



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES



Thomas S. Burack, Commissioner

WATER CONSERVATION PLAN APPROVAL

August 12, 2016

Christopher Day
Head of School
Cardigan Mountain School
62 Alumni Drive
Canaan, NH 03741

**Subject: Canaan – Cardigan Mountain School (PWS ID #: 0354010)
 Water Conservation Plan, NHDES # 150201**

Dear Mr. Day:

On August 8, 2016, the New Hampshire Department of Environmental Services (“NHDES”) Drinking Water and Groundwater Bureau received a Water Conservation Plan (the “WCP”), signed on July 28, 2016, for Cardigan Mountain School located in Canaan, New Hampshire. Pursuant to RSA 485:61 and Env-Wq 2101, community water systems seeking permits from NHDES for new sources of groundwater shall submit a water conservation plan to NHDES. Based on review of the WCP, NHDES has determined the WCP complies with Env-Wq 2101, *Water Conservation* rules.

Pursuant to Env-Wq 2101, the Town of Canaan and the Upper Valley Lake Sunapee Regional Planning Commission were provided a copy of the WCP, along with other required materials.

DES approves the WCP based on the following conditions:

1. No later than source activation, all source meters, distribution meters, meters measuring water consuming processes, and any transfer meters and data loggers shall be installed.
2. Upon source activation, source meters and any other meters measuring water consuming processes prior to distribution shall be read monthly, no sooner than 27 days and no later than 33 days from the last meter reading.
3. No later than the source activation date, service connections shall be outfitted with meters.
4. For buildings constructed after the source activation date, the service connection shall be outfitted with meters no later than system connection to the service.
5. Upon source activation, service meters shall be read at the intervals specified in the WCP but in no case less than quarterly.
6. Service meters shall be read no sooner than 83 days after and no later than 97 days after the previous quarterly reading.

7. All meters shall be installed per the manufacturer's instructions or American Water Works Association standards.
8. Upon source activation, all meters shall be tested and maintained based on the schedule proposed in the WCP.
9. Water use shall continue to be reported to the NHDES Water Use Registration and Reporting program on a quarterly basis
10. Upon source activation, a water balance, the difference between the system input volume and the metered authorized consumption, shall be reported annually to NHDES. The water balance shall be reported by March 1 for the prior year using the online reporting tool.
11. Upon final source approval, a water conservation outreach and education program shall be implemented in accordance with the WCP, including the distribution of water efficiency outreach materials twice a year and the training of students, faculty, and staff to report leaks and malfunctioning fixtures.
12. Upon source activation, a leak detection and repair program shall be implemented in accordance with the WCP.
13. From the date of this WCP Approval, all new non-metallic pipes installed in the system shall be outfitted with detectable tracer tape or detectable tracer wire, or be GPS located and maintained in a GIS system.
14. Every three years from the date of this WCP approval, a *Water Conservation Plan Ongoing Compliance Reporting Form* shall be submitted to NHDES documenting how the system has maintained compliance with the WCP. The following records shall be maintained by the water system to include with the report:
 - a. A leak log including the date a leak was discovered, the date a leak was repaired, the type of leak (ex. water main, service line, hydrant, valve), the approximate size of the leak (gpm), and the nearest address to the leak.
 - b. The title of water efficiency materials distributed and the date of distribution or training.
 - c. Date of installation and replacement of all meters and testing and calibration records.
 - d. Number of fixtures repaired and replaced each year.
15. Proposed changes to the WCP shall not be implemented unless approved by NHDES.

The online *Annual Water Balance Reporting Form* and the *Water Conservation Plan Ongoing Compliance Reporting Form* may be located by going to the DES website (www.des.nh.gov), clicking on the "A-Z List" in the top right corner of the page, clicking "Water Conservation," and scrolling down to "Forms/Applications."

Please feel free to contact me with any questions at (603) 271-0659 or via e-mail at kelsey.vaughn@des.nh.gov.

Sincerely,



Kelsey Vaughn
Water Conservation Program
Drinking Water and Groundwater Bureau

cc: Jon Warzocha, Horizons Engineering
Tim Jennings, Cardigan Mountain School
Town of Canaan
Upper Valley Lake Sunapee Regional Planning Commission
Christine Bowman, NHDES
Steve Roy, NHDES
Shelley Frost, NHDES
Stacey Herbold, NHDES

Cardigan Mountain School
Canaan, New Hampshire

WATER CONSERVATION PLAN

A community water system seeking authorization for a new source of water must submit a water conservation plan to the New Hampshire Department of Environmental Services (NHDES) for approval demonstrating how the water system proposes to comply with water conservation standards pursuant to Env-Wq 2101, *Water Conservation*, rules. Cardigan Mountain School is an existing small community water system.

Activities outlined in the water conservation plan will be completed by Facilities Department personnel under the supervision of our certified water system operators.

I certify that I have read this Water Conservation Plan, understand the responsibilities of the water system as referenced in the plan, and that all information provided is complete, accurate, and not misleading.

Owner Name: Christopher Day, Head of School for Cardigan Mountain School

Owner Signature:  Date: 7/28/16

Contact Information

Name and location of system: Cardigan Mountain School, Canaan, NH
PWS 0354010

Owner of system and mailing address: Cardigan Mountain School
62 Alumni Drive
Canaan, NH 03741

Name and mailing address of preparer of water conservation plan:

Tim Jennings
Director of Facilities
62 Alumni Drive
Canaan, NH 03741

Current Project Overview: The current project scope includes drilling and testing two additional bedrock wells to be connected to the existing campus potable water system (for potable use only, no irrigation). New piping will be 200 psi rated CTS polyethylene with an installed tracer wire and tape.

Name designation of each proposed water source and any existing sources:

Proposed: wells CM-3 and CM-4

Existing: wells BRW-1 (CM-1) and BRW-2 (CM-2)

Existing Water System Overview:

Number of connections existing for each of the following classes:

Residential: 19 – Residential connections include: student dormitories and faculty housing, which is a mix of apartments attached to dorms, duplexes, and single-family homes.

Industrial/commercial: None

Institutional: 8 -- Institutional connections include: Dispersed classrooms, offices, dining hall, and athletic buildings including a hockey rink that produces ice during the winter months (November to February). Taken as whole, these uses for water are comparable to a typical public middle or high school campus. System water is not used for heating, cooling, processing, or product ingredient. Sanitary use is limited to that required for servicing public bathrooms. Outdoor water use is minimal.

Municipal: None

The water system does not provide water to any consecutive water systems or privately owned redistribution systems.

There are no proposed connections that will receive more than 20,000 gpd.

The school operates year-round. The academic school year typically runs from the second week of September until the first week of June. The summer school program typically runs from the end of June until the middle of August. On average, there are 40 year-round residents as well as 215 students and 135 staff on campus during the academic school year.

The school operates a separate irrigation system for sports fields and lawn areas, taking surface water from Canaan Street Lake at two locations. The sports field off Back Bay Road has an automatic irrigation system that utilizes sprinkler heads and includes a sensor to prevent the system from operating during a rain event. The other irrigation system is manually operated, using extension hoses and small portable sprinklers and one rain cannon. It is primarily used to water the landscaped areas and athletic fields on the central campus. The biggest determining factor for watering frequency is weather conditions, but other factors such as seeding and grass establishment are also considered. Both irrigation systems have water meters, and irrigation water use data is reported to NHDES quarterly as required.

Transfer of Ownership: System ownership is not proposed to be transferred.

System Side Management

Water Meters

Source Meters

No later than the new source activation date, meters will be installed on each new and any existing water source.

An irrigation well is not proposed.

Source meter information for existing sources and for each proposed source:

Source Name: BRW-1 (CM-1)

Source Meter Make: Neptune

Source Meter Model: T-10

Source Meter Size: 1”

Source Meter Installation Date: 7-11-16

Last Meter Test/Calibration Date: New meter (factory calibration) 3-14-16

Source Name: BRW-2 (CM-2)

Source Meter Make: Neptune

Source Meter Model: T-10

Source Meter Size: 1”

Source Meter Installation Date: 7-11-16

Last Meter Test/Calibration Date: New meter (factory calibration) 3-14-16

Source Name: CM-3

Source Meter Make: Neptune

Source Meter Model: T-10

Source Meter Size: 1”

Source Meter Installation Date: 3-15-16

Last Meter Test/Calibration Date: New meter (factory calibration) 9-24-15

Source Name: CM-4
Source Meter Make: Neptune
Source Meter Model: T-10
Source Meter Size: 1”
Source Meter Installation Date: To be installed
Last Meter Test/Calibration Date: New meter (factory calibration)

Irrigation meter information:

Name: East Campus
Meter Make: CTS
Meter Model: Turbine flow meter
Meter Size: 2”
Meter Installation Date: 2014?
Last Meter Test/Calibration Date: 2014

Name: West Campus
Meter Make: CTS
Meter Model: Turbine flow meter
Meter Size: 2”
Meter Installation Date: 2014?
Last Meter Test/Calibration Date: 2014

No later than the source activation date, source meters and irrigation meters will be read at least every 30 days.

Meter Selection, Installation, and Maintenance

All meters will be American Water Works Association (AWWA) certified, with the exception of the below paragraph.

AWWA does not have standards for magnetic flow meters. If a magnetic flow meter is proposed, the meter make, model, size, and manufacturer specifications will be forwarded to the NHDES Water Conservation program for review. The meter will not be installed until receiving approval for its use from NHDES.

The selected size of the meters will be based on projected flow rates.

Meters will be installed as specified by the manufacturer including requirements for horizontal or vertical placement, distance of straight run of pipe upstream and downstream of the meter, and strainer installation. If the manufacturer does not supply installation specifics, meters will be installed in accordance with the

“Manual of Water Supply Practices M6, Water Meters-Selection, Installation, Testing, and Maintenance” (American Water Works Association, 2012).

The following meter testing and calibration schedule or meter change-out schedule will be implemented. If the manufacturer’s accuracy warranty extends beyond the below schedule, the meter will be tested or changed-out no later than the warranty expiration date.

Meter Size (inches)	Testing Rate (years)
<1"	10 yrs
1" - 2"	4 yrs
3"	2 yrs
>3"	1 yr

A log of the date meters were installed, tested, calibrated, repaired, and replaced will be maintained. Calibration certificates will be kept on file.

Pressure Management

The design pressures of the system are from 50 psi to 80 psi.

Leak Detection and Repair

When a leak is suspected due to higher than average water use, Facilities Department personnel will walk the campus and visually inspect the system. The service meter for each building will be reviewed, and fixtures and appliances will be checked for leaks. An e-mail will also be sent to faculty and administration for them to check for leaks and inform the students of the suspected leaks.

When a leak in the distribution system has been suspected in the past, Granite State Rural Water Association has provided assistance with locating the leak.

Leak detection methodologies will be conducted in accordance with “Manual of Water Supply Practices M36, Water Audits and Loss Control Programs” (American Water Works Association, 2016).

Leaks will be repaired within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.23.

A log of all leaks will be maintained including the date the leak was discovered, the date the leak was repaired, the type of leak (ex. service, main, hydrant, valve), the size of leak (gpm), and the nearest street address to the leak.

Service Metering, Billing, and Water Audits

All four wells will discharge, through their individual source meters, to a common source water main, which in turn is metered at the point of entry to the 100,000 gallon storage tank. Water from the storage tank is re-pumped through a 2" Neptune compound turbine flow meter to the distribution system. An overhaul of the pump and controls is scheduled for the summer of 2016. As part of the overhaul, the 2001 vintage 2" Neptune distribution meter will be tested. Further, the distribution meter, and the individual source meters, will be fitted with electronic transmitters which will feed data to our campus building management system for remote monitoring.

Service Meter Installation, Reading, and Maintenance

Service meters are in place at each service connection. The meters range in size from 5/8" to 2-1/2".

Service meters will be read at intervals coinciding with the following school calendar session start and end dates, but in no case more than every 90 days:

- At start of the Academic Year, on or about the second week of September
- At the start of the Thanksgiving break
- At the end of the Thanksgiving break
- At the start of the Christmas break
- At the end of the Christmas break
- At the beginning of spring break, on or beginning of March
- At the end of spring break, on or about the end of March
- At the end of the Academic year, around the first of June
- At the start of summer school, around the end of June
- At the end of summer school, around middle of August

Service Meters will be read visually and recorded manually.

It is expected to take 2 hours to read all service meters.

On days that service meters are read, the distribution meter will also be read.

Service meters will be maintained in accordance with the Meter Selection, Installation, and Maintenance section above. All service meters were installed in 2001, and since are now beyond the AWWA recommended service life, will be replaced over the next three years.

Water Balance & Water Audit

The operators will submit a water balance (system input volume – authorized metered consumption) annually to NHDES.

The yearly water balance will be reported to NHDES using the NHDES online water balance reporting tool, and will be submitted no later than March 1. (The electronic reporting form is located on the Water Conservation homepage of the NHDES website.)

The water system will prepare and submit a water audit and response plan if more than 15% of system input volume cannot be accounted for by authorized metered consumption. The response plan will identify how the water system intends to reduce losses to below 15% within two years.

Water audits will be calculated in accordance with “Manual of Water Supply Practices M36, Water Audits and Loss Control Programs” (American Water Works Association, 2016).

Conservation Rate Structure and Billing

All water delivered to the distribution system is used by the school, hence a billing system would serve no useful purpose.

No irrigation water is supplied by the wells.

Consumption Side Management

Educational Outreach Initiative

The following education and outreach initiative will be implemented no later than the date of final source approval.

The system will begin distributing water efficiency outreach materials twice a year (at the beginning of the academic year in September, and at the beginning of summer school in June). The materials will be distributed through e-mail and training sessions at faculty and student meetings. The materials distributed will be either NHDES Water Efficiency Fact Sheets located at

<http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm#efficiency>

or EPA WaterSense materials located at <http://www.epa.gov/watersense/>.

The administration will focus on faculty, staff, housekeeping, and student awareness and the prompt reporting of leaking faucets, running toilets, and missing aerators in order to reduce water use on campus. There is a Green Team on campus that is comprised of students, faculty, and staff.

The system will maintain a log indicating how the system has complied with this provision. The log will include dates the outreach and education actions were taken and what was done.

Institutional Water Efficiency: Conformance with the recommendations in NHDES fact sheet, WD-DWGB-26-13 Water Efficiency: Institutions, is taken seriously and is an ongoing daily effort.

Fixtures and Plumbing Maintenance: Low flow faucets, shower heads, toilets, and urinals (including some waterless urinals) are in place throughout the campus. All hi flow fixtures (toilets, faucets, and shower heads) have been replaced with low flow units over time except two toilets, and all of the dorms have been retrofitted with low flow fixtures. It is estimated that on average, 30 or more fixtures are replaced per year due to mechanical failures. It is also estimated that on average, 60 or more fixtures are repaired per year, typically due to a report that a toilet or urinal valve is stuck in the open position, a faucet is dripping, or students have removed the aerators on faucets or shower heads. CMS facilities personnel perform annual inspections of all buildings, continually monitor the condition of the building plumbing systems, and are quick to repair leaks as they occur. For a system with as low a daily demand as Cardigan's, a leaking fixture is quickly noticed and acted upon.

Commercial kitchen water conservation: The dining facility was built in 2012, and new equipment was installed at that time, including:

Equipment	Make	Model	Comments
Pre-Rinse Spray Valves			Flow rate: 1.42 gpm
Dishwasher	Hobart	Advansys CLeR	Opt Rinse technology conserves water/ Energy Star qualified
Ice Machine	Scotsman	Prodigl	Air-cooled (fitted on top of Kloppenberg ice storage bin)

Commercial laundry water conservation: the school operates 2 small hi speed commercial washing machines at the athletic center in conformance with applicable conservation measures. Each faculty apartment has its own washer and dryer, and the washing machines are a combination of top- and front-loading, depending on the space available and other relevant factors. Student laundry is done off-campus through a laundry service.

Reporting and Implementation

The water system will submit a form supplied by NHDES once every three years from the date of the water conservation plan approval documenting how compliance with the requirements of Env-Wq 2101 *Water Conservation* are being achieved.

By March 1 of each year, the system will submit a water balance for the prior year to NHDES using an electronic reporting form located by going to www.des.nh.gov, scrolling down the “A-Z” list and choosing “Water Conservation”.

The water system will report monthly production volumes, quarterly to the NHDES Water Use Registration and Reporting Program. Monthly means once every calendar month, but not sooner than 27 days after and no later than 33 days after the previous reading.

Appendix A Definitions

Authorized metered consumption: billed metered water plus unbilled metered water.

Community water system (CWS): a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Consecutive water system: a public water system that buys or otherwise receives some or all of its finished water from one or more wholesale systems for at least 60 days per year.

Final Source Approval: the date of final well siting approval or the date of issuance of the large groundwater withdrawal permit.

Large community water system: a community water system that serves more than 1,000 persons.

Privately owned redistribution system (PORS): A system for the provision of piped water for human consumption which does not meet the definition of a public water system and meets all of the following criteria:

Obtains all of its water from, but is not owned or operated by a public water system; (2) serves a population of at least 25 people, 10 household units, or 15 service connections, whichever is fewest, for a least 60 days per year; and (3) has exterior pumping facilities, not including facilities used to reduce pressure, or exterior storage facilities which are not part of building plumbing.

Public water system (PWS): a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year.

Small community water system: a community water system that serves 1,000 people or less.

Source activation date: the date the source is placed into use.

System input volume: the volume of water input to the water supply system after treatment, analysis, and storage.

Water balance: the difference between the system input volume and authorized metered consumption.

Water conservation: any beneficial reduction in water losses, waste, or use.

Wholesale system: a public water system or an industrial, commercial, or institutional (ICI) water user that treats source water and then sells or otherwise delivers finished water to a consecutive water system or privately owned distribution system.

Appendix B Notification Process

Public Notification Instructions

Once a final draft of the water conservation plan is agreed upon by the applicant and NHDES, NHDES will send a signature line to the applicant for addition to the plan along with a summary of the requirements of Env-Wq 2101, *Water Conservation* rules. Within 10 working days of receiving the summary from NHDES, the applicant is required to provide a copy of the water conservation plan via certified mail with return receipt requested to the governing board of the municipality in which a proposed source is located, all municipalities that will receive water from the water system (if any), all wholesale customers (if any) and the regional planning commission serving the location of the proposed source. In most cases, only the municipality and the regional planning commission will require notification. All signed copies of the certified mail return receipts (the green cards) must be forwarded to NHDES along with the final, signed water conservation plan.

Additional Attachments

The applicant must provide the governing boards with a summary of the requirements of Env-Wq 2101, which may be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm, and request that the governing board amend local site planning requirements to reflect the requirements of Env-Wq 2101 or to promote water efficiency.