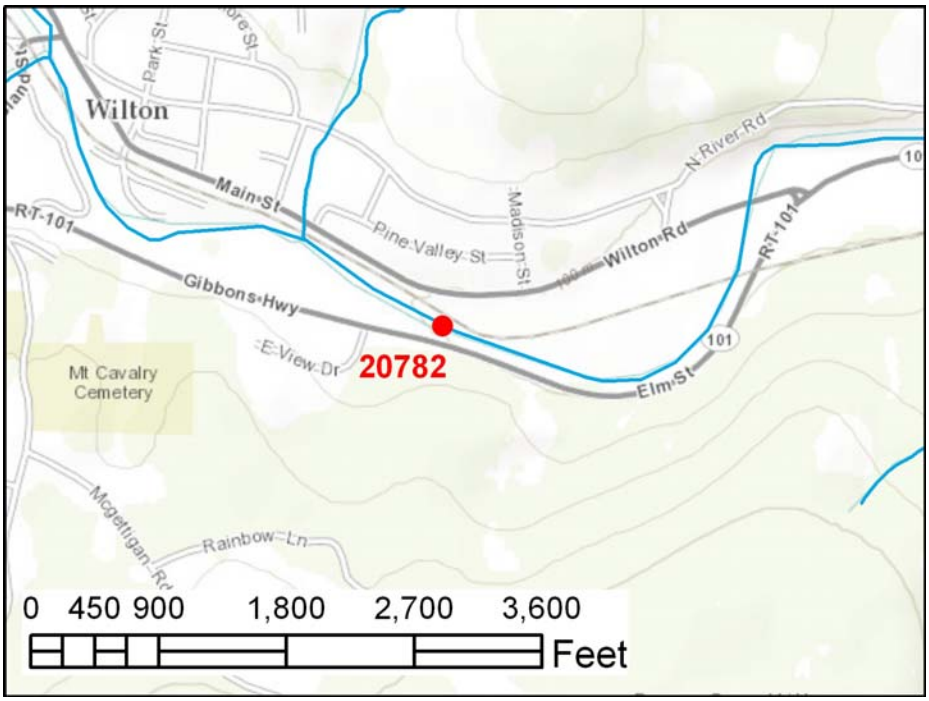

Figure 1 – Location map of Pine Valley Mill Dam, Wilton, New Hampshire.

Water Source and Uses

The hydropower operations at Pine Valley Mill Dam are dependent on stream flow in the Souhegan River. The dam is operated as run-of-river, meaning that the operation of the dam does not alter the flow of the river and all of the water diverted through the hydroelectric operations is returned to the river. The return point (#20782-D01) is located approximately 0.6 miles downstream of the dam at a former mill building between Wilton Road and North River Road located in Milford, New Hampshire (Figure 1).

The hydroelectric operations use water 24 hours per day, year round. The only flow restrictions on the facility are a Federal Energy Regulatory Commission (FERC) permitted minimum instream flow of 25 cfs and a minimum production flow of 15 cfs, for a total minimum flow restriction of 40 cfs. When electricity is not being produced by the facility, flow either goes over the dam and/or through the bypass pipe on the north side of the dam, but not through the penstock.

Figure 2 - Pine Valley Mill Dam, Wilton, New Hampshire looking upstream from the south bank (2005)

Water Use Patterns

Water use data for the Pine Valley Mill Dam for the period of 2005 through 2008 are show graphically in Figures 3 and 4 and summarized in Tables 1 and 2.

Water use is dependent on river flow. On an annual basis, Pine Valley Mill Dam water use has ranged from a high of 21,400 million gallons (2006) to a low of 11,500 million gallons in 2007 (Figure 3 and Table 1). Average annual water use was 18,200 million gallons for 2005 through 2008. During this period, annual water use has not shown significant upward or downward trends.

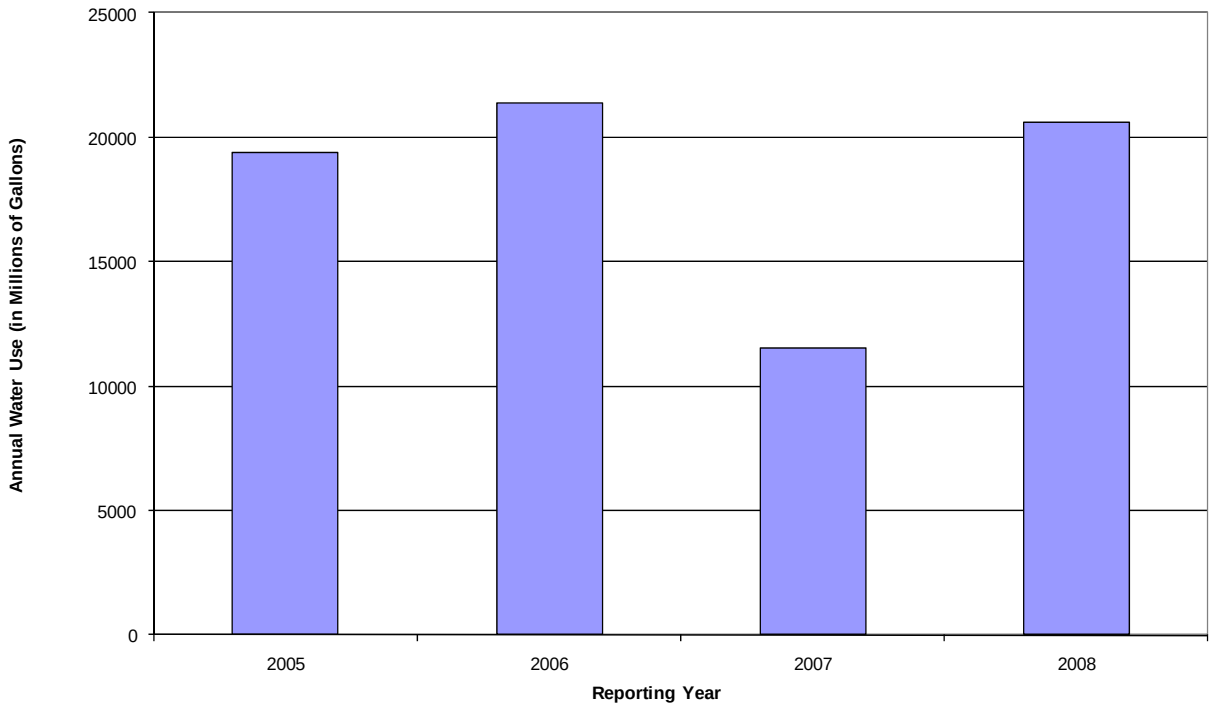

Figure 3 - Pine Valley Dam Annual Water Use, 2005-2008

Table 1 - Annual Water Use Statistics (2005-2008)

	Low	High	Average
(million gal)	11,500	21,400	18,200
(cfs)	48.9	90.8	77.3
(cfsm at impact point)	0.482	0.895	0.762
(cfsm at Merrimack Gage)	0.286	0.531	0.452

Minimum monthly water use at Pine Valley Mill Dam during this period was 0 gallons (July 2007, August 2005 and September 2006), with a maximum of 3,360 million gallons (January 2006), and an average of 1,500 million gallons (Figure 4 and Table 2). The four years of reported data show monthly water use to be variable and typically follows the normal river flow. Peak usage occurs during April (2,580 million gallons) and minimum usage occurs during August (195 million gallons), which is typical of a run-of-river hydroelectric dam in New Hampshire.

The monthly use data, in thousands of gallons, were converted to cubic feet per second. Daily water use by the Pine Valley Mill Dam has ranged from a minimum of 0 cfs (July 2007, August 2005 and September 2006) to a maximum of 168.0 cfs (January 2006), and average use was 76.6 cfs for the period of 2004 to 2008.

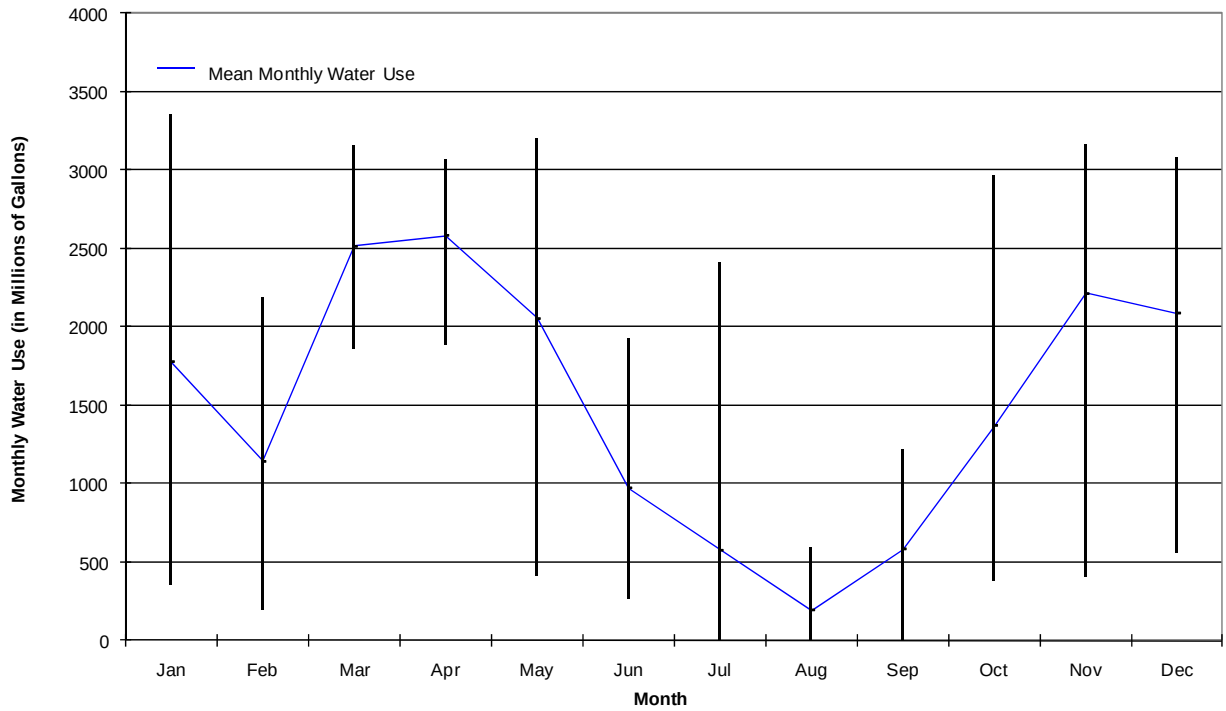

Figure 4 - Pine Valley Dam Monthly Water Use, 2005-2008

Table 2 - Pine Valley Dam Monthly Water Use Statistics (2004-2008)

	Low	High	Average
(million gal)	0	3,360	1,500
(cfs)	0	168.0	76.6
(cfsm at impact point)	0	1.650	0.755
(cfsm at Merrimack Gage)	0	0.980	0.448

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules (Env-Wq 2101) requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. Since the Pine Valley Mill Dam is hydroelectric power facility with no consumptive use, a Water Conservation Plan is not required.

Existing Water Conservation Measures

Since Pine Valley Mill Dam is managed as a run-of-river operation, no water conservation measures are required at this facility.

Water Conservation Alternatives and Costs

Since the facility is operated on a run-of-river basis and since there are no consumptive losses associated with its operations, no additional water conservation measures are currently required.

Conservation Implementation Schedule

Since no additional water conservation measures are currently required, there is no conservation implementation schedule.

Water User Contact Information

Water User: Pine Valley Business Center
Address: 37 Wilton Road, Milford, NH, 03055
Contact: Lisa Morrison
Phone: 880-6655
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information:

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

New Hampshire Dam Bureau, NHDAMS Data Sheet for Pine Valley Hydro Mill Dam.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc and completed by Paul Robichaud of Milford Elm Street Trust.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Savage Municipal Water Supply Superfund Site (#20833)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The Savage Municipal Water Supply Superfund Site (Savage Well site) is a CERCLA hazardous waste site located in Milford, New Hampshire. Two different registered water users are associated with the ongoing remedial activities at the Savage Well site. One of the registered water users is the OK Tool Source Area (#20832), which is located to the west of this site and is discussed in a separate Conservation Plan. The Savage Well site includes an active groundwater pump and treatment system where groundwater contaminated by volatile organic compounds (VOCs) down-gradient of the OK Tool Source Area are removed, treated and then re-infiltrated to the Souhegan River aquifer via underground injection or is discharged directly into the Souhegan River. The Savage Well site remediation activities are the responsibility of the Potentially Responsible Parties (PRPs) and are covered under an existing remediation plan.

Water Source and Uses

The Savage Well site covers the groundwater contamination plumes in the Souhegan River aquifer between the OK Tool Source Area and the Souhegan River. Groundwater is extracted from a wellfield (20833-S01) that consists of three wells in the plume area. The water is treated for VOCs via air stripping and returned to the aquifer upgradient of the extraction wells through a wellfield (20833-D01) that consists of three injection wells. During times of high groundwater levels, treated water is also discharged directly to the Souhegan River via a surface water discharge (20833-D02). Figure 1 depicts the location of the extraction and injection wellfields and surface water discharge with respect to the Souhegan River. The drainage area of the Souhegan River at the location of these wells is 104 sq. mi.

Water Use Patterns

Water use is nearly continuous during treatment operations and the wells are generally pumped at a uniform rate of 25 gallons per minute (gpm). Groundwater pumping is metered, recorded monthly, and reported to DES.

According to the water use registration forms on file with DES, the extraction wells are typically pumped at a constant rate of 648,000 gallons per day (gpd) with an average annual use of 236,520,000 gallons. The water pumped from the extraction wells is either returned to the aquifer through underground injection or discharged directly into the Souhegan River; thus, there is no net water consumption at this site. Water use data for the extraction wellfield for the year 2008 are shown graphically in Figure 2 and summarized in Table 1. The monthly water use data

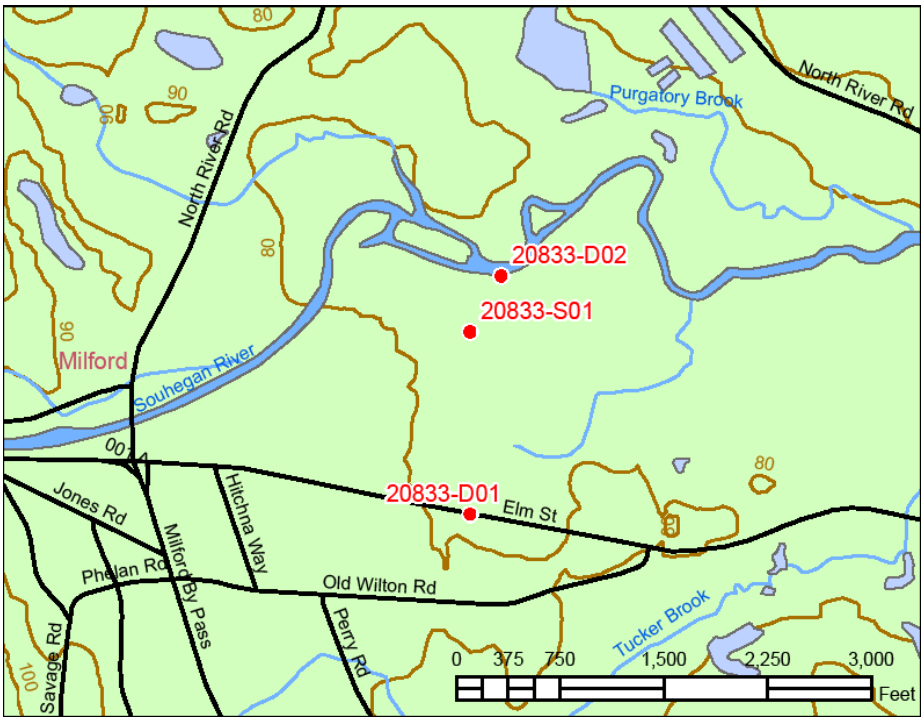

Figure 1 - Location map of Savage Well Superfund Site, Milford, New Hampshire

were converted to flow in cubic feet per second by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor.

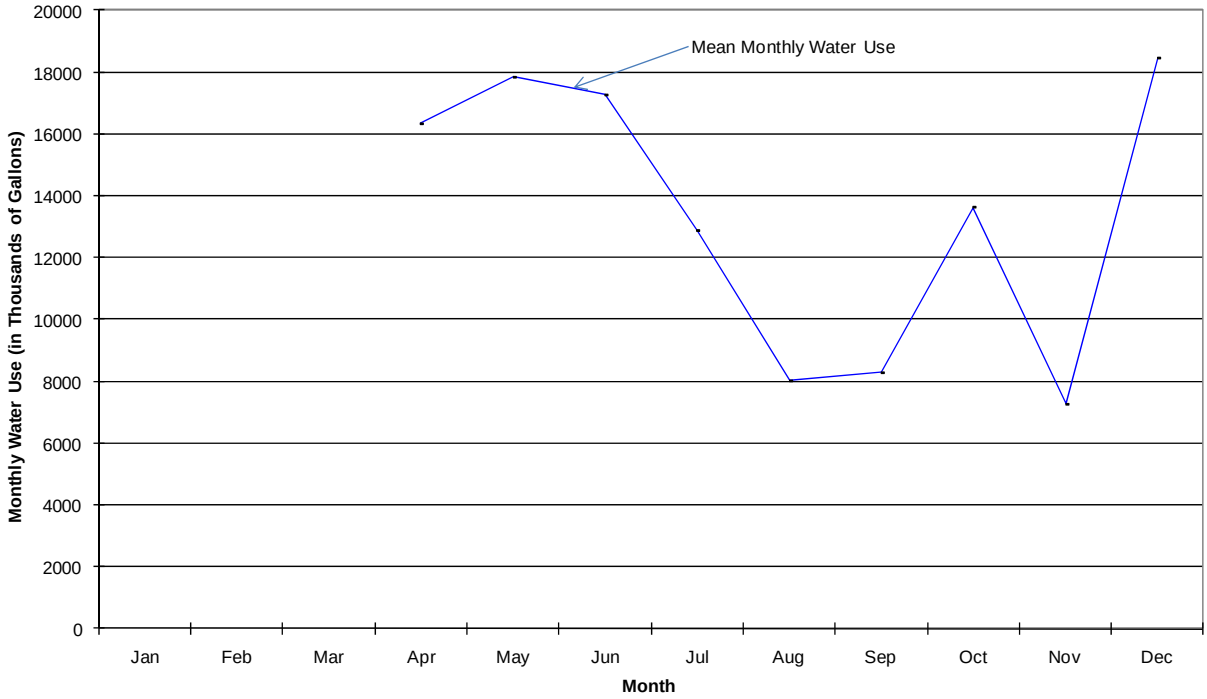

Figure 2 - Savage Well Site Monthly Water Use for 2008

Table 1 - Savage Well Site Monthly Water Use Statistics for 2008

	Low	High	Average
(thousand gal)	7,300	18,400	13,300
(cfs)	0.3746	0.9210	0.6750
(cfsm at impact point)	0.0036	0.0088	0.0065
(cfsm at Merrimack Gage)	0.0022	0.0054	0.0039

Env-Wq 2101 Requirements for Water Conservation Plans

The development and approval of a water conservation plan that meets the Water Conservation Rules (Env-Wq 2101) is a requirement under the Instream Flow Rules (Env-Wq 1900). Water use at the Savage Well Superfund Site is for the remediation of contaminated groundwater. The laws and rules that are to govern its operations have been specified during the Superfund settlement. The Instream Flow Rules were not included in that settlement. The water is returned to groundwater through an injection wellfield or to the Souhegan River. Any pipe losses would also return to groundwater. Following discussion with the Affected Water Users, following Env-Wq 1906.02(d) (1) of the Instream Flow Rules, no conservation measures are to be implemented.

Existing Water Conservation Measures

Meters are installed on the groundwater extraction wells. Contaminated water is transmitted via double lined pipes to the treatment facility. The treated water is returned to the aquifer and to the Souhegan River. Water returned to groundwater is estimated for each injection well and the remainder is attributed to the return to the Souhegan River.

Water Conservation Alternatives and Costs

The remediation activities at the Savage Well site are specified in a remedial operations plan overseen by DES and the United States Environmental Protection Agency (EPA). Water is withdrawn and returned to the aquifer or to the Souhegan River. Following discussions with legal representatives for the Affected Water User, it was agreed that no additional conservation measures are to be implemented.

Conservation Implementation Schedule

Since no additional conservation measures are currently required for the Savage Well Superfund Site, there is no implementation schedule.

Water User Contact Information

Water User: Hitchner Manufacturing Co. Inc. & Thomas & Betts Corp.
Address: McLane, Graf, Raulerson & Middleton, PA, Suite 500, 11 South Main Street, Concord, NH, 03301
Contact: Greg Smith
Phone: 230-4401
Email: gsmith@mclane.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/29/03.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Water use registration forms on file with the Department of Environmental Services (DES).

Waste Site Cleanup & Reuse in New England – Savage Municipal Water Supply, United States Environmental Protection Agency. website: http://yosemite.epa.gov/r1/npl_pad.nsf/701b6886f189ceae85256bd20014e93d/83c7d221bb30028c8525691f0063f6f4!OpenDocument

CONSERVATION PLAN

Souhegan Woods Golf Club (#20523)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The Souhegan Woods Golf Club is located off of Thornton Ferry Road in Amherst, New Hampshire. This 18-hole golf course was built in 1991 and is open to the public.

Water Source and Uses

The Souhegan Woods Golf Club has a registered withdrawal (20523-S01) from the Souhegan Designated River, which is the source of irrigation water for the golf course operations (Figure 1). Water is withdrawn from the river via a suction line that extends approximately 15 feet out from the shore and approximately six feet below the water surface (Figure 2). This intake is located in the Town of Amherst approximately 6.3 miles upstream from the confluence of the Souhegan with the Merrimack River. The drainage area of the Souhegan River at the point of withdrawal is approximately159 sq. miles.

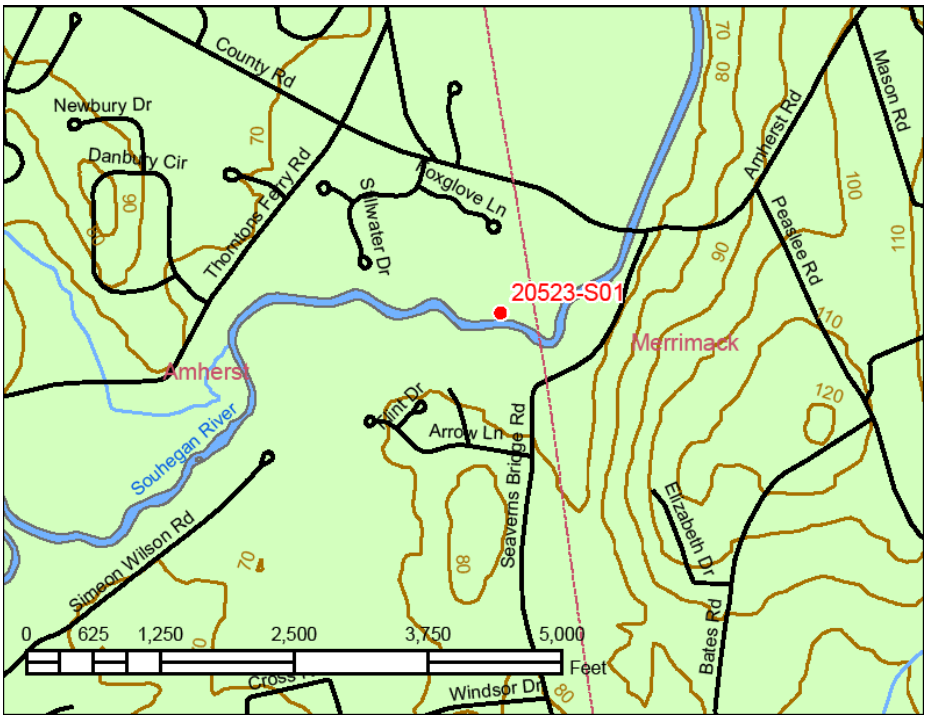

Figure 1 – Location Map of the Souhegan Woods Golf Club's Souhegan River Intake, Amherst, New Hampshire

Figure 2 – Photograph of the Souhegan Woods Golf Club Souhegan River Intake (June 2004)

Water is withdrawn on an "as needed" basis, which is defined as the minimum amount of water necessary to maintain healthy turf as determined through the physical monitoring of soil moisture levels. Water withdrawn from the river by the Souhegan Woods Golf Club is used to irrigate 70 acres of golf course fairways and greens and for equipment cleaning. Irrigation of the courses is necessary to ensure that the various grasses used at the courses remain healthy and adequately watered and to meet user expectations in terms of course appearance, condition and "playability."

Water Use Patterns

Water use is metered, recorded monthly and reported to DES annually. A new recording meter was installed in April 2009 and the meters are checked and calibrated each spring upon start-up.

As noted, water use is on an as needed basis, varying from every day to twice a week, with the greatest use during the spring through the fall, but is also weather dependent. Weather conditions are monitored using information from local weather stations. Irrigation is typically performed daily from 8 pm to 6 am. However, very dry conditions or mechanical failure of the irrigation system may require occasional daytime irrigation.

Water use data for the Souhegan Woods Golf Club for the years of 1991 through 2008 were obtained from DES and are presented in Figures 3 and 4 and summarized in Tables 1 and 2. The tables include the conversion of water use from thousands of gallons to cubic feet per second (cfs), as well as to cubic feet per second per square mile of the drainage area to allow for comparison with stream flow values reported for the Souhegan Designated River.

Between 1991 and 2008 annual water use has varied from a low of 17.4 million gallons (2003) to a high of over 56.8 million gallons (2001), averaging 34.9 million gallons for the reporting period (Figure 3 and Table 1). During this period annual water use increased by 7.27 million gallons or 27 percent. This represents an average increase of 404,000 gallons per year or 1.5 percent per year.

From 1991 to 2001 annual water use increased by 112 percent, but declined from 2001 to 2003 due to changes in water use management to increase water use efficiency. These changes included the introduction of new turf grasses and wetting agents and improvements in the pumping operations. Water use increased again between 2003 and 2008.

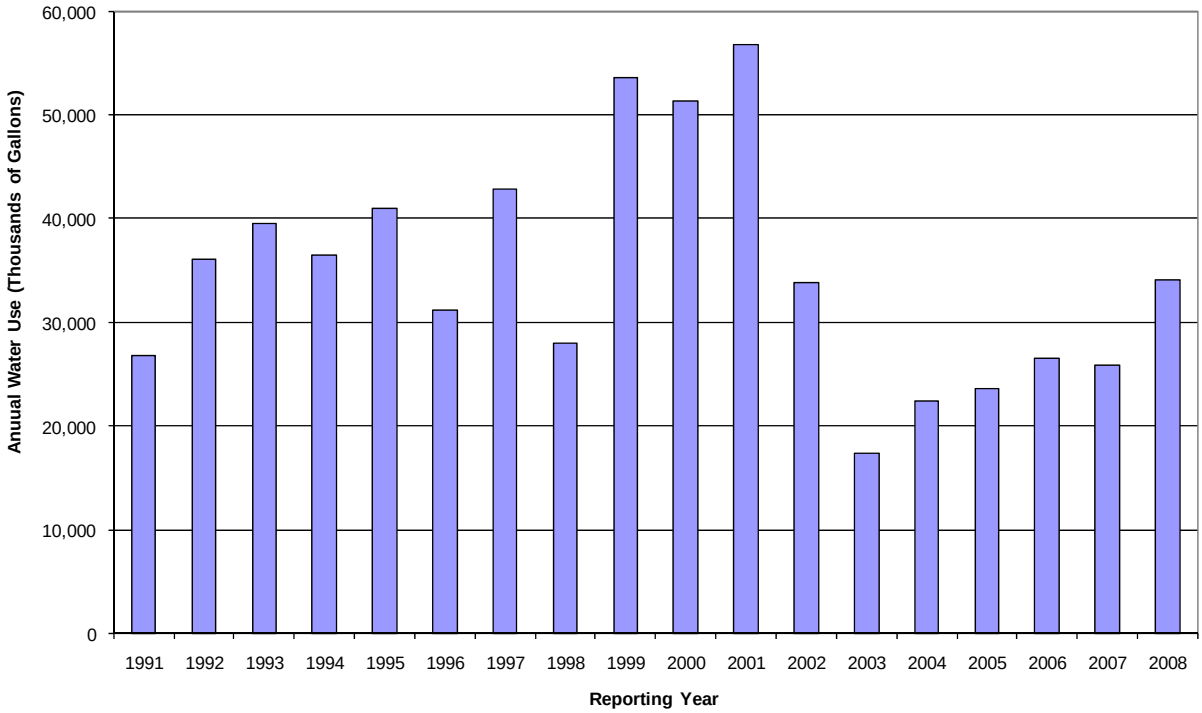

Figure 3 – Souhegan Woods Golf Club Annual Water Use 1991-2008

Table 1 – Souhegan Woods Golf Club Annual Water Use Statistics (1991-2008)

	Low	High	Average
(thousand gal)	17,400	56,800	34,900
(cfs)	0.0740	0.2410	0.1480
(cfsm at impact point)	0.0005	0.0015	0.0009
(cfsm at Merrimack Gage)	0.0004	0.0014	0.0009

Water withdrawals typically begin in April, but have occasionally occurred in March (six years), increase to a maximum in July, then decline and typically end by November (Figure 4). The range in monthly water use reflects the weather conditions that affect the water demand by the golf course turf. Total monthly water use for the reporting period has ranged from 0 (multiple occurrences) to 16.3 million gallons (August 2001, a period of drought) and averaged 2.89 million gallons per month over the year (Table 2). When averaged for just the April-October period, average monthly water use was 4.93 million gallons.

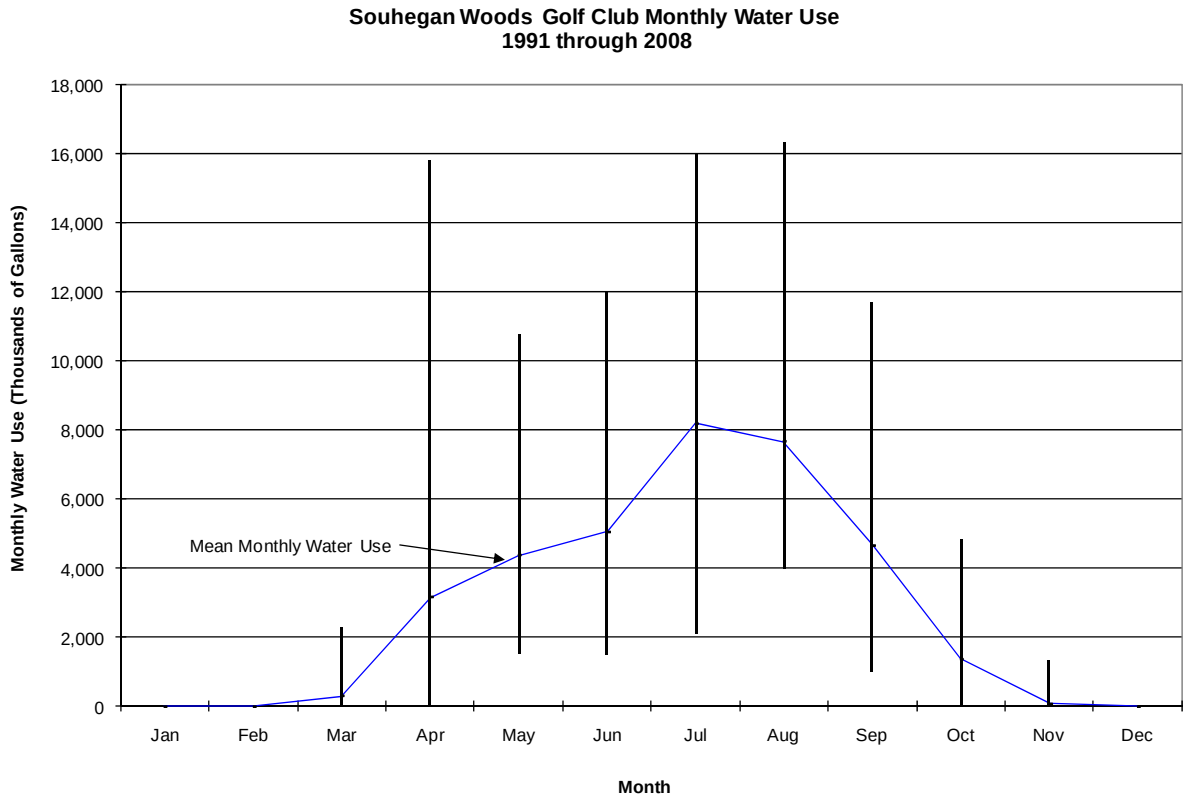

Figure 4 – Souhegan Woods Golf Club Monthly Water Use, 1991-2008.

Table 2 – Souhegan Woods Golf Club Monthly Water Use Statistics (1991-2008)

	Low	High	Average	Apr-Oct avg
(thousand gal)	0	16,300	2,890	4,930
(cfs)	0	0.816	0.147	0.249
(cfsm at impact point)	0	0.0051	0.0009	0.0016
(cfsm at Merrimack Gage)	0	0.0048	0.0009	0.0015

Monthly water use data were converted to flow in cubic feet per second (cfs) by dividing the monthly totals by days and then multiplying this result by a flow unit conversion factor. Based

on these values, the water use by the Souhegan Woods Golf Club has ranged from a minimum of 0 cfs (December through February in all years, November in all but one year (1999), ten years in March, two years in April and October) to a maximum of 0.816 cfs (during August 2001) with an average of 0.249 cfs for the April – October period and 0.147 cfs annually during the past 17 years (Table 2).

Env-Wq 2101 Requirements for Water Conservation Plans

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use. As a commercial water user, Souhegan Woods Golf Club needs to maintain its source water meter in accordance with the ”Manual of Water Supply Practices, Water Meters – Selection, Installation, Testing and Maintenance” (AWWA 1999), follow water conservation best management practices developed for golf courses, and use best available water conservation technologies.

Existing Water Conservation Measures

The management of the Souhegan Woods Golf Club is aware of and adheres to the water efficiency practices for golf courses recommended by DES. Several basic water conservation measures are used at the Souhegan Woods Golf Club. To minimize water use irrigation is only conducted when needed and is done in the evening and overnight to reduce evapotranspiration losses. The need for irrigation is based on manual soil moisture monitoring, turf conditions and weather. Souhegan Woods Golf Club has upgraded their irrigation system for evapotranspiration-based watering to further improve their water use efficiency.

Extensive efforts are made to monitor water use. Water meters are checked and calibrated each spring upon start up to ensure that accurate water use data are collected. To identify irrigation system leaks, visual inspections of the golf course are performed each morning and throughout the day along with pressure monitoring within the pump house.

Additional water efficiency practices employed by Souhegan Woods Golf Club include proper turf/soil cultivation techniques such as: aeration, verticutting, top-dressing, soil analyses and use of wetting agents.

Water Conservation Alternatives and Costs

Souhegan Woods Golf Club has implemented many of the water efficiency practices recommended by DES in its Environmental Fact Sheet WD-DWGB-26-6, Water Efficiency: Golf Courses. The implementation of these practices has led to a significant overall reduction in water use since 2001. These practices should be continued, and expanded as appropriate, to further conserve water as part of its normal business operations.

Conservation Implementation Schedule

By June 1, 2014, the Souhegan Woods Golf Club will finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document the Souhegan Woods Golf Club's existing water conservation activities.

Water User Contact Information

Water User: Souhegan Woods Golf Club
Address: 65 Thorton Ferry Road II, Amherst, NH, 03031
Contact: Ryan Lane, Superintendent
Phone: 424-4122
Email: rustyone33@yahoo.com

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

American Water Works Association (AWWA) 1999. Water Meters – Selection, Installation, Testing and Maintenance. Manual of Water Supply Practices M6.

Department of Environmental Services (DES) 2013. Water Efficiency: Golf Courses. Environmental Fact Sheet WD-DWGB-26-6 (http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/documents/dwgb-26-6.pdf).

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed by Ryan Lane, Souhegan Woods Golf Club.

Personal communication with Ryan Lane, Souhegan Woods Golf Club.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Waterloom Falls Dam (#20228)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

Waterloom Falls Dam is located on the main stem of the Souhegan River in New Ipswich, New Hampshire (Figure 1). The dam is a privately owned hydropower facility licensed by the Federal Energy Regulatory Commission (FERC Project No. 7920) and registered with the DES Dam Bureau (#175.09). According to the records of the DES Dam Bureau, the concrete and stone dam is 214 feet long and 22.5 feet high (Figure 2). The dam impounds Waterloom Pond, which is 75 acres and used locally for recreation.

Water Source and Uses

The hydropower operations at Waterloom Falls Dam are dependent on the stream flow in the Souhegan River, and are thus registered with the DES as a water user (20228). Water use is reported quarterly. The dam is operated as run-of-river, meaning that the operation of the dam does not alter the flow of the river and all of the water diverted through the hydroelectric operations is returned to the river 75 feet downstream of the dam via a penstock.

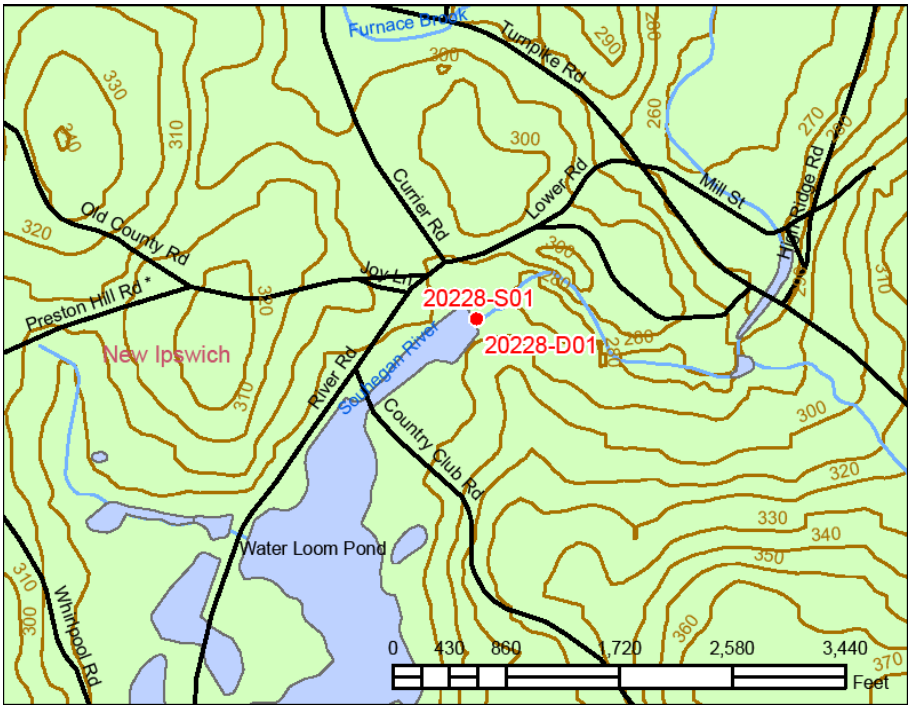

Figure 1 – Location map of the Waterloom Falls Dam, New Ipswich, New Hampshire.

If sufficient flow is available, the hydroelectric operations at Waterloom Falls Dam can produce power 24 hours a day, seven days a week, 365 days a year. Under the terms of its license to operate, the facility must allow for a minimum outflow of 10 cubic feet per second (cfs) during the summer (June through September) and 15 cfs the rest of the year. When the hydropower facility is not operating, all of the flow goes over the dam's spillway (Figure 2).

Figure 2 - Waterloom Falls Dam, New Ipswich, New Hampshire (June 2005)

Water Use Patterns

Water use data for the Waterloom Falls Dam for the period of 1989 through 2008 re shown graphically in Figures 3 and 4 and are summarized in Tables 1 and 2.

Water use is dependent on river flow. On an annual basis, Waterloom Falls Dam water use has ranged from a low of 2,760 million gallons (2001) to a high of 6,680 million gallons in 1996 (Figure 3 and Table 1). Average annual water use was 4,890 million gallons for the sixteen years that a complete annual record was available. Annual water use has not shown significant upward or downward trends and has mirrored water usage at other Souhegan River dams.

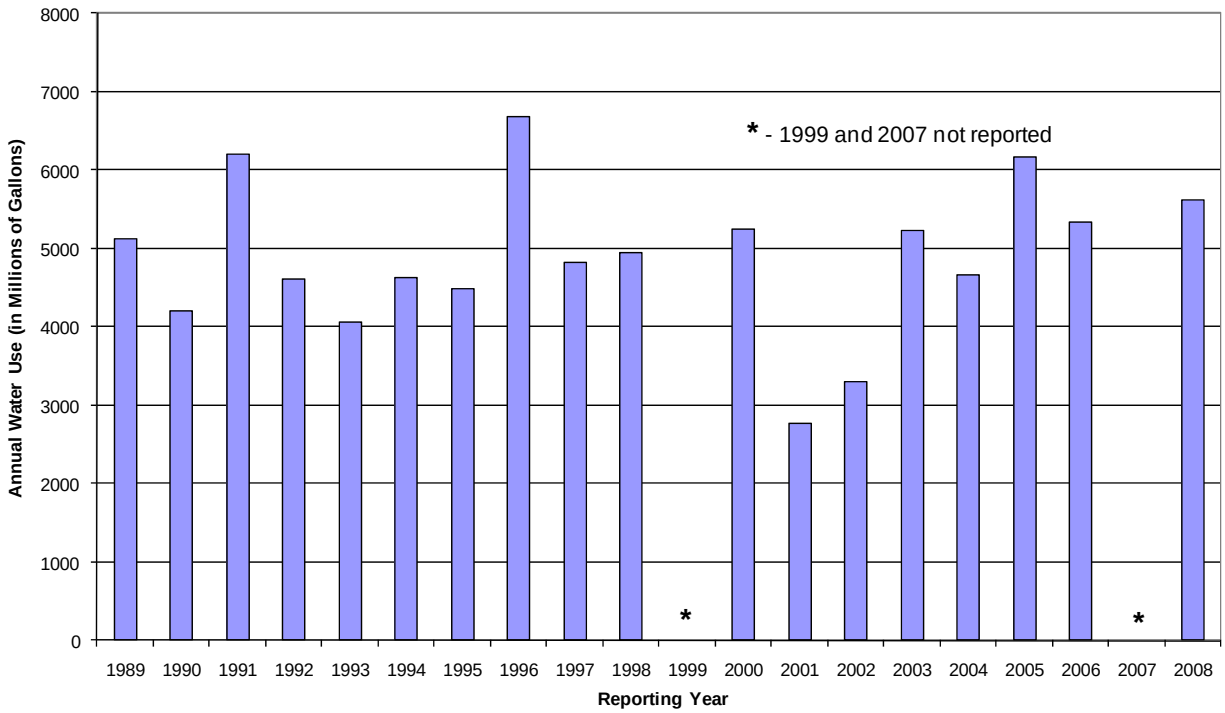

Figure 3 - Waterloom Falls Dam Annual Water Use, 1989-2008

Table 1 - Annual Water Use Statistics (1989-2008)

	Low	High	Average
(million gal)	2,760	6,680	4,890
(cfs)	11.70	28.30	20.80
(cfsm at impact point)	0.5180	1.2500	0.9170
(cfsm at Merrimack Gage)	0.0686	0.1660	0.1210

Minimum monthly water use at Waterloom Falls Dam was 416,000 gallons (July, August and September 1990) with a maximum of 951 million gallons (April 2008) and an average of 408 million gallons (Figure 4 and Table 2). Generally, monthly water use ranges between 360 and 460 million gallons per month. Greatest monthly usage is usually during April when river flows are greatest, which is typical for a run-of-river dam in New Hampshire.

Monthly water use data, in thousands of gallons per month, were converted to cubic feet per second. Based on these converted values, daily water use by the Waterloom Falls Dam has ranged from a minimum of 0.02 cfs (July and August 1990) to a maximum of 49.10 cfs (April 2008), and average use was 20.80 cfs for the period of 1989 to 2008 (Table 2).

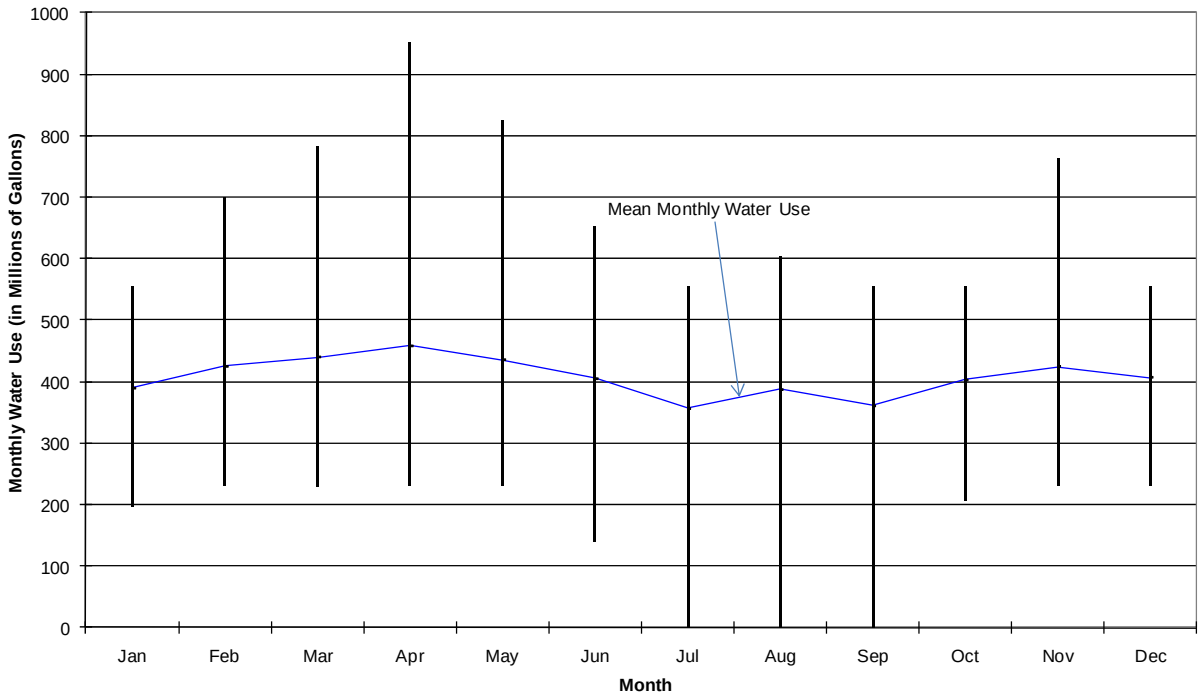

Figure 4 - Waterloom Falls Dam Monthly Water Use, 1989 through 2008

Table 2 - Monthly Water Use Statistics (1989-2008)

	Low	High	Average
(million gal)	0	951	408
(cfs)	0.02	49.10	20.80
(cfsm at impact point)	0.0009	2.1700	0.9170
(cfsm at Merrimack Gage)	0.0001	0.2870	0.1210

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules (Env-Wq 2101) requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. Since Waterloom Falls Dam is hydroelectric power facility with no consumptive use, a Water Conservation Plan is not required.

Existing Water Conservation Measures

Since Waterloom Falls Dam is managed as a run-of-river operation, no water conservation measures are used at this facility.

Water Conservation Alternatives and Costs

Because the facility is operated on a run-of-river basis and there are no consumptive losses associated with its operations, no additional water conservation measures are currently required.

Conservation Implementation Schedule

Since no additional water conservation measures are currently required, there is no conservation implementation schedule.

Water User Contact Information

Water User: Kathleen R. Dolan
Address: PO Box 605, Hillsboro, NH 03244
Contact: Kathleen R. Dolan
Phone: 478-7828
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

New Hampshire Dam Bureau, NHDAMS Data Sheet for Waterloom Falls Dam.

Personal communication with Robert Greenwood, Alden Hydro, LLC.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. and completed with input from Robert Greenwood of Alden Hydro, LLC.

Water use reports on file with the Department of Environmental Services (DES).

CONSERVATION PLAN

Wilton Water Works (#20065)

Introduction

Conservation plans under the Instream Flow Program (Env-Wq 1900) require meeting the conservation measures and best management practices in the Department of Environmental Services (DES) Water Conservation Rules (Env-Wq 2101). Use of these measures and practices as a standard will provide a common level of effort by all water users.

The Wilton Water Works has two overburden water supply wells located just off Route 31 in Wilton, New Hampshire. The water pumped from these wells is the source water for the Town of Wilton.

Water Source and Uses

The Wilton Water Works has two registered ground water wells, the Everett Well (20065-S01) and the Abbott Well (20065-S02). Figure 1 depicts the location of these wells with respect to the Souhegan Designated River. These overburden wells are located 849 feet and 97 feet west of the river. The drainage area of the Souhegan River upstream of these wells is approximately 47 sq. miles.

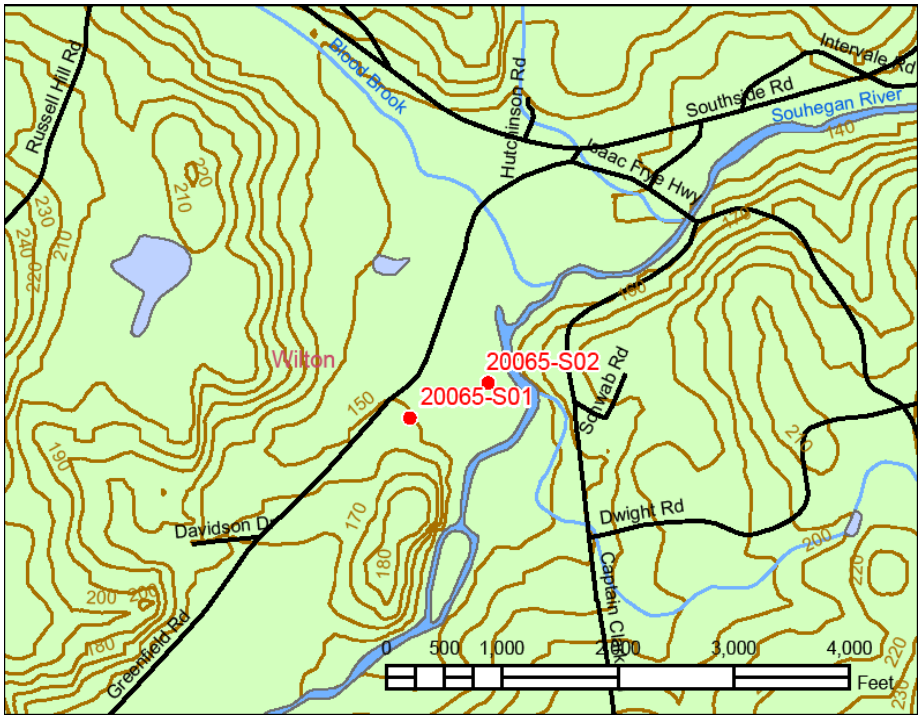

Figure 1 – Location Map of Wilton Water Works Water Supply Wells, Wilton, New Hampshire.

Pumping alternates between the two wells. The water produced by the wells is distributed to the Town's water supply system and can also be stored in 616,000 gallons tank.

The wells are located in a stratified drift formation connected to the Souhegan River and intercept groundwater to the Souhegan River. An analysis of the induced recharge by these wells was performed as part of the Instream Flow Study (DES 2005). The results of the analysis indicated that the wells do not induce river recharge at normal and maximum pumping levels. A more detailed hydrogeologic assessment of the production wells has since been performed by Emery & Garrett Groundwater, Inc. (2008) for the Wilton Water Commission. The objective of the study was to delineate the wellhead protection area around the Abbott and Everett Production Wells. This study included a seven day pump test of the two production wells and an evaluation of the pumping impacts on the Souhegan River. Based on the study's findings, Emery & Garrett Groundwater, Inc. (2008) concluded that "approximately 32% of the groundwater being withdrawn from the Abbott Production Well during the pumping test was induced from the Souhegan River." However, there was no evidence that the Everett Well induced recharge from the river.

Water Use Patterns

Water withdrawal for the Town's water supply needs is continuous and pumping alternates between the two wells to reduce drawdown in the aquifer. The active well is pumped 6 to 8 hours and then shut down for 16 to 18 hours. When system demand exceeds the preset pumping rate of the active well, the second well automatically comes on line. The pre-set flow rate for the Abbott Well is 400 gallons per minute (gpm), while the Everett Well pumping rate is pre-set at 450 gpm. Daily water demand varies diurnally with the highest demand during the day and the lowest demand at night. When pumping exceeds demand, excess water fills storage, and when pumping is less than demand, stored water makes-up the difference. Both wells are metered, and withdrawals are recorded monthly and reported to DES quarterly.

Water use data for the Wilton Water Works for the years of 1988 through 2008 are summarized in Figures 2 through 7 as well as in Tables 1 through 6, for each well and for the combined pumping of the two wells. Water use records were incomplete for 1988, so are not included in the annual use summaries. The monthly summaries include both complete and incomplete records for the years 1988 through 2008.

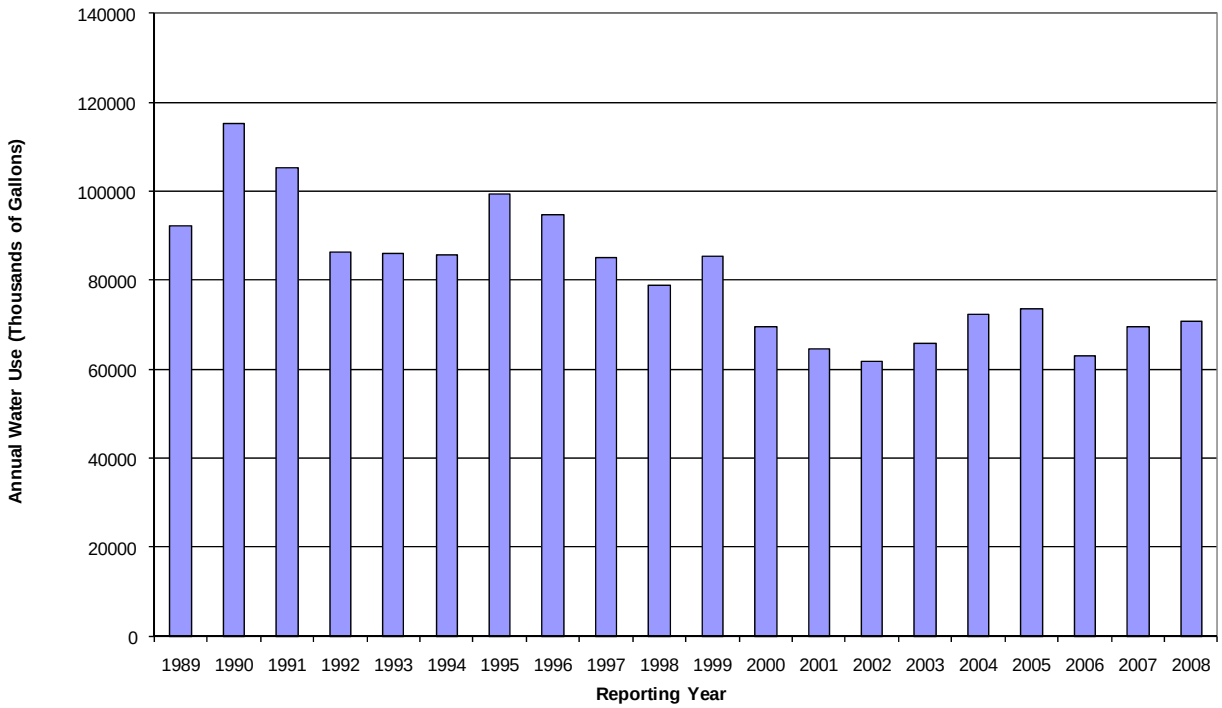

Figure 2 - Wilton Water Works Annual Water Use, 1989-2008

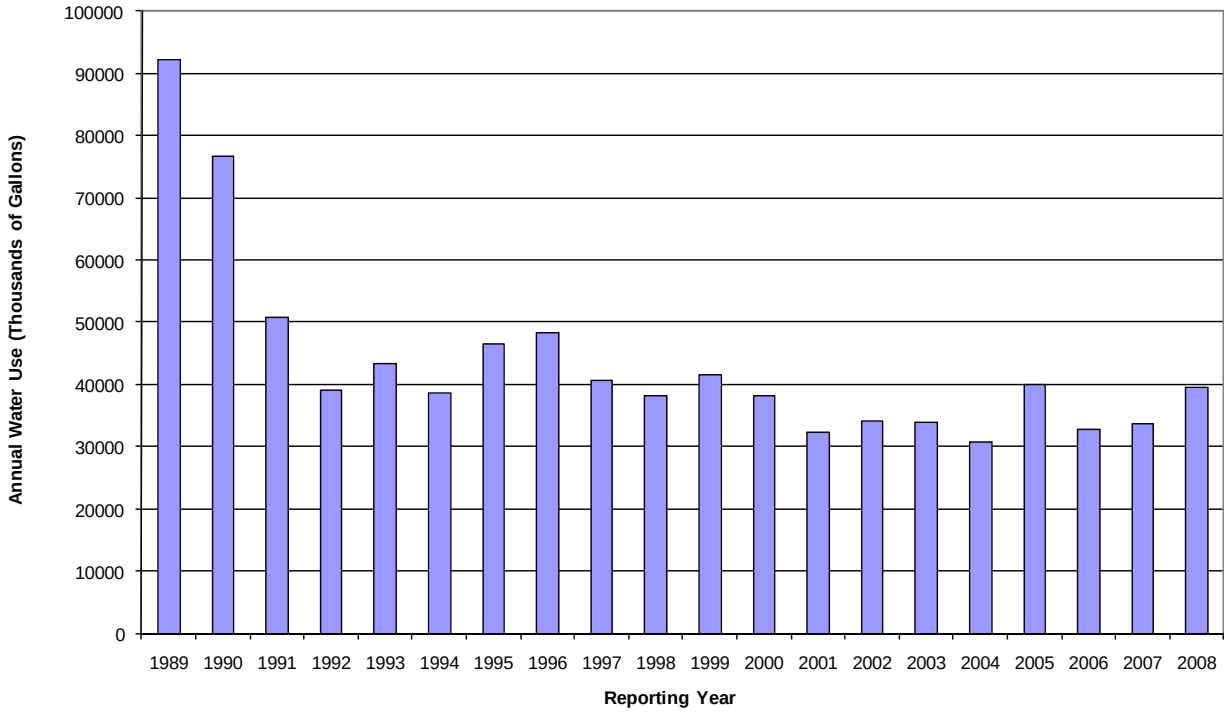

Figure 3 - Wilton Water Works Everett Well Annual Water Use, 1989-2008

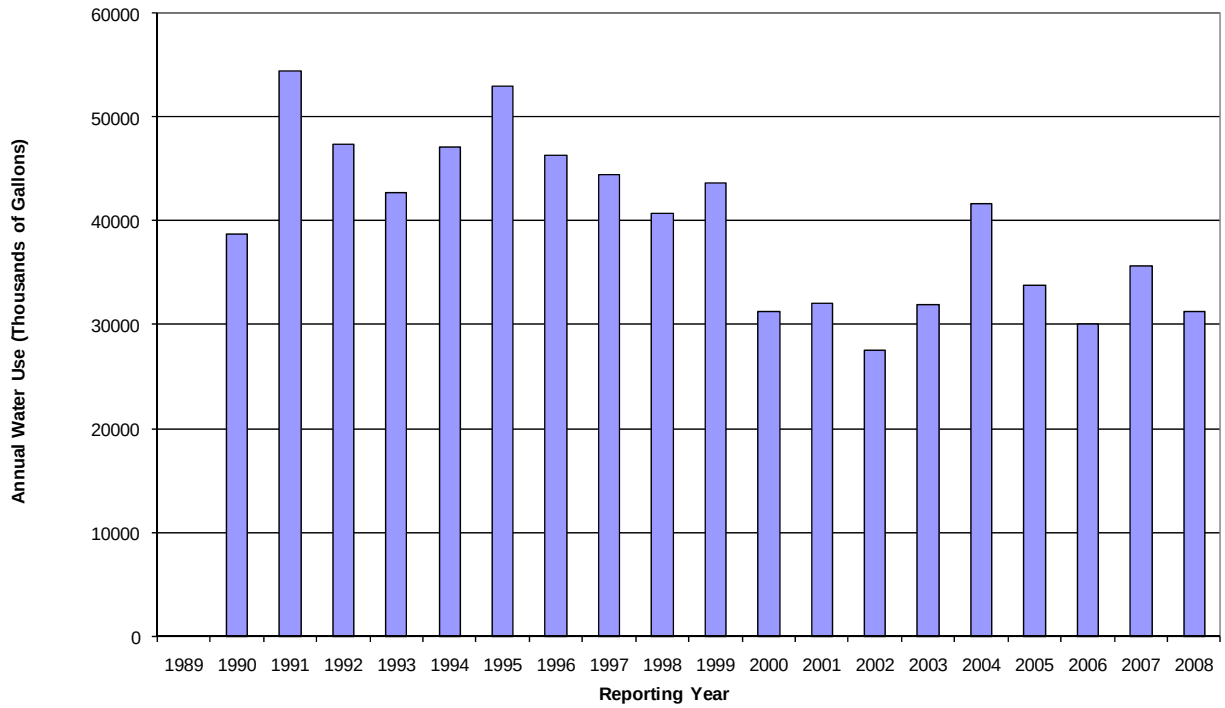

Figure 4 - Wilton Water Works Abbott Well Annual Water Use, 1989-2008

Table 1 - Wilton Water Works Annual Water Use Statistics (Combined Wells 1989-2008)

	Low	High	Average
(thousand gal)	61,650	115,200	81,200
(cfs)	0.0262	0.4889	0.3446
(cfsm at impact point)	0.0056	0.0074	0.0105
(cfsm at Merrimack Gage)	0.0015	0.0029	0.0020

Table 2 - Wilton Water Works Annual Water Use Statistics (Everett Well 1989-2008)

	Low	High	Average
(thousand gal)	30,800	92,200	43,800
(cfs)	0.1305	0.3913	0.1850
(cfsm at impact point)	0.0028	0.0084	0.0040
(cfsm at Merrimack Gage)	0.0008	0.0023	0.0011

Table 3 - Wilton Water Works Annual Water Use Statistics (Abbott Well 1989-2008)

	Low	High	Average
(thousand gal)	0	54,400	37,700
(cfs)	0	0.2318	0.1598
(cfsm at impact point)	0	0.0049	0.0034
(cfsm at Merrimack Gage)	0	0.0014	0.0009

Between 1989 and 2008, annual water use by Wilton Water Works ranged from a high of 115.2 million gallons (1990) to a low of 61.6 million gallons (2002), and average use was 81.2 million gallons (Figure 2 and Table 1). During this period, annual water use has decreased by 21.4 million gallons or 23 percent. This represents a decrease of 1.07 million gallons a year or 1.2 percent per year over the 20 year period. The decline in water use after 1995 is most likely the result of the metering of all of the water users in the Town during that year. Prior to the installation of water meters, water users only paid a flat base fee.

For the period of record, maximum, average, and minimum annual production for the Everett Well has been greater than the Abbott Well (Figures 3 and 4 and Tables 2 and 3). This difference reflects the higher pumping rate and utilization of the Everett Well. For the Abbott Well, no water use was reported in 1989, excluding that year, its minimum annual production was 27.5 million gallons in 2002.

Monthly water use records for the system begin in October 1988. Monthly water use varies in response to weather conditions and changes in seasonal demand. Total and average monthly water usage was highest during the summer and lowest during winter. This seasonal pattern reflects increased outdoor water usage (lawn irrigation, garden watering, vehicle washing, etc.) during the summer months, which declines during the fall, remains low during the winter, and begins to increase again in the spring. The highest total monthly use was 11.7 million gallons (June 1991) while the lowest monthly use was 0 in December 2008 (Tables 4, 5 and 6). Water use did occur during December 2008, but the recording meters were damaged as a result of an ice storm (Figure 5 and Table 4). Otherwise, the lowest total monthly water use was 2.1 million gallons in November 2002. The average monthly use was 6.8 million gallons (Figure 2 and Table 2).

The Everett Well (849 feet from the Souhegan River) produces more water than the Abbott Well (97 feet from the Souhegan River), except during the late summer and early fall (August through October). Monthly water use for the wells has ranged from 9.68 million gallons (Everett Well in January 1990) to 0 gallons (multiple months for both wells). The high total monthly production from the Everett Well in January (1990) was because it was the only water source for the Town at the time.

Monthly water use data for Wilton Water Works were converted from thousand gallons per month to cubic feet per second by dividing the monthly totals by days and then multiplying them by a flow unit conversion factor These values were also divided by the drainage basin area (171 sq. miles) relative to the location of the United States Geological Survey gage station (01094000) on the Souhegan Designated River in Merrimack, New Hampshire, and they were also normalized to the drainage area (46.8 sq. miles) of the Designated Reach above the impact point of the withdrawals.

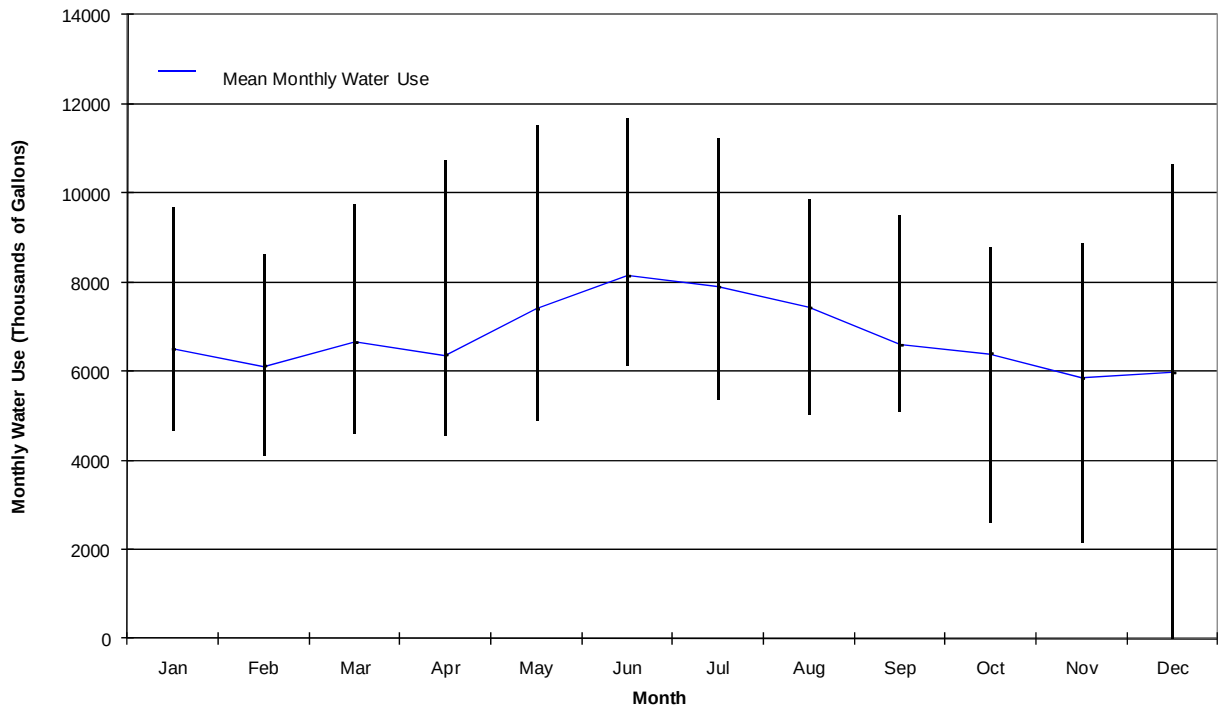

Figure 5 - Wilton Water Works Monthly Water Use, 1988-2008

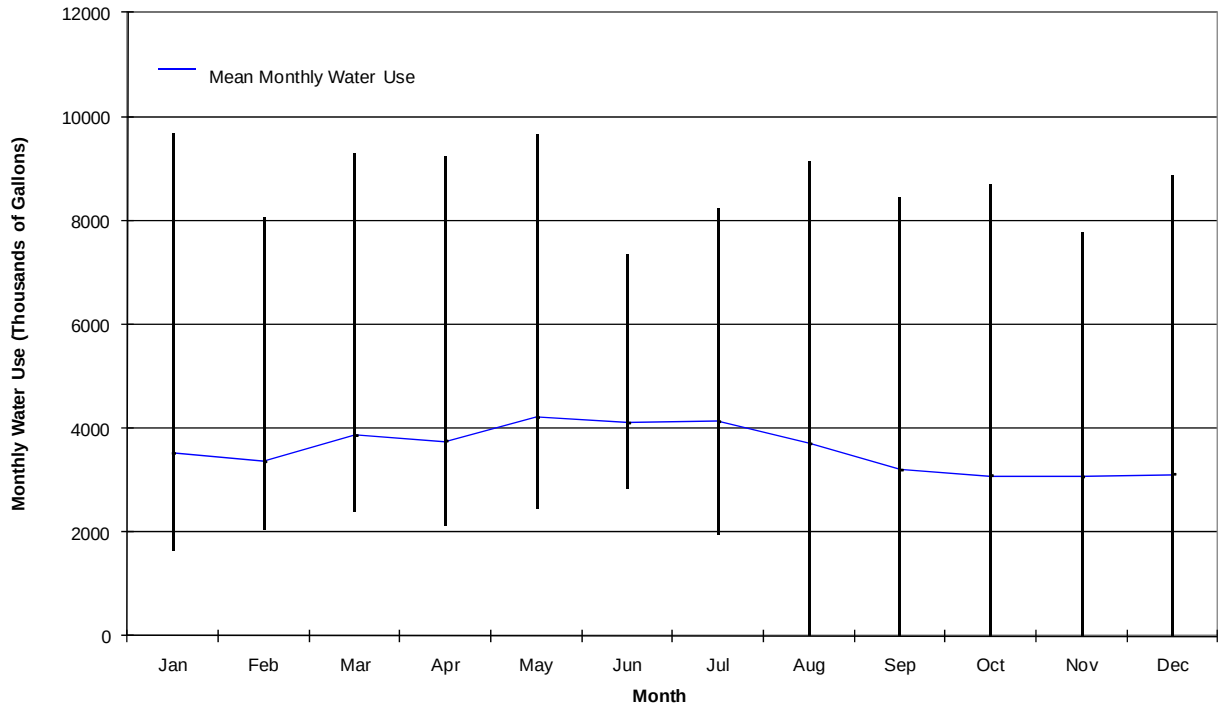

Figure 6 - Wilton Water Works Everett Well Monthly Water Use, 1988-2008

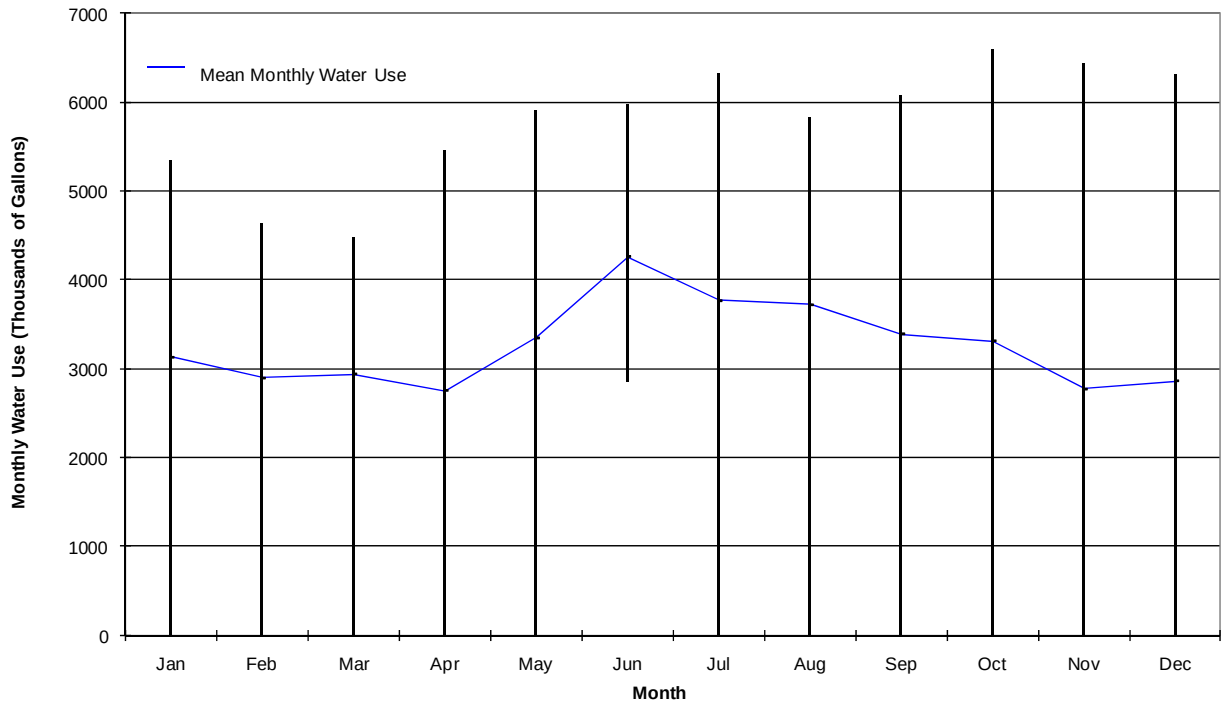

Figure 7 - Wilton Water Works Abbott Well Monthly Water Use, 1988-2008

Table 4 - Wilton Water Works Monthly Water Use Statistics (Combined Wells 1988-2008)

	Low	High	Average
(thousand gal)	0	11,700	6,800
(cfs)	0	0.5831	0.3445
(cfsm at impact point)	0	0.0125	0.0074
(cfsm at Merrimack Gage)	0	0.0034	0.0020

Table 5 - Wilton Water Works Monthly Water Use Statistics (Everett Well 1988-2008)

	Low	High	Average
(thousand gal)	0	9,680	3,620
(cfs)	0	0.4840	0.1840
(cfsm at impact point)	0	0.0103	0.0039
(cfsm at Merrimack Gage)	0	0.0028	0.0011

Table 6 - Wilton Water Works Monthly Water Use Statistics (Abbott Well 1988-2008)

	Low	High	Average
(thousand gal)	0	6,580	3,260
(cfs)	0	0.3300	0.1660
(cfsm at impact point)	0	0.0070	0.0035
(cfsm at Merrimack Gage)	0	0.0019	0.0010

Based on these values, the average daily water use by Wilton Water Works has ranged from a minimum of 0 cfs (0 gallons per day, December 2008) to a maximum of 0.583 cfs (376,805 gallons per day, June 1991), and average use was 0.345 cfs (222,980 gallons per day) for the period of 1988 to 2008 (Table 4).

Env-Wq 2101 Requirements for Water Conservation Plan

Development and approval of a water conservation plan that meets the Water Conservation Rules requirements will satisfy the Conservation Plan requirements under the Instream Flow Rules. The Conservation Rules require different activities depending on the type of water use. Conservation plans for public water supplies require inclusion of the following components:

- Installation, maintenance, and use of appropriately selected meters;
- Maintaining low levels of unaccounted-for water;
- Performing water audits to assess losses;
- A comprehensive plan for leak detection surveys of the distribution system;
- System pressure reduction, as necessary;
- A water conservation educational outreach initiative;
- Adopting a rate structure that promotes water conservation; and,
- On-going water conservation compliance reporting.

Wilton Water Works will be in compliance with the water conservation plan requirements of the Instream Flow Program by completing a Water Conservation Plan and receiving approval of it by the DES Groundwater and Drinking Water Bureau.

Existing Water Conservation Measures

Several water conservation measures have been implemented by the Wilton Water Works. The source wells are metered and the water meters at the wells are tested and calibrated, if needed, approximately every two years. Every customer of the Wilton Water Works has been metered since 1995 and the service meters are inspected when problems are suspected. Leak detection is performed on a case-by-case basis, although the Town is investigating funding for developing and implementing a leak detection program.

Water bills are issued on a semi-annual basis, with a base fee per water user for the period plus a flat fee per 1,000 gallons. Information on water conservation and efficiency is posted on the Wilton Water Commission's web site.

Water Conservation Alternatives and Costs

The existing water conservation measures employed by Wilton Water Works should be expanded to include measures to better identify water losses and to increase water use efficiency. As required under the Water Conservation Rules for existing large community water systems (Env-Wq 2101.05), the Town will determine its unaccounted-for water use annually. If the amount of unaccounted-for water use exceeds 15 percent, a response plan will be submitted to the DES within 60 days. The response plan will identify how the water system will reduce the

percentage of unaccounted for water below 15 percent within two years. In addition, a regularly scheduled leak detection program for the system should be developed and implemented to identify water losses. It is also recommended that Wilton Water Works formally adopt a formal water conservation policy for the Town, using the water conservation measures outlined in the Emergency Plan Guide (Wilton Water Works 2009).

If the Town needs to implement or maintain more restrictive water conservation measures due to diminished supply from its source(s) or storage, then those actions take precedence over this Conservation Plan. Nothing in this Plan precludes the Town from further conservation actions on its own initiative.

Conservation Implementation Schedule

By June 1, 2014, Wilton Water Works will finalize a Water Conservation Plan in accordance with Env-Wq 2101 in order to meet the Instream Flow Rule (Env-Wq 1900) requirements for a conservation plan. The Water Conservation Plan will document the Wilton Water Work's existing water conservation activities as well as compliance with the requirements for Existing Large Community Water Systems (Env-Wq 2101.05). The Plan will be administered by the Drinking Water and Groundwater Bureau under the authority of the Instream Flow Program.

Water User Contact Information

Water User: Wilton Water Works
Address: P.O. Box 83, 42 Main Street, Wilton, NH, 03086
Contact: Charles McGettigan, Jr., Water Commissioner
Phone: 654-6602
Email: Not available

Conversion Factors for Volume and Flow Units

1	cubic foot =	7.481	gallons
1	gallon =	0.1337	cubic feet
1	acre-foot =	43,560	cubic feet
1	acre-foot =	325,872	gallons
1	cfs =	448.86	gpm
1	cfs =	646,358.4	gpd
1	cfs =	0.65	MGD
1	gpm =	0.002227866	cfs
1	gpd =	0.00000154713	cfs
1	MGD =	1.5471	cfs

Sources of Information

Env-Wq 1900 Rules for the Protection of Instream Flow on Designated Rivers, effective 5/28/11.

Env-Wq 2101 Water Conservation Rules, adopted 5/12/05.

Env-Wq 2102 Water Use Registration and Reporting Rules, adopted 5/12/05.

Department of Environmental Services (DES) 1998. Developing a Water Utility Conservation Program. Environmental Fact Sheet WD-WSEB-6-1.

Department of Environmental Services (DES) 2001. Implementing a Water Efficiency and Conservation Program for Public Water Utilities. Environmental Fact Sheet WD-WSEB-26-9.

Department of Environmental Services (DES) 2005. Souhegan River Instream Flow Task 2 Report. Prepared by Dr. Tom Ballestero, University of New Hampshire.

Emery & Garrett Groundwater, Inc. 2008. Delineation of the Wellhead Protection Area around the Abbott and Everett Production Wells, Wilton, New Hampshire. Prepared for the Wilton Water Commission.

Personal communication with Charles McGettigan, Jr. Wilton Water Commission.

Personal communication with Jim Tuttle, Wilton Water Commission.

Survey of Souhegan River Affected Water Users performed by Normandeau Associates, Inc. completed by Charles McGettigan, Jr. of the Wilton Water Commission.

Wilton Water Works 2009. Emergency Plan Guide. Effective March 2009, Updated July 2009.

Water use reports on file with the Department of Environmental Services (DES).