The State of New Hampshire

DEPARTMENT OF ENVIRONMENTAL SERVICES

Thomas S. Burack, Commissioner

WATER CONSERVATION PLAN APPROVAL

September 6, 2011

Thomas Mason Jr.
Lakes Region Water Company Inc.
PO Box 389
Moultonboro, NH 03254

RE: Ossipee – Indian Mound (PWSID: 1842030)
Water Conservation Plan, August 8, 2011, NHDES # 999508

Dear Mr. Mason:

On August 10, 2011, the New Hampshire Department of Environmental Services ("DES") Drinking Water and Groundwater Bureau received a water conservation plan, dated August 8, 2011, for Lakes Region Water Company Inc., Indian Mound located in Ossipee, NH (the "Plan"). Pursuant to RSA 485:61 and Env-Wq 2101, community water systems seeking permits from DES for new sources of groundwater shall submit a water conservation plan to DES. Based on review of the Plan, DES has determined the Plan complies with Env-Wq 2101.06, *Requirements for Existing Small Community Water Systems*.

Pursuant to Env-Wq 2101.11, the Town of Ossipee and the Lakes Region Planning Commission were provided the opportunity to comment on the Plan from August 10, 2011, the date of public notification, through August 31, 2011. DES received no comments.

On **September 11, 2014**, and every three years thereafter, the water system shall submit a detailed and completed compliance report form to DES documenting compliance with the Plan. Required information includes contact information for the water-system owner and for the individual responsible for carrying out plan tasks; dates tasks were performed; and data relating to meter reading, water audits, leak detection, and public outreach. A copy of the *Water Conservation Plan Compliance Report Form* may be located at the DES website, www.des.nh.gov, on the Water Conservation Program homepage.

Revisions to the Plan shall not be implemented without further approval from DES.

Please feel free to contact me with any questions at (603) 271-6989 or via e-mail at stacey.herbold@des.nh.gov .

Sincerely,

Stacey Herbold
Water Conservation Program
Drinking Water and Groundwater Bureau
Department of Environmental Services

ec: Derek Bennett, NHDES
cc: Town of Ossipee
Lakes Region Planning Commission

Report Form for
Water Conservation Plans
Small Community Water Systems

PROJECT NAME: **Indian Mound – Small Community Water System**
TOWN/CITY: **Ossipee, NH**
EPA ID # **1842030**
DATE: **August 8th, 2011**

PURPOSE A community water system seeking approval for a new source of water must meet the requirements of New Hampshire Administrative Rule Env-Wq 2102, Water Conservation. Requirements vary depending on the type of water system as follows: **Env-Wq 2101.06 Existing Small Community Water System**

This report was submitted for review to:
ATTN: Diana Morgan
NHDES – Drinking Water & Groundwater Bureau
29 Hazen Drive, PO Box 95
Concord, NH 03302-0095

PROJECT/CONTACT INFORMATION

Project Contact:

Name:	**Jake Dawson**
Address:	**PO Box 389, Moultonboro, NH 03254**
Company:	**Lakes Region Water Company Inc.**
Phone Number:	**(603) 476-2348 or cell (603) 677-6478**

Project Owner:

Name:	**Thomas Mason Jr.**
Address:	**PO Box 389, Moultonboro NH 03254**
Company:	**Lakes Region Water Company Inc.**
Phone Number:	**(603) 476-2348**

To the best of our knowledge, ownership of the water system will NOT be transferred at a future date from the person listed above to a homeowner's association or any other entity.

RECEIVED
AUG 10 2011
DES/DWGWB
By

SOURCE & SYSTEM OVERVIEW

- **Reason for New Source:** On 4/11/11, we requested that the Permitted Production Volume (PPV) in any 24 hour period for gravel pack well (GPW) # 1 be increased from 28,800 gallons to 57,599 gallons. This was per recommendation of the New Hampshire Department of Environmental Services (NHDES) due to an increased demand on the existing water supply. Pursuant to NH Administrative Rule Env-Dw 301.23, increasing the PPV shall require submission of the same information necessary to approve a new well. Although the NHDES is waiving this rule and will accept pumping test data from 8/21/07 as documentation of sustainable yield (instead of having LRWC go through the entire new well siting process), we must submit a water conservation plan developed in accordance with Env-Wq 2101.00 since the PPV is being increased.

- **Service Connections/Types:** The Indian Mound CWS consists of 96 existing service connections, the majority of which are residential homes. There exists one (1) known commercial connection, which is the Indian Mound Golf Course/Tavern (and an apartment above the restaurant). Other than that there are NO known industrial, commercial, institutional, or municipal connections. None of the residential service connections receive more than 20,000 gpd as they are used as single family homes, nor does the Indian Mound Golf Course/Tavern as its maximum use is 5,000 gpd (average is 900 gpd). There is a rough estimate of approximately 10 additional service connections that could exist at full build-out. This is the maximum number of services that could be added in the future; however, there is no evidence to suggest that this would happen any time in the near future.

- **Population Trends:** The majority of the Indian Mound customers are seasonal occupants. The summer months are when the system exhibits highest water use, because there is an increase in average occupants due to the seasonal nature of the system. The busiest times are during long holiday weekends, specifically the July 4th, Memorial Day and Labor Day holidays. The entire system's average daily use is usually less than 27,000 gpd, with maximum daily use of less than 47,000 gpd occurring during the busy July months, where peak use is realized and temperatures are usually the highest. The maximum daily yield of GPW 1 was determined to be 50 gpm (72,000 gpd) during a 48-hour pumping test conducted in August 2007.

SYSTEM METERING

- **Water Sources:** There are 2 active well sources currently in use for the Indian Mound CWS. The first is PTW #1, which is a 2" point well located inside the pump station. The second is GPW #1, which is a 50 foot gravel pack well located outside the pump station.

- **Source Meters:** Each well has its own source meter. PTW #1 has a 1" Sensus SR meter with flow ranges of 0.5 – 75 gpm. GPW #1 has a 2" Sensus SR meter with flow ranges of 0.5 – 200 gpm. Each meter is typically read at least once per week, sometimes more during weeks preceding and following busy holiday weekends. At the very least, they will always be read at least once every 30 days. Both meters were last tested in 2008 and we will continue to test such once every 4 years as required by NHPUC rules as well as AWWA standards.

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

Service Meters: Each of the existing 96 Indian Mound CWS customers are considered residential in nature (with the exception of the Indian Mound Golf Course/Tavern), most with seasonal occupancy status and NONE have meters currently installed. Since Indian Mound is an existing small community water system, LRWC has chosen to conduct a comprehensive leak detection survey every 2 years in lieu of service meters and water accounting (per NHDES Rule Env-Wq 2101.06 (b). This survey shall be completed in accordance with procedures and protocols described in Chapter 3 and 4 of the "Manual of Water Supply Practices, Water Audits and Leak Detection" document identification number AWWA M36, American Water Works Association, 1999.

LEAK DETECTION

- **Leak Detection:** Lakes Region Water Company Inc. estimates for water loss at least annually, but typically about once per week. We review source meter records, taking into account any excess kilowatt hours used by the pump station and any customer complaints or insight that is available to help us identify any potential leaks. We document water flow during "low flow periods" which occur largely between midnight to 4am and assume this to be leakage. We also perform system inspections at least once per week, noting any significant changes in activity and perform leak detection as necessary, but at least once per week on average. The most recent estimate of water loss was calculated in July 2011 during which 33 gpm was unaccounted for and considered lost due to leakage. This was attributed to a water main break across Route 16B that was repaired immediately upon its discovery, which occurred during the week of Sunday, July 3, 2011.

  The Company performs in-house leak detection, since several of their field personnel are certified water operators who have successfully completed training sessions of a wide variety conducted by NHDES, AWWA and Granite State Rural Water Association. As stated above, our most recent leak detection was performed in July 2011, where a sizeable 33 gpm leak was discovered. 100% of the system was surveyed for leakage and 100% of the losses were recovered upon its immediate repair.

  A Meter Master Flow Recorder (Model100 EL) is often used to record flows on a continuous basis, which are then analyzed to obtain minimum flows during off-peak hours (in the middle of the night between midnight and 4am), which is considered true water loss. This process typically occurs following an unaccounted for water estimate (weekly), but no less than once per year.

The Indian Mound CWS is comprised of approximately 1 mile (5,280 feet) of 2" diameter poly pipe, 2,000 feet of 4" diameter PVC pipe, and 700 feet of 2" diameter PVC pipe, all of which was installed in the early 1970s. At least once every 2 years, all water mains, shut off valves, blow offs and customer service lines are completely surveyed for leakage using an acoustic listening device. A ground microphone is used in conjunction with acoustic listening device Models HL400 and HL 90 which are manufactured by Metrotech. Each of these contact points will be field surveyed for water leakage at 5 foot intervals over the top of the pipe. Due to this system's design and overall low consumption volume, it is not cost effective or necessary to install zone meters to assist in leak detection. At the conclusion of such assessments, any damages to existing structures will be noted and replaced as soon as possible, but no later than 60 days.

Lakes Region Water will perform leak detection every 2 years in accordance with "Manual of Water Supply Practices, Water Audits & Leak Detection" document identification number AWWA M36, American Water Works Association, 1999. 100% of the system will be surveyed for leakage each year. Any identified leaks will be documented & repaired immediately or within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.09.

- **Intentional Water Loss:** There are no "bleeders" used within the system at dead ends to improve water quality or prevent freeze-ups because they are unnecessary. There are also no storage tanks that we allow to intentionally overflow due to unique system hydraulics or other concerns.

- **Pressure Management:** The Indian Mound CWS currently operates at pressures between 55 psi and 75 psi. Pressure reduction is not necessary because there are no zones that exceed maximum operating pressures allowed by State Rules. If the pressure exceeds 125 psi, pressure-reducing valves will be installed on the service line or water main to maintain the pressure below 125 psi. This will be completed within 1 year of discovery of any such pressure issue.

CONSUMPTION MANAGEMENT

- **Educational Outreach Initiative:** The educational outreach initiative will consist of two NHDES Fact Sheets (*attached*):

  - Fact Sheet WD-DWGB-26-2: Water Efficiency Practices for Domestic Indoor Water Use
  - Fact Sheet WD-DWGB-26-3: Water Efficiency Practices for Outdoor Water Use

  These fact sheets are highly informative materials that can familiarize customers of simple water conservation measures that can be implemented at home. They will be distributed to each customer immediately following the department's approval of this water conservation plan (most likely to be included along with customer's quarterly water bills). After this initial mailing, they will be distributed annually along with the Consumer Confidence Report (CCR), which must be sent to each customer by July 1st of each year.

In order to document how compliance with the requirements of Env-Wq 2102 is being achieved, Lakes Region Water Company Inc. will submit a "3 Year Water Conservation Compliance Report" to be supplied by the NHDES once every three years. All activities outlined in this water conservation plan will be completed by water system personnel under the supervision of a certified water system operator.

- **Public Notification**: Within 7 days of submitting the final water conservation report to the NHDES for review, Lakes Region Water Company Inc. will provide via certified mail:

  - The Final Water Conservation Report (after initial NHDES review)
  - Education outreach materials for review:
    - Water Conservation Rules Summary (Env-Wq 2101)
    - NHDES Fact Sheet WD-DWGB-26-2: Water Efficiency Practices for Domestic Indoor Water Use
    - NDHES Fact Sheet WD-DWGB-26-3: Water Efficiency Practices for Outdoor Water Use

  The materials listed above will be sent to the following governing boards:

  - Lakes Region Planning Commission
    103 Main Street, Suite 3
    Meredith, NH 03253

  - Elizabeth Gillette, Chairperson
    Town of Ossipee, Conservation Commission
    PO Box 67
    55 Main Street
    Center Ossipee, NH 03814

  Copies of the cover letters to be sent to the governing boards along with all pertinent attachments are enclosed for NHDES review. Certified mail receipts will be provided when available.

Before submitting, thoroughly check this form to be sure all applicable questions are answered, all information is provided, and all necessary attachments are included. Incomplete submittals will significantly slow the approval process.

If strict compliance with any of the requirements of Env-Wq 2101 is not feasible, the small community water system may apply for a waiver to a specific portion of the rule. A waiver application form is provided at the end of this document for your convenience.

Preparer's Signature:

Date: **August 8, 2011**

As a reminder, have you included the following?

- Educational outreach initiative documentation and materials created by the water system.
- Public notification documentation (certified mail receipts).
- Public notification cover letters and pertinent documents.
- Other pertinent or supportive materials.

ATTACHMENTS

LAKES REGION WATER COMPANY INC.

420 Governor Wentworth Highway, PO Box 389
Moultonborough, NH 03254
Telephone: 603-476-2348, Fax: 603-476-2721
Hours: Monday through Friday, 8:30am to 4:30pm

August 8, 2011

Governing Board
Address
City, NH Zip code

Re: Water Conservation Plan for Indian Mound Community Water System, Ossipee NH

Dear _____:

Applicants applying for approval of new drinking water sources for Community Water Systems are subject to the requirements of Env-Wq 2101: *Water Conservation Rules*. As part of the application process we must complete a water conservation plan for the new water source and submit it for review by the New Hampshire Department of Environmental Services (NHDES). We must also perform the following Public Notification tasks:

- Provide a summary of Water Conservation Rule Env-Wq 2101 and the proposed water conservation plan for the water system to the governing board of the municipality in which the water system is located and the regional planning commission established for the area where the water system is located.
- Request that the governing board of each municipality review the water conservation plan for consistency with Env-Wq 2101 and amend the local site planning requirements to promote water conservation landscaping practices within the service area of the new water system.
- Request that the regional planning commission review the water conservation plan for consistency with Env-Wq 2101 and promote water conservation landscaping and other conserving water use practices among its member towns.

We are requesting that you review the enclosed materials, comment on the water conservation plan, and promote water conservation practices within your jurisdictional area. You have twenty-one (21) days to review and provide comment to NHDES on the water conservation plan. This 21-day period commences upon the receipt date of certified mailing of this correspondence. Please communicate your comments in writing to NHDES at your earliest convenience and address all comments to:

ATTN: Diana Morgan
NHDES-Drinking Water & Groundwater Bureau
29 Hazen Drive, PO Box 95
Concord, NH 03302

In addition, if you wish to review the preliminary well siting, you may contact the above NHDES staff at (603) 271-6685. Thank you in advance for your time and cooperation.

Sincerely,

Taryn Zambouras
Office Manager, Lakes Region Water Company Inc.
Water Conservation Plan Project Contact

Email: lrwater@lakesregionwater.com
Website: lakesregionwater.com

-Water Conservation Rules-
Env-Wq 2101 (formerly Env-Ws 390)

Applicants applying for permits to develop new sources of water need to be aware that they are subject to new water conservation requirements required by RSA 485.61 which became law in July 2002. The law requires that the Department of Environmental Services (Department) adopt and administer water conservation rules for applicants developing the following type of new water sources:

1. New sources of groundwater for community water systems subject to RSA 485:3;

2. New sources of groundwater for bottled and bulk water operations subject to RSA 485:3;

3. New sources of groundwater that exceed 57,600 gallons over any 24-hour period subject to RSA 485-C; and

4. New sources of surface water associated with projects that require a water quality certification pursuant to Section 401 of the Federal Clean Water Act.

The Department met with an advisory committee consisting of representatives of municipalities, community water systems, environmental organizations, and business and industry to develop the water conservation rules. The rules were formally adopted by the Department in May 2005.

A general summary of the requirements of the water conservation rules is provided below.

Requirements for All Large Community Water Systems and All New Small Community Water Systems Developing New Sources of Water

1. Install and maintain meters for all water withdrawals and service connections.

2. Implement a water audit, leak detection and leak repair program in accordance with the "Manual of Water Supply Practices, Water Audits and Leak Detection", document identification number AWWA M36, American Water Works Association, 1999.

3. When applicable, development and implementation of response plans to reduce unaccounted for water to less than 15%.

4. Implement a rate structure that encourages efficient water use.

5. Implement a water conservation educational outreach initiative.

Requirements for Existing Small Community Water Systems Developing New Sources of Water

1. Either: a) Install source and service connection meters and implement a water audit, leak detection and leak repair program in accordance with the "Manual of Water Supply Practices, Water Audits and Leak Detection", document identification number AWWA M36, American Water Works Association, 1999; **or** b) Complete a system-wide leak detection once every two years.

2. Repair all leaks within 60 days of identification.

3. Implement a water conservation educational outreach initiative.

Requirements for Applicants Developing New Sources of Water for Industrial, Commercial, or Institutional Water Uses

1. Install water meters for all water sources.

2. Retrofit or replace single pass water-cooling systems when feasible based upon an economic analysis that includes a four-year payback period.

3. Install controls to stop the overflow or discharge of water to waste when feasible based upon an economic analysis that includes a four-year payback period.

4. Identify water conservation best management practices or best available technologies that may be applicable to the types of water-using processes at the subject facility, and implement these measures when feasible based upon an economic analysis that includes a four-year payback period.

5. For all new lawn areas, install six (6) inches of loam and devices to shut-off automatic irrigation systems when not needed.

For more information about the water conservation rules, contact Derek Bennett at 271-6685 or derek.bennett@des.nh.gov.

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-2 2010

Water Efficiency Practices for Domestic Indoor Water Use

Only 1 percent of the earth's water is available for drinking. The average American uses 100 gallons of water a day. Our excessive water use habits deplete potable drinking water supplies and return trillions of gallons of wastewater to streams and coastal waters. The following indoor water efficiency practices can save as much as 25,000 gallons of water per person per year. Water efficiency practices not only save water, they save money. For a description of how to determine water use in your home, see the following fact sheets at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-DWGB-26-15, "Performing a Domestic Water Use and Conservation Audit." To save water on outdoor use, see fact sheet WD-DWGB-26-3, "Water Efficiency Practices for Outdoor Water Use" at the same website.

General Water Efficiency Practices

The following water efficiency practices apply to general domestic water use. Bathroom, kitchen and laundry water use are addressed in later sections.

- Look for the WaterSense label when considering water using fixtures, appliances, and services. WaterSense, sponsored by the U.S. Environmental Protection Agency (EPA), labels water-efficient products that have been independently tested to ensure water savings without sacrificing performance or quality.
- Shut off water when not in use, such as when you brush your teeth or shave.
- Never put water down the drain when you can use it for something else, such as watering plants.
- Insulate water pipes and hot water heaters. This retains heat so that water doesn't need to run as long to get hot. It also saves on energy costs.
- Avoid water softening systems unless absolutely necessary. Backwashing these systems uses large quantities of water. If you do use a water softener, run the minimum amount of recommended regenerations to maintain softness.
- Turn off pumps, water softeners, and other water-using equipment while on vacation.
- Check for and repair leaks. Not only will you save water but you will save energy and money. A large percentage of energy costs can be attributed to pumping, treating, heating, and cooling water.
- If you are on municipal water and have a meter at your house, check the meter over a period of time when no one is using water. If the meter moves, you have a leak.
- If you have a well, the pump shouldn't run at times when no water is being used.

Water Efficiency Practices in the Bathroom
More than one fourth of all domestic indoor water consumption is used in the bathroom. The following water efficiency practices will help you save water in the bathroom.

- Install ultra-low flow toilets (ULF) that use a maximum of 1.28 gal/flush (4.8L/flush) or retrofit existing toilets with displacement bottles or dams. Dual flush toilets offer a choice between the 1.6-gallon flush for solid wastes and a 1.0-gallon flush for liquid only. Never put bricks in toilet tanks; they disintegrate over time. Use a squat, fat glass jar, like a pickle jar, no more than 6" high, filled with water. Glass is heavier than plastic and less apt to shift around in the tank.
- Install low-flow bathroom faucets that use no more than 1.5 gallons per minute or install low-flow faucet aerators or laminar flow restrictors. These devices are readily available at most hardware and building supply stores.
- Install low-flow showerheads that use no more than 2.0 gallons per minute. Low-flow showerheads are designed to use less water and still provide the same invigorating spray as their water-wasting counterparts.
- Don't use the toilet as a garbage disposal. Avoid unnecessary toilet flushing by disposing of tissues, cigarette butts and other items in the trash, and composting vegetable food waste.
- Replace or repair toilet flush handles that stick in the flush position.
- Avoid using automatic bowl cleaners in your toilet tank. These chemicals rapidly degrade flapper valves and other tank components, causing the toilet to leak.
- Adjust the toilet tank float level so that water fills no higher than 0.5"-1.0" below the top of the overflow pipe. At higher levels water can flow down the pipe and leak through to the bowl. The refill valve then tops off the tank, causing a continuous cycle of drain and fill.
- Detect leaks in toilet tanks by dropping food coloring in the tank (12 drops). Do not flush the toilet for at least an hour. If the tank leaks the dye will show up in the bowl.
- Fill bathtubs no more than half full.

Water Efficiency Practices in the Kitchen
The following water efficiency practices can be applied to routine kitchen chores.

- Operate dishwashers with full loads only. Use the water-save cycle if your dishwasher is equipped with one.
- If washing dishes by hand, rinse them in a basin rather than under running water.
- Store drinking water in the refrigerator rather than running the tap for cold water.
- Compost food scraps rather than using a garbage disposal. Not only do disposal units waste water; the fine particles they produce can clog a septic system.
- Consider installing an instant water heater on the kitchen faucet. This reduces the time needed to run water until it becomes hot.
- Do not run water to melt ice or thaw frozen foods. Defrost them in a microwave or in the refrigerator overnight.
- Rinse vegetables in a pan of water rather than under running water.

Water Efficiency Practices in the Laundry
The laundry is usually the second highest domestic indoor water use. The following water efficiency practices are designed to save water in the laundry.

- Wash full loads only. If unable to wash a full load, set your washer to the appropriate water level setting.
- Consider replacing your top-loading, vertical-axis washer with a more efficient horizontal-axis washer. Most of these are front-loading, but some newer models are also top-loading. These washers rotate clothes rather than agitating them and use much less water, an average of 20 gallons per load compared to an average of 43 gallons for conventional washers. See the EPA's Energy Star website listed at the end of this document for a catalog of Energy Star-approved washing machines.

For Additional Information
Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/index.htm. All of the bureau's fact sheets are on-line at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm. More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm.

Resources
Woodinville, WA Water District. In-depth water-saving tips, how to check for leaks. http://www.woodinvillewater.com/Conservation/District%20Program/District%20Program.htm

US EPA. Listing of Energy Star rated washing machines. www.energystar.gov

References:
New England Interstate Water Pollution Control Commission (NEIWPCC) *MRI Water Conservation Technical Bulletin #5, Water Conservation Best Management Practices for Domestic/Sanitary Water Use;* NEIWPCC, Lowell, Mass.; 1996.
US Dept. of Defense, *MIL-Handbook-1165, Water Conservation;* US Dept. of Defense; 1997; pp 25-37.
Vickers, Amy; *Handbook of Water Use and Conservation;* WaterPlow Press, Amherst, Mass.; 2001; pp 23-75, 87-133.

Note: This fact sheet is accurate as of May 2010. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.

ENVIRONMENTAL
Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

WD-DWGB-26-3 2010

Water Efficiency Practices for Outdoor Water Use

Outdoor water uses increase water consumption during spring and summer by an average of 50 percent. Landscape watering and car washing are the two main outdoor water uses responsible for this demand for water. This increase in demand comes at a time of year when there is less water naturally available in the environment due to warmer temperatures and plant uptake.

By implementing just a few minor changes in how you use water outdoors, you will find that you can maintain your existing outdoor activities using much less water. This will save money on your water and electric bill, and protect the environment by leaving more water for New Hampshire's rivers, wetlands and aquifers. In the case of outdoor lawn watering, using water more efficiently will actually improve the durability of your grass, reduce the need for chemical amendments, and decrease lawn mowing frequency.

The following sections address conservation for landscape and garden irrigation and other outdoor uses.

Landscape and Garden Irrigation Conservation:

Use water-wise and region-appropriate landscape plantings. Visit the fact sheets webpage at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-DWGB-26-4, "Fundamentals of Xeriscaping and Water-Wise Landscaping."

Watering frequency should be based on soil moisture, weekly precipitation and plant/turf conditions. Typically, established landscape plants and turf grass require one inch of water per week, and this amount may be applied in one application. You may see golf courses watering lush greens almost continuously; however, these are often exotic grasses that must be cooled from the heat of the day. Do not copy the watering practices of these types of operations.

Use a rain gauge to calculate your lawn and garden water needs. A rain gauge allows you to measure how much rain has fallen. These devices are available for a minimal cost at your local garden/hardware store and are easy to use. Mature lawns only require about one inch of water a week. The amount of water you should apply to your garden or lawn equals one inch minus the amount of rain you received for the week.

Soil moisture sensors are useful in determining how wet your soil is. You can check the moisture of the soil to determine watering needs. In some instances you will find that you do not need to water even if it has not rained recently.

Water only those areas that are dry. Water by hand, if possible.

Determine sprinkler or hose application volumes by placing cans at various locations in the lawn or garden. Mark a one-inch depth on the inside of the cans. Time how long it takes your sprinkler heads or hose to deliver an inch of water to each of the cans, and average the times it takes to fill each can one inch

deep. This is how long you should run your sprinklers or hose to deliver an inch of water.

Completely wet the plant root zone each time you water to prevent dry layer formations that inhibit root growth. Probe the soil after irrigating to determine whether the water reached the root zone. If water penetration is too deep, too shallow, or spotty, adjust your watering practices to correct it.

Do not over-water your lawn. Only water to the depth of the root zone. Excess water percolates too deeply, making it unavailable for plant use. Also, too much water prevents air from reaching root systems and encourages shallow roots and plant diseases.

Plant drought-resistant turf grass. The most drought-tolerant grasses are the fine leaf fescues. The University of New Hampshire Cooperative Extension recommends a mix containing hard fescue, Chewings fescue and perennial ryegrass. Most garden centers carry this type of mix.

Set your mower height to two inches. Longer grass blades retain moisture better, shade the root system, and encourage roots to grow deeper and stronger.

Keep the mower blades sharp. Mowing with a dull blade gives grass a "split ends" look making it seem drier than it is.

Give lawns the lowest priority for watering, since they are able to go dormant for long periods of time, slower to die and less expensive to replace than other vegetation.

If using a sprinkler system, connect it to an automatic timer. If you do not have a timed system, set a kitchen timer to avoid over-watering.

Be sure sprinkler heads are producing drops rather than a mist. This helps to reduce evaporation.

If you use automatic, pop-up sprinkler heads, choose the type that incorporate electronic sensors to monitor soil moisture and rain events. Periodically check to ensure sensors are operating properly.

Operate automatic sprinkler systems connected to public water systems only when the water demand is low, usually between 4 a.m. and 6 a.m.

Irrigate between 9 p.m. and 9 a.m. to prevent evaporative water loss.

Don't water the pavement. Adjust sprinklers so that they water only the plants.

For larger systems, develop an irrigation maintenance program. Routinely inspect all water lines, valves and pumps for leaks. Keep replacement and repair parts on hand. Inspect sprinkler nozzles to ensure they are operating properly and are distributing the water uniformly. Evaluate irrigation system pressures to better control application rates.

Apply appropriate fertilizers to encourage the growth you want in your plants. Nitrogen promotes leaf growth, phosphorus benefits fruits and flowers and potassium promotes root development. For instance, lettuces require primarily nitrogen; grass needs nitrogen in the spring and potassium the rest of the growing season. Roses and tomatoes call for phosphorus. Usually a balanced fertilizer, such as 10-10-10 that contains 10 percent each of potassium, phosphorus and nitrogen, is best for vegetables, shrubs and flowers. Specialty fertilizers for lawns contain higher percentages of either nitrogen or potassium depending upon what time of year they should be applied.

Do not irrigate during windy conditions.

Utilize drip or trickle irrigation wherever possible. These systems apply water near the root zone of the plant, ensuring a complete watering while lessening excess water usage.

Plant species native to New Hampshire. Native plants are hardier and tend to need less water. Visit the New England Wildflower Society's website at www.newfs.org for information about native plants.

Use mulch to retain moisture. Mulch can be used almost everywhere in the garden, even on row vegetables. Mulch hay, straw and sheet composting work well in the vegetable garden.

Minimize your lawn area. Replace grass with moss, rocks, gravel, wood chips or mulched flowerbeds. Consider xeriscape or "Zen" gardens. Xeriscape effectively uses drought-tolerant vegetation that subsists on precipitation alone. Zen gardens traditionally contain no vegetation, only raked sand, sculpture and a water feature. See fact sheet WD-DWGB-26-4 "Fundamentals of Xeriscape and Water-Wise Landscaping" for more information.

Use rain barrels, cisterns, and ponds to collect water that can be reused for gardens.

Establishing Turf grass:

Underlay turf areas with at least six inches of loam.

Choose a drought-resistant seed mix that favors at least 50 percent fine leaved fescues. You will need three to four pounds of seed per 1,000 square feet. Try to avoid mixes that contain Kentucky bluegrass. This grass, despite its name, is actually a native to England and requires a whopping 35 inches of rain a growing season to survive.

Test your soil. Fine leaf fescues thrive at pH values between 5 and 6.5. If your soil test indicates more acid conditions apply lime at a rate of 50 lbs/1,000 square feet. Contact your county cooperative extension for cost and information on obtaining a soil test kit. See extension.unh.edu for a complete listing of UNH county extension services and contacts.

Apply a starter-type fertilizer and till lime and fertilizer into the top 6 inches of the soil.

Rake and smooth the soil.

Apply seed uniformly. A broadcast spreader is an excellent tool for seeding lawns. The two most common types of spreaders are push spreaders that drop the seed out of the bottom of a hopper as you walk behind them and the crank type that broadcast the seed in a circular pattern from the hopper as you turn a crank. Make sure you overlap your passes with the seeder to avoid bare spots.

Roll or tamp the soil to make sure you have good seed-to-soil contact. The seed must be in contact with the soil to germinate. Water the area thoroughly.

Apply a weed-free mulch such as straw. Don't allow the seeded area to dry out, as seeds also need moisture to germinate.

The best time to plant grass seed in New Hampshire is August through September. If you plant earlier there is greater risk of broadleaf weed infestation. If you plant too late in the season the slow-germinating fescues will not have time to establish a good root system before freeze-up. Once established, a lawn of fine leaved fescues requires no watering. For more information, visit the UNH Cooperative Extension's website at extension.unh.edu.

Other Outdoor Water Use Conservation:

Cover swimming pools when not in use to prevent evaporation.

Lower the water level in the pool to prevent water loss from splashing.

Minimize pool filter backwashing.

Wash vehicles using a bucket and sponge, using a hose for rinsing only.

Sweep driveways, walks and decks with a broom rather than hosing them off.

Use hose nozzle shutoff devices.

Check your irrigation system, outdoor faucets, and hose connections for leaks. A 25-cent hose gasket can save money on your water or electric bill.

For Additional Information
Please contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/index.htm. All of the bureau's fact sheets are on-line at http://des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm. More information about the DES Water Conservation Program can be found at http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/index.htm

Additional Resources
University of NH Cooperative Extension, Home & Garden Education Program. Phone: 1-877-398-4769

UNH Cooperative Extension. Links to home and garden fact sheets.
www.extension.unh.edu/resources/category/Home_and_Garden

North Carolina Cooperative Extension. Detailed fact sheet on efficient irrigation. Includes directions for setting up a drip irrigation or sprinkler system.
www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_6.html

References
_____; *MRI Water Conservation Technical Bulletin #7, Water Conservation Best Management Practices for Landscape and Turf Management;* New England Interstate Water Pollution Control Commission, Wilmington, MA; 1996.
_____; *MIL-Handbook-1165, Water Conservation;* US Dept. of Defense; 1997; pp 67-75.
Vickers, Amy; *Handbook of Water Use and Conservation;* WaterPlow Press, Amherst, MA; 2001; pp 140-223.