

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

ORIGINAL	
N.H.P.U.C. Case No.	DW 10-141
Exhibit No.	LRW #14
Witness	T. Mason
DO NOT REMOVE FROM FILE	

The Company proposes the following schedule for the Department's review and approval.

Revised Mt Roberts Schedule Proposal

- **February 29, 2012.** Submission of Preliminary Report and Water Conservation Plan to NHDES.
- **March 1 to March 30, 2012.** Revisions to Preliminary Report and Water Conservation Plan based on comments by NHDES.
- **April 2012.** Potential installation date of permanent power from NHEC. This decision will be based on power requirements delineated by pump size determined after pumping test is conducted. Consisting of power poles and service wire form the intersecting corner of the current LRW Co owned tank and the access road for the MT Roberts well property. *Please see attached.*
- **April 15, 2012** Complete pump test, contingent upon NHEC (if needed) and suppliers. Water Quality samples to be collected in ending period of pump test.
- **May 31, 2012** Exterior site work and plumbing completed. Including but not limited to; wellhead construction, water line installation, water meter installation, and appropriate electrical controls for well pumps.
- **May 31, 2012** Submission of Final Report for well siting approval.

Removed:

Lease agreement between LRW Co and the Mason Family and PUC staffs review of lease. NHDES has dismissed need for temporary lease.

**Email: Lrwater@Lakesregionwater.com
Website: www.Lakesregionwater.com**



Justin C. Richardson

From: Roy, Stephen <Stephen.Roy@des.nh.gov>
Sent: Wednesday, February 15, 2012 11:27 AM
To: Lakes Region Water Company Inc.; jake dawson
Cc: Justin C. Richardson; Pillsbury, Sarah; Eckberg, Stephen R.; Hatfield, Meredith; Hollenberg, Rorie; Patch, Douglas L.
Subject: RE: Mt Roberts revised proposal
Attachments: Mt Roberts revised schedule.doc

Hello Taryn: This message is intended for Tom and Jake.

Please forward a copy to them at your earliest convenience, and please feel free to copy any other party you believe needs a copy.

DES approves the revised schedule that LRWC intends to follow to add up to 40 gallons per minute (57,600 gallons per day) to the Paradise Shores/Suissvale water system. That schedule was received by DES via email on February 13, 2012 and included a list of activities or submittals that LRWC intends to undertake or submit between the dates of February 29, 2012 and May 31, 2012 (see attached).

Please note that, normally, DES does not need (nor do the rules require) to approve *schedules and/or plans* to go through the community well permitting process; rather DES has to approve actual applications to the program which include the information needed under the administrative rule requirements. As such, DES' approval of this schedule is more of a review of it for consistency with past discussions at various meetings in which DES has highlighted the need to cease the 'temporary' use nature of wells at the water system before this summer season; a position that DES alerted LRWC to mid last year that; in turn, ties back to the Letter of Deficiency [LOD] originally issued to LRWC in ____ . In that vein, this email does not close out the existing LOD issued to LRWC for this system; that LOD remains in effect.

One item for clarification: The schedule submitted referenced the 'removal' of the need for LRWC to arrange for ownership/control of the well site and the sanitary radius around the well. Please be advised that DES does not commonly approve an application for a new community well unless the applicant demonstrates ownership or perpetual control of the well site, per the administrative rule requirements. DES is simply recognizing that there are extenuating circumstance currently under review by many parties about the well property ownership issue; and DES has determined that the potential for a public health concern posed by either a:) not having available water for the system this summer, or b:) equipping the well with piping, etc. in a temporary manner, outweighs the need to meet the well site ownership/control requirement at this time. As such, please be advised that any source approval issued by DES for use of these proposed wells shall include a condition that the well site ownership/control rule requirement is met within a specified timeframe, and that this email does not issue a waiver to LRWC from meeting this rule requirement.

Steve Roy

 Stephen J. Roy, P.G.
 Groundwater Permitting - Technical Section Manager
 Drinking Water & Groundwater Bureau
 New Hampshire Department of Environmental Services
 29 Hazen Drive, P.O. Box 95
 Concord, New Hampshire, 03301 USA
 Office: (603)-271-3918 Fax: (603)-271-0656
 Email: Stephen.Roy@des.nh.gov

-----Original Message-----

From: Jake Dawson [<mailto:jdawson101@hotmail.com>]
Sent: Monday, February 13, 2012 12:08 PM
To: justin richardson; Roy, Stephen
Subject: Mt Roberts revised proposal

Gentlemen,
Please see attached proposed timeline for the Mt Roberts well siting. Feel free to contact me at your convenience to discuss any issues.

Jake (John) Dawson III
Supervisor
Lakes Region Water Company

jdawson101@hotmail.com
Office: 603-476-2348
Cell: 603-677-6478
Fax: 603-476-2721

**Preliminary Report Form for
New Small Production Wells for Small Community Water Systems
December 2007**

PROJECT NAME: Mt. Roberts BRW #2 and BRW #4

TOWN/CITY: Moultonboro, NH

DATE: February 29, 2012

EPA ID # 1612010

PURPOSE: This form, when complete, will provide the information required for small well siting preliminary reports under Env-Dw 301, *Small Production Wells for Small Community Water Systems*. You don't have to use this form; however, based on experience, NHDES has found that use of the form speeds the well siting and approval process. If you prefer to produce an original report, remember to provide **all the information** required under the rules, and NHDES recommends that you use this form as a checklist to help ensure your report is complete. Helpful information and reminders are provided throughout the form and are printed in *italics*. Copies of this form and other useful publications may be found at www.des.nh.gov/DWSP/newcomm.htm.

INSTRUCTIONS:

- A. Obtain copies of the following well siting materials from the NHDES's Public Information Center (603) 271-2975 or from the NHDES website above. Additional copies of this reporting form are also available. These materials will help you complete this form.
1. Administrative Rule, Env-Dw 301, *Small Production Wells for Small Community Water Systems, October 2007*.
 2. The well siting guide, *The Applicant's Toolkit for Siting New Small Community Wells in New Hampshire, November 2007*.
 3. Administrative Rule, Env-Ws 372, *Design Standards for Small Community Water Systems, November 2005*.
(Small community water systems are subject to design criteria under Env-Ws 372. This document assists you in making sure the new well project will meet those criteria.)
 4. The pumping test guide, *A Field Guide for Pumping Test Operators*.
 5. Administrative Rule, Env-Ws 390, *Water Conservation Rules, and Water Conservation Plan Form* (www.des.nh.gov/h2o_conservation.htm.)
- B. Contact NHDES staff to request a GIS map and inventory of known and potential contamination sources and water supplies for your site. The staff person will need a location map of your site (usually a USGS map or equivalent). This may be faxed to (603) 271-0656, to the attention of "GIS Map & Inventory Request." When you receive the map and inventory contact NHDES staff at (603)

271-8808 to schedule a file review. When you arrive at NHDES for your file review, sign in with the receptionist and tell her you are there to see the Waste Management Division file librarian. Generally, only active known contamination sites need be reviewed. File information is required for Section 3.4 of this form. For further instructions on conducting a file review, refer to the guidance document.

- C. Review the well siting rules and guidance materials listed above. You should use these materials to assess your water system design and site specific well siting needs.
- D. Complete the form by answering all questions and providing appropriate attachments. Answer the questions from top to bottom, unless instructed to skip to another section. Helpful information and reminders are provided throughout the form and are printed in *(parentheses and italics)*.
- E. It is very important to recognize that an incomplete form, like an incomplete preliminary report, **will be returned** for completion with the missing sections highlighted. NHDES reviews submissions in the order they are received. So, an incomplete form delays the review process until a completed submission is received.
- F. If you need to add additional pages for clarification or continuation of information, please include them directly after the page containing the pertinent section.
- G. Before submitting, review the form to ensure all questions are answered and all attachments are included. When complete, submit to:

**New Community Well Sitings
NHDES Drinking Water & Groundwater Bureau
PO Box 95
Concord, NH 03302-0095**

For help with this form or other community well siting concerns, call NHDES at (603) 271-2947.

Information contained in this form is current as of October 2007. Statutory or regulatory changes that may occur after October 2007 may cause part or all of the information to be invalid. If there are any questions concerning the status of the information please contact NHDES at (603) 271-2947.

Section 1.0 GENERAL INFORMATION

(This section asks you to identify the people and companies responsible for the well siting and water system and to describe the well site. This information will help ensure clear communication about the well siting.)

1.1 Project Contacts:

1.1a Project Contact. *(Person completing this form? This person must have a PE, PG, water well contractor, or pump installer license or a water system operator certification.)*

Name: **Jake Dawson**

Address: **PO Box 389, Moultonboro NH 03254**

Company: **Lakes Region Water Company Inc. (LRWC)**

Phone Number: **(603) 476-2348**

License/Certification Type & Number: **Operator # 2380, Level 1 Distribution & Treatment**

1.1b Project Owner. *(Who currently owns the proposed water system and well site?)*

The water system owner is: Thomas Mason Jr, President
Lakes Region Water Company Inc.
PO Box 389, Moultonboro NH 03254
(603) 476-2348

The well site owner is: Thomas & Barbara Mason
PO Box 389, Moultonboro NH 03254
(603) 476-5150

1.1c Will the person named above retain ownership of the water system after well siting approval is obtained?

YES If **YES**, got to (1.2) below.

1.2 Has a Water Conservation Plan, in accordance with Env-Wq 2101, *Water Conservation Rules*, been submitted with this application? *(It is advisable to submit a draft Water Conservation Plan to NHDES prior to public notification.)*

YES The Water Conservation Plan is being submitted concurrently with this report.

*(If **YES** go to Section 1.3. If **NO**, stop and complete the Water Conservation Plan form found at the back of this document.)*

1.3 Site Location Maps and Sketch:

1.3a. Site Map. *(Show the well location on a US Geological Survey [USGS] map, scaled to 1:24,000.)*

Name and Date of USGS Map: **Town of Tamworth, 1998 & Town of Melvin Village, 1987. Please see attached USGS map.**

Please see attachment 1.3a Site Sketch.

1.3b. Tax Map. *(Show the well location on the town's tax maps and identify the map and lot numbers.)*

Town tax map and lot number: **Moultonboro, NH Tax Map 71, Lot 6 (please see attachment 1.3b).**

1.3c. Location Description. (EPA requires NHDES to report the location of each well in reference to the pump station. Please provide a description in this format. For example, Well # 1 is 150 feet SW of the pumphouse.)

BRW #2 is 620 feet SE of the Mt Roberts pump house and BRW #4 is 865 feet NE of the MT Roberts pumphouse).

1.3d. Site Sketch. Provide a sketch with a scale of 1"=100' or larger, showing the well location and everything within at least 1,000 feet of the new well. Incorporate historic, existing and proposed land uses, including: (Include contours and all stormwater drainage structures.)

- | | | | |
|-----------------------|------------------|-------------------|--------------|
| •livestock areas | •surface waters | •wetlands | •flood plain |
| •foot paths | •gravel roads | •easement areas | •fuel tanks |
| •homes | •driveways | •landscaped areas | •fences |
| •sand/soil/wood piles | •farm animals | •protected lands | •trails |
| •mowed areas | •roads (and ROW) | •parking | •dumpsters |
| •recreational areas | •farm fields | •buildings/sheds | •storage |
| •pump houses | •ball fields | •other wells | •salt piles |
| •septic systems | | | |

(Please Note: Sections 3.2b, 3.3b, 3.3c, 3.4a, and 4.2c require additional information that should be added to this sketch.)

Please see attachment 1.3a Site Sketch. Since the land surrounding the 2 wells consists of predominantly undeveloped forest area, there is little land use to report on the site sketch.

Section 2.0 SOURCE WATER REQUIREMENTS

(This information is needed to help ensure the well siting work will meet the intended purpose and the pumping test is designed appropriately.)

2.1 Water System:

Is this a new water system? **NO** (If **NO**, go to Section 2.3)

2.3 Existing Water System:

2.3a Type of New Well (check one)

Installation of new wells

2.3b Type of Need (Why does the system need a new well? Check all that apply.)

TO SUPPLEMENT DECLINING YIELDS OF EXISTING WELLS.

To meet current demand and design requirements. (Pending LOD for source capacity)

2.3c Water Shortages:

2.3c.1 Has the water system experienced any water shortages? **YES**

If **YES**, describe the events and measures taken, include dates, and provide a general assessment of where and how customers are using water. Attach water meter records for the well(s) for the past two years. Please provide daily meter records that show peak use, if available. **Please see attachment 2.3c Water Meter Records. Emergency approval of additional well sources has been utilized in conjunction with outdoor watering bans during the warm summer months & predominantly for holiday weekends where peak use is realized & water demand is high.**

Lakes Region Water Company has requested numerous Emergency well use approvals from NHDES over the last several years. The approvals were granted by NHDES contingent upon several factors that LRWC complied with.

2.3c.2 Were water conservation measures implemented? YES

If **YES**, describe the measures taken.

Effective during emergency well use, Lakes Region Water Company instituted mandatory restrictions on outdoor water use per NHDES requirements. All unnecessary outdoor water use activities were prohibited, and any customers with special requests have been addressed on a case by case basis. The Outdoor Water Ban restrictions were sent via our automated phone messaging system, were emailed with pertinent attachments, were posted at local bulletin boards within the water system, and posted on LRWC's website. A follow-up mailing was also sent with customer water bills. Verbal explanations to specific customers were also made either via the customer's request or due to non compliance with the ban.

2.3c.3 Will it be necessary to connect a new well to the water system prior to final approval due to a water system emergency?

NO

2.3d. Describe the existing system.

How many wells does the system have (*active & inactive*)? **2 active wells; 10 inactive**

How many wells are being used now? **2**

How many of the existing wells were constructed after July 1998? **0**

Specify which wells were constructed after July 1998. **Not applicable**

How many service connections does the system have? **390 + 1 special contract (with POASI)**

What type(s) of use(s) does the system serve (*refer to Env-Ws 372.10 to identify use type*)?

Single Family, seasonal, second homes

2.3e. What is the total source capacity required for the existing system under Env-Ws 372.12? (*Please use worksheet A to ensure calculations are complete and describe how those calculations were developed. If landscape irrigation is planned for this project, or already exists at the site, this use must be included in your source capacity calculations.*)

= **545,250 gpd or 378 gpm Please See Attachment 2.3e: Source Capacity, Worksheet A.**

Total Source Capacity Required under Env-Ws 372

2.3f. Are more service connections proposed? YES

2.3f.1 If the answer to 2.3f above is **YES**, then how many new connections are proposed? **173 or less**
(Go to 2.3f.2.)

2.3f.2. What is the total source capacity required for the system under Env-Ws 372 after the expansion?

Total Source Capacity Required for the expanded system = **675,000 gpd or 468.75 gpm**

2.3g. Number and Operation of Existing Wells.

2.3g.1 Describe the existing wells in Table 2-2 and provide well logs (*Well Completion Report, if available*) for each well. Document the **maximum sustainable capacity** of each well. (*This is the maximum rate, in gpm, at which the well can presently operate on a continuous, long-term basis, without running out of water. Include wells that will be replaced, reactivated, or improved to regain lost capacity by deepening, increasing the pumping rate, or by hydrofracture.*) Attach extra sheets as needed. **The Well Completion Reports should already be on file with the NHDES.**

Table 2-2, EXISTING WELLS (*Show all well locations on the site sketch in Section 1.3d.*)

Well Name and Number <i>(Include wells not currently in use that will be reactivated or improved)</i>	Current Use		Proposed (<i>Improved</i>) Use	
	Pumping Rate (gpm)	Maximum Total Daily Withdrawal or Permitted Production Volume (gpd)	Pumping Rate (gpm)	Maximum Total Daily Withdrawal or Permitted Production Volume (gpd)
BRW #5 (1612010-006)	75 gpm	108,000 gpd	Not Applicable	
BRW #6 (1612010-007)	35 gpm	50,400 gpd	Not Applicable	

2.3g.2 Describe in Table 2-3 how the maximum sustainable capacity was determined for each well. (*For example, water meter records, sanitary survey reports, driller's log, pumping test report, etc.*)

Table 2-3, CAPACITY

Well Name/Number	Description of How Maximum Sustainable Capacity was Determined
BRW #5 (1612010-006)	Current pumping rate/field observations/water meter records
BRW #6 (1612010-007)	Current pumping rate/field observations/water meter records

2.3h Number and Operation of Proposed (New) Wells

2.3h.1 Describe proposed wells in Table 2-4. (*Show all proposed well locations on the site sketch in Section 1.3d.*)

Table 2-4, PROPOSED WELLS (New Wells for an Existing Water System)

Well Name and Location	Well Type, Bedrock or Overburden	Proposed Use	
		Maximum Pumping Rate (gpm)	Proposed Permitted Production Volume (PPV) (gpd)
Mt. Roberts Well #2	Bedrock	40 gpm	57,599 gpd
Mt. Roberts Well #4	Bedrock	40 gpm	57,599 gpd
Each well will operate so that their combined PPV does NOT exceed 57,599 gpd. Their total combined pumping rate will be 40 gpm between the 2 wells, not 40 gpm per individual well.			

2.3i. Meeting Source Capacity Requirements.

(If the PPVs of all the system wells constructed after July 1998 PLUS the proposed PPVs of the new wells are greater than 57,600 gpd, STOP! This application is subject to the requirements of the Large Groundwater Withdrawal Rules. Contact NHDES for further guidance.)

(Not Applicable).

Section 3.0 SOURCE WATER PROTECTION

(This information is needed to evaluate the appropriateness of the well site based on land uses.)

3.1 Land Uses in Immediate Area

3.1a. Historic Land Uses. Describe historic use(s) *(a 50-year history)* of the well site property within at least 500 feet of the new well. List sources of information. **According to LRWC President, Thomas Mason Jr., the well site and surrounding property has always been used for conservation land; consistent with what it is used for today.**

3.1b. Existing Land Uses. Describe the existing land use(s) on the property within at least 500 feet of each new well. **The majority of the land surrounding the wells is currently in a conservation trust. The remaining land is used for water utility infrastructure.**

3.1c. Proposed Land Uses. Describe proposed use(s) of the property within at least 500 feet of each new well. *(Include any activity listed in Section 1.3d.)*

No change is proposed to the current conservation or utility land use.

3.1d. Land Uses and Potential Sites. Based on land uses, describe why each well site was chosen over other possible sites. If there are other possible sites on the property explain, in general, why they weren't chosen. If there are none, say so. *(Wells tend to be located in areas where buildings and septic systems are not allowed. These areas are often also inappropriate for wells due to wetland and surface water proximity.)* **There is little land available to LRWC that they own and are able to control, within close proximity to the Paradise Shores pump house and distribution mains. This site was chosen over other possible sites because it is predominantly conservation land and as such, remains in an untouched state with little to no unnatural land use.**

3.1e. Tax Map/Site Sketch. Do all the land uses and possible sites described above appear on the site sketch in Section 1.3d?

YES If **YES**, go to Section 3.2.

3.2 Surface Water and Floodplain

3.2a. Setback from floodplain. *(This information must be identified using the Federal Emergency Management Flood Hazard Maps. These maps can be obtained from the location town or online at www.fema.gov/hazard/flood/index.shtm.)*

3.2a.1. Is the well site in a 100-year flood plain? **NO** According to FEMA, the proposed well site is not within any moderate to high risk flood zone area.

What is the elevation of the well site? **Approximately 893 feet above sea level.**

What will be the final wellhead elevation? **895 feet above sea level.**

How were these elevations determined? **Well site elevations were determined using GPS.**

3.2a.2 Attach copies of the relevant portions of the Flood Hazard Map (formerly the Flood Insurance Rate Map) or any engineering calculations or surveyed information used to identify floodplain locations and elevations in relation to the proposed well, if a Flood Hazard Map is not available.

Please see attachment 3.2 Flood Map: FHBM map 3300150002B revised 12/21/79 by the Federal Emergency Management Agency.

3.2b. Setback from surface water.

How far away is the nearest surface water or persistent wetland? **Approximately 52 feet**
(Surface water includes streams, brooks, ponds, drainage ditches, detention ponds, fire ponds, or lakes. A persistent wetland is one that is flooded for at least 30 consecutive days. New wells must be located at least 50 feet from surface water or wetlands.)

Describe the nature of the surface water or wetland. Describe all other surface waters and wetlands in the immediate area of the proposed well(s). Include distances. *(Be prepared to sample during the pumping test for a microscopic particulate analysis if a proposed new overburden well is within 100 feet of a surface water or wetland or if a proposed new bedrock well is within 200 feet of a surface water or wetland. The location and extent of all surface waters and wetlands should be shown accurately on the map required in Section 1.3. In some instances wetland delineation by a New Hampshire- certified wetland scientist will be required.)* **The nearest body of water is a seasonal brook. It is 52 feet from BRW #2 and 303 feet from BRW #4.**

3.3 Sanitary Protective Area

3.3a. Sanitary Protective Area (SPA) Radius.

What is the length of the sanitary protective area (SPA) radius for each well? *(Complete Table 3-1 on the next page for each new well. The size of the SPA depends on the proposed permitted production volume(s) [PPV] of the well(s). Match the proposed PPV for each well to the SPA radius in the table below. If more than one well is in one SPA, then the SPA radii for those wells will be based on the combined PPV for those wells. Please note, each well must have a separate SPA. The SPA for each well is a circle, centered on the well, with an appropriately identified radius. Note the SPAs on the site sketch required in Section 1.3.)*

SANITARY PROTECTIVE AREA RADII

<u>Permitted Production Volume (gal/day)</u>	<u>Radius</u>
less than 14,400	150 feet
14,401 to 28,800	175 feet
28,801 to 57,599	200 feet

3.3b. Provide a site sketch of the SPA(s) showing the well location, SPA, and SPA radius for each well. *(You may use the map provided in Section 1.3d.)*

Table 3-1, SANITARY PROTECTIVE AREA RADII

Well Name/Number	Proposed Permitted Production Volume	Radius
BRW #2 (1612010)	57,599 gpd	200 ft
BRW #4 (1612010)	57,999 gpd	200 ft
200 ft radius shown for each well because of overlap of BRW 2 and BRW 4 SPAs.		

3.3c. Sanitary Protective Area Land Use Evaluation. Is all the land inside the SPA in a natural, untouched state and will it stay that way after build out of the project?
Yes, the land in the SPA is currently undeveloped forest area

3.3d. Control of Sanitary Protective Area.

Does the water system own the land in the SPA? **NO**

If **NO**, does the water system intend to gain control by purchasing the land or getting a land use easement? **Yes**

3.4 Preliminary Wellhead Protection Area (WHPA)

3.4a. Draw the Preliminary Wellhead Protection Area on the USGS map in Section 1.3a, or submit a copy of the GIS Map provided by NHDES depicting the WHPA. *(The Preliminary Wellhead Protection Area or WHPA is a circle, centered on the well, with a 4000-foot radius.)*

Please see attachment 3.4 GIS map & Inventory, dated 1/26/12 provided by NHDES.

3.4b. Collection of Information

3.4b.1 Have you obtained from the NHDES a GIS map and inventory of the WHPA that is less than 90 days old? *(Submit a copy of the GIS Map and Inventory with this form.)*

YES **Please see attached GIS map & Inventory, dated 1/26/12 provided by NHDES**

3.4b.2 Have you completed a windshield survey of the WHPA, including a review of municipal records?

YES, the windshield survey of the WHPA was performed; however, the file review of any known and potential contamination sources is not necessary per NHDES rules since none of the PCS's appear on the NHDES' list of projects that must be reviewed. There are no other potential contamination sources that does not appear on the NHDES' GIS Map & Inventory.

Please see attachment 3.4b Worksheet C: Windshield Survey.

If **YES**, complete and attach a copy of the windshield survey worksheet found in the Applicant's Toolkit and at the end of this form (Worksheet C).

3.4c. Inventory Review. Using the information collected above *(in 3.4b)* answer the following.

3.4c.1 Are public or private wells located within 1,000-feet of the water system wells? *(All developed lots not served by a public water system should be identified as having a private well.* **NO.**

3.4c.2 Provide a list of all public and private well owners within 1,000 feet of the proposed well(s). *(List names, addresses, and lot numbers.)* **There are no private or public water supplies in use within 1,000 feet of the proposed wells.**

3.4c.3 Are there any active known contamination sources within the WHPA for the well? *(Projects listed as "inactive" or "closed" do not require a file review.)*

YES

There are 3 known potential contamination sites within 4000 feet of the Mt. Roberts wells. They are as follows:

- **Skelley's Market: 374 Route 109 South – (UST) Project type
Underground Storage Tanks**
- **Wally's Marine Service: 426 Governor Wentworth Hwy – GSR Project Type
General Service & Repair Shop**
- **Balmoral Storm Drains: Paradise Drive – SD Project Type
Storm Drains**

Since each of the above known contamination sources do not appear on the NHDES' list of projects that must be reviewed, a file review is not necessary. Each facility will be treated as a potential contamination source, and we will continue to perform the necessary water quality sampling as determined by the NHDES. None of these contamination sources are believed to be a threat to the system wells at this time. *These sites are noted on the enlarged site sketch.*

Section 4.0 PUMPING TEST PROGRAM PROPOSAL

NHDES experience shows that often there are discrepancies between the pumping test proposal and what happens during the test. Sometimes this means the applicant has had to repeat the test. To **avoid repeating the pumping test**, NHDES asks that a **complete description** of the pumping test proposal be provided. *(See Env-Dw 301 and the Field Guide for Pumping Test Operators for a discussion of pumping test design and requirements.)*

4.1 Test Performer(s)

Usually several people are involved in the pumping test operations and planning. Please list below all individuals or companies who will participate in performing the pumping test.

4.1a Who is responsible for designing and directing the pumping test and making decisions during the test? *(Such as making sure the test is conducted as approved, including preliminary report approval conditions from NHDES, that the water is discharged in the approved location, that a constant pumping rate is maintained, that measurements are made correctly and on schedule, when to shut down the pump, etc.)*

Name: **Jake Dawson, Certified Water Operator #2380**

Address: **420 Governor Wentworth Hwy, PO Box 389 in Moultonboro, NH 03254**

Company: **Lake Region Water Company Inc.**

Phone Number: **Office # 603-476-2348, Cell # 603-677-6478**

4.1b If different from above, list the company responsible for installing the pump and discharge setup for the pumping test and/or reading and recording measurements taken during the test. *(List all responsible parties and describe the tasks they will perform. Please note that if the pump will be permanently installed, the person performing this task must possess a New Hampshire pump installers license.)*

Company: **Lakes Region Water Company Inc.**

Address: **420 Governor Wentworth Hwy, PO Box 389 in Moultonboro, NH 03254**

Phone Number: **Office # 603-476-2348**

License Number: **The pump installation used for the test will be temporary and therefore will not require a licensed installer. Pump installation and discharge setup will be performed by Lakes Region Water Company Inc..**

4.2 Operation of Wells

4.2a. Existing Well Operation

4.2a.1 How will the system's existing wells be operated during the testing? Complete Table 4-1 on the next page. *(Please note that all existing wells required to meet the source capacity requirements of the system must be pumped during the testing unless data is presented that clearly demonstrates the existing wells are not hydraulically connected to the new wells. Also, the system must continue providing water from existing wells to the customers.)*

4.2a.2. If existing wells will be pumped at a constant rate, how will pumping rates be measured? *(Complete Table 4-2 for each well. The standard equipment is a calibrated in-line cumulative flow meter that preferably reads in gallons and is properly sized for the expected flow rate. Pumping rates must be calculated as often as water level measurements are taken, after the first 10 minutes of pumping. All cumulative flow meter readings must be recorded after the first hour of the test.)*

Table 4-1, PROPOSED OPERATION OF EXISTING WELLS

Well	Pumping Rate (gpm)	Operation Schedule <i>(Constant rate, as needed, or shut off)</i>
BRW #5	NA	Shut off
BRW #6	NA	Shut off

4.2a.3 How will constant pumping rates be maintained? Describe how the rates will be managed to offset hydraulic head changes. *(Pumping rates must be constant. Please note that documentation of totalizing meter readings might be required in the Final Report to demonstrate pumping rates have not varied more than +/- 5%. If an existing well is not necessary to demonstrate source capacity, it must be shut off or run at a constant rate during the pumping test to avoid interference with the new well.)*

Table 4-2, PUMPING RATE MEASUREMENTS

Well Name/ Number	Equipment	Method	Schedule <i>(Frequency of Measurement)</i>
BRW #5	N/A	N/A	N/A
BRW #6	N/A	N/A	N/A

4.2b. New Well Operation.

4.2b.1 How will the system's new wells be operated during the testing? How will constant pumping rates be maintained? Describe how the rates will be managed to offset hydraulic head changes. *(Pumping rates must be constant. Please note that documentation of totalizing meter readings might be required in the Final Report to demonstrate pumping rates have not varied more than +/- 5%. All new wells required to meet the source capacity requirements of the system must be pumped together during the testing.)* Complete Table 4-3.

Pumping rates will be maintained with a calibrated in-line compound flow meter at the wellhead. The rates will be monitored using a stopwatch to measure time for specified volumes to pass through the flow meter. Flow rates will be checked at 15-minute intervals during the first 2 hours and hourly thereafter.

Table 4-3, PROPOSED OPERATION OF NEW WELLS

Well	Pumping Rate (gpm)	Constant Rate Maintenance
Mt. Roberts #2	40 gpm	The well will be pumped at its proposed rate, continuously for 48 hours by manual adjustment of valve at wellhead
Mt. Roberts #4	40 gpm	The well will be pumped at its proposed rate, continuously for 48 hours by manual adjustment of valve at wellhead

4.2c. Where will the pumped water be discharged? *(Complete Table 4-4 for each well and show the locations on the site sketch in Section 1.3d. The discharge from all wells must be directed to locations that ensure the water will flow unrestricted away from all wells, will not produce artificial well recharge, and cannot affect aquifer hydraulics. A temporary discharge permit is required for all pumping tests.)*

TABLE 4-4, PROPOSED DISCHARGE LOCATIONS

Well	Discharge	Distance from and Name/Number of Nearest Well
Mt. Roberts #2	Will be approximately 400 feet down gradient	400' W of Mt. Roberts #4
Mt. Roberts #4	Will be approximately 400 feet down gradient	400' W of Mt. Roberts #2

*Explain why the discharge location for each well cannot affect aquifer hydraulics.

There is sufficient distance between each well location. In addition, discharge water will flow rapidly from the discharge point down gradient with no opportunity for ponding. Please see attached Site Sketch.

4.3 Water Level Measurement

4.3a. How and when will water levels be measured in each well during pumping and recovery periods? Complete Table 4-5 for each well. *(The standard equipment is a datalogger, pressure transducer or electronic water level indicator. Water level measurements must be taken every 5 minutes for the first hour and at least once an hour thereafter. Water level measurements may be recorded more frequently, if desired. Remember to note recovery measurement frequency.)*

Table 4-5, WATER LEVEL MEASUREMENT

Well	Measurement Schedule (Frequency)	Equipment
Mt. Roberts #2	For both pumping & recovery periods, measurements will be taken at a minimum of 5-minute intervals during the first 2 hours and hourly thereafter.	Solinst Levellogger probe Model 3001, LT F300/M100 & an electronic tape measure
Mt. Roberts #2	For both pumping & recovery periods, measurements will be taken at a minimum of 5-minute intervals during the first 2 hours and hourly thereafter.	Solinst Levellogger probe Model 3001, LT F300/M100 & an electronic tape measure

4.3b. Static Water Levels. Can existing wells be shut down before the start of the pumping test to obtain static water levels? *(Before the test, static water levels must be measured. The static water level is the well under natural, non-pumping conditions. To get accurate static water levels you need to shut down existing wells for as long as possible.)*

YES. Water will be provided by existing storage tanks.

4.4 Monitoring of Non-System Wells

(You must provide an assessment in the final report of how the new wells will influence other wells within 1,000 feet. You also need to gather data to identify the effect other wells have on the water levels in your wells and to correct your data for any effect. A recently calibrated non-invasive, sonic device for measuring water levels in non-system wells is recommended, if possible.)

Will pumping and water levels in non-system wells be monitored?

NO. The closest non-system well is a well owned by the Mason Family which is not in use.

Table 4-6, PROPOSED MONITORING OF NON-SYSTEM WELLS

Well	Water Level Measurement Method	Water Level Measurement Schedule <i>(Time of day and frequency)</i>
This section NA.		

Section 5.0 SUSTAINABLE YIELD EVALUATIONS

NHDES experience shows that the evaluation of the well's yield under the rules and its impact on conducting the pumping test is often misunderstood. This has meant the applicant has had to repeat their test. To **avoid repeat testing**, NHDES asks the applicant to provide a complete description, **in their own words**, of how the sustainable yield of the new well(s) will be determined. Stabilization during the pumping test and a 180-day extrapolated estimate of drawdown are two methods for determining sustainable yield. *(Refer to Env-Dw 301 and the Field Guide for Pumping Test Operators.)* How will yield be identified for each well tested? *(Describe the criteria used to determine when to end the test and how water level data will be used to identify yield of each well in Table 5-1.)*

Table 5-1, EVALUATION OF YIELD

Well	Description of Yield Evaluation to be Performed
Mt. Roberts #2	<p>If under constant rate pumping conditions, the water levels in the Mt. Roberts Wells stabilize during the pumping period (defined by NHDES as fluctuation of less than 1 inch in any 2 hours for a period of at least 12 hours), the constant pumping rate maintained during the test will be adopted as the sustainable yield. Based on past field observations, this seems high likely.</p> <p>If water levels fail to stabilize as described above, sustainable yield will be determined using a 180-day extrapolation estimate of water drawdown. We will estimate what the water level in the well will be at 180 days by extending the graphical data out to this point on a logarithmic scale. We will then extrapolate the drawdown from this graph and use it to determine the well's expected yield.</p>
Mt. Roberts #4	Same as above

Section 6.0 WATER QUALITY ANALYSIS

*(All new wells must be analyzed for radon plus all the parameters listed under the Safe Drinking Water Act (SDWA). These samples must be collected, while the wells are still pumping, but near the end of the pumping test. See NHDES guidance on SDWA Sampling and Reporting. **Additional sampling may be required** to evaluate contamination sources, justify a waiver, or evaluate an existing water quality problem.)*

6.1 Sample Collection and Delivery

6.1a. Who is responsible for collecting water quality samples and delivering them to the laboratory?

Name: LRWC personnel: **Adam Baker under the direction of Jake Dawson**

6.1b. How will the sample be stored and transported to the laboratory? *(VOCs and bacteria samples should be kept cold.)* **All water quality samples will be sampled, stored and transported to the lab according to state standards. They will be packed on ice in coolers and transported to the accredited lab for testing within 24 hours.**

6.2 Analyses and Laboratory

6.2a. Sample Collection and Analyses. Provide well numbers or names, when the samples will be collected, and what parameters will be analyzed. *(Complete the Table 6-1 for each well.)*

Table 6-1, PROPOSED WATER QUALITY MONITORING

Well	When Sample Will be Collected	Parameters to be Analyzed
Mt. Roberts #2	During the final 2 hours of the 48 hour pumping test	IOCs only will be taken during pumping test. See historical data for full SDWA parameters.
Mt. Roberts #4	During the final 2 hours of the 48 hour pumping test	IOCs only will be taken during pumping test. See historical data for full SDWA parameters.

6.2b. What laboratory will analyze the samples and for which parameters? *(Complete Table 6-2 for each laboratory. The laboratory must have current certification in New Hampshire for performing the analyses using drinking water methods.)*

Table 6-2, PROPOSED LABORATORY

Laboratory	Certification Number	Analyses This Lab Will Perform
NHDES	#3000	IOCs only.

Section 7.0 REFINEMENT OF WELLHEAD PROTECTION AREA

(Refer to Env-Dw 301 and the siting guide, Applicant's Toolkit, for a discussion of the standard method and reporting requirements.)

Do you intend to use the default WHPA radii? *(Please note, small overburden wells require an analytical delineation method. This may affect how you propose your pumping test. Contact NHDES well siting staff for guidance.)*

YES

7.2 If **YES**, identify the anticipated radii of the WHPAs. *(Complete the Table 7-2 for each well. The size of the WHPA will depend on the permitted production volume(s) of the well(s) and how they will be operated to meet source capacity requirements for the system.)*

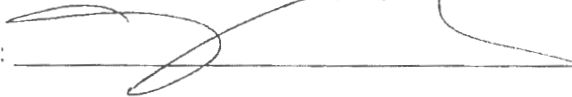
Table 7-1, WELLHEAD PROTECTION AREA RADII

<u>Permitted Production Volume (Gal)</u>	<u>Radius (Feet)</u>
Zero to 7,200	1,300
7,201 to 14,400	1,500
14,401 to 28,800	2,050
28,801 to 43,200	2,850
43,201 to 57,599	3,600

Table 7-2, WELLHEAD PROTECTION AREAS

Well Name/Number	Proposed Permitted Production Volume	WHPA Radius
Mt. Roberts #2	57,599 gpd	3,600 feet
Mt. Roberts #4	57,599 gpd	3,600 feet
<i>The combined PPV of both wells will not exceed 57,599 gpd; therefore, the WHPA refinement is a radius of 3,600 feet.</i>		

Before submitting, thoroughly check this form to be sure all questions are answered, all information is provided and all necessary attachments are included. Incomplete submittals will be returned with missing information sections highlighted.

Preparer's Signature: _____


Date: **February 29, 2012**

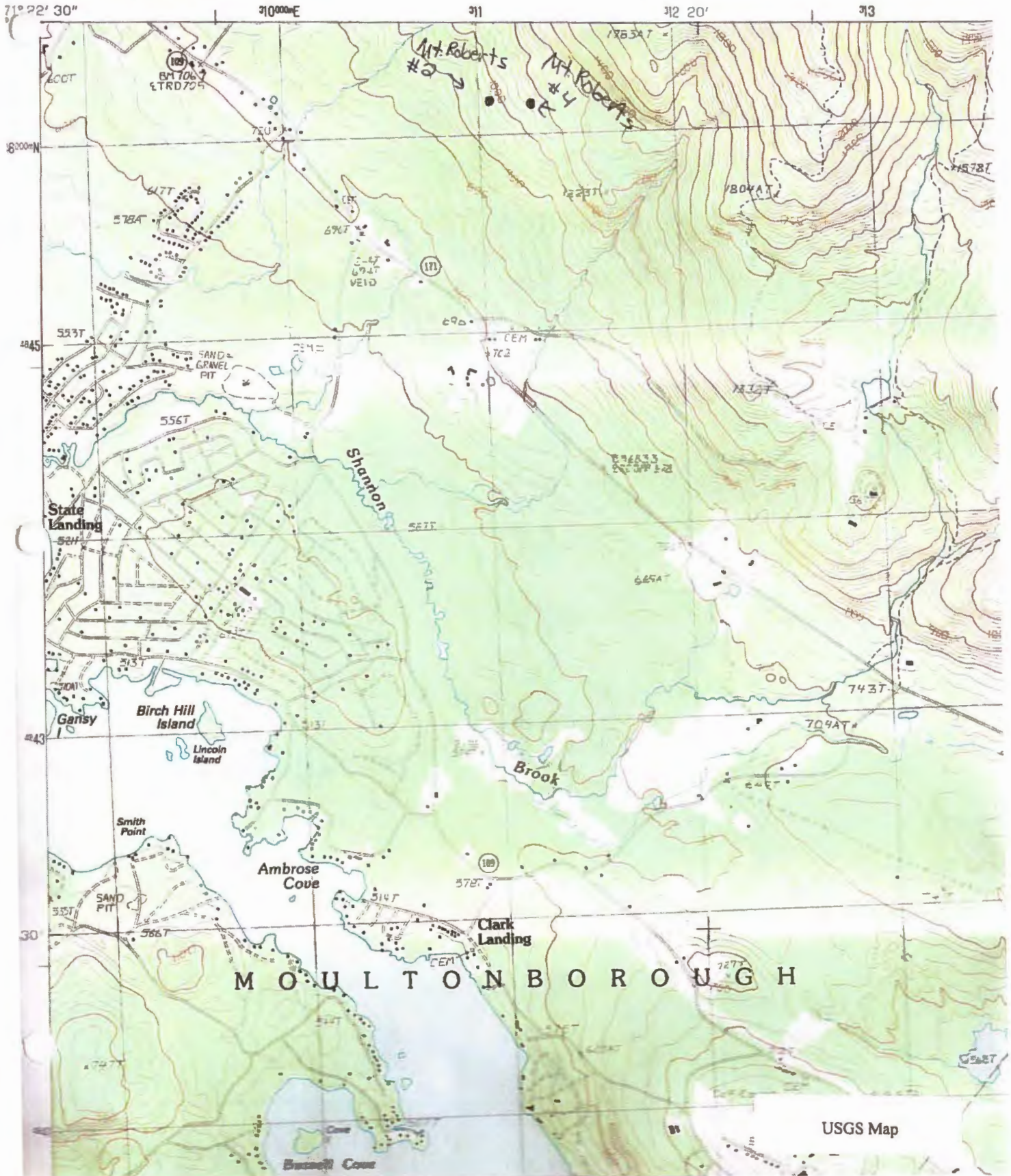
Note: NHDES approval should be obtained for any changes in the testing program described on this form. NHDES will review this form to determine completeness of the pumping test and water quality sampling programs and appropriateness of the well site, based on what is known at the time of the submittal. The final well siting report required by Env-Dw 301 must clearly justify any deviation in what is presented in the preliminary report.

As a reminder, have you included the following?

1. USGS map and tax map.
2. Flood Hazard Map.
3. Site map showing well locations, SPAs, surface waters, wetlands, roads, buildings, ground contours, stormwater drainage structures, pumping test discharge location, and all other features within 1000' of the well(s).
4. A GIS Map and inventory.
5. Windshield survey worksheet.
6. File review worksheet.
7. Source capacity calculations.
8. Wellhead Protection Area map.
9. Description of the analytical groundwater method, if used, and all attendant documentation.
10. Water Conservation Plan.
11. List of public & private well owners within 1,000feet.
12. Example of letter requesting permission for monitoring non-system wells and permission form.

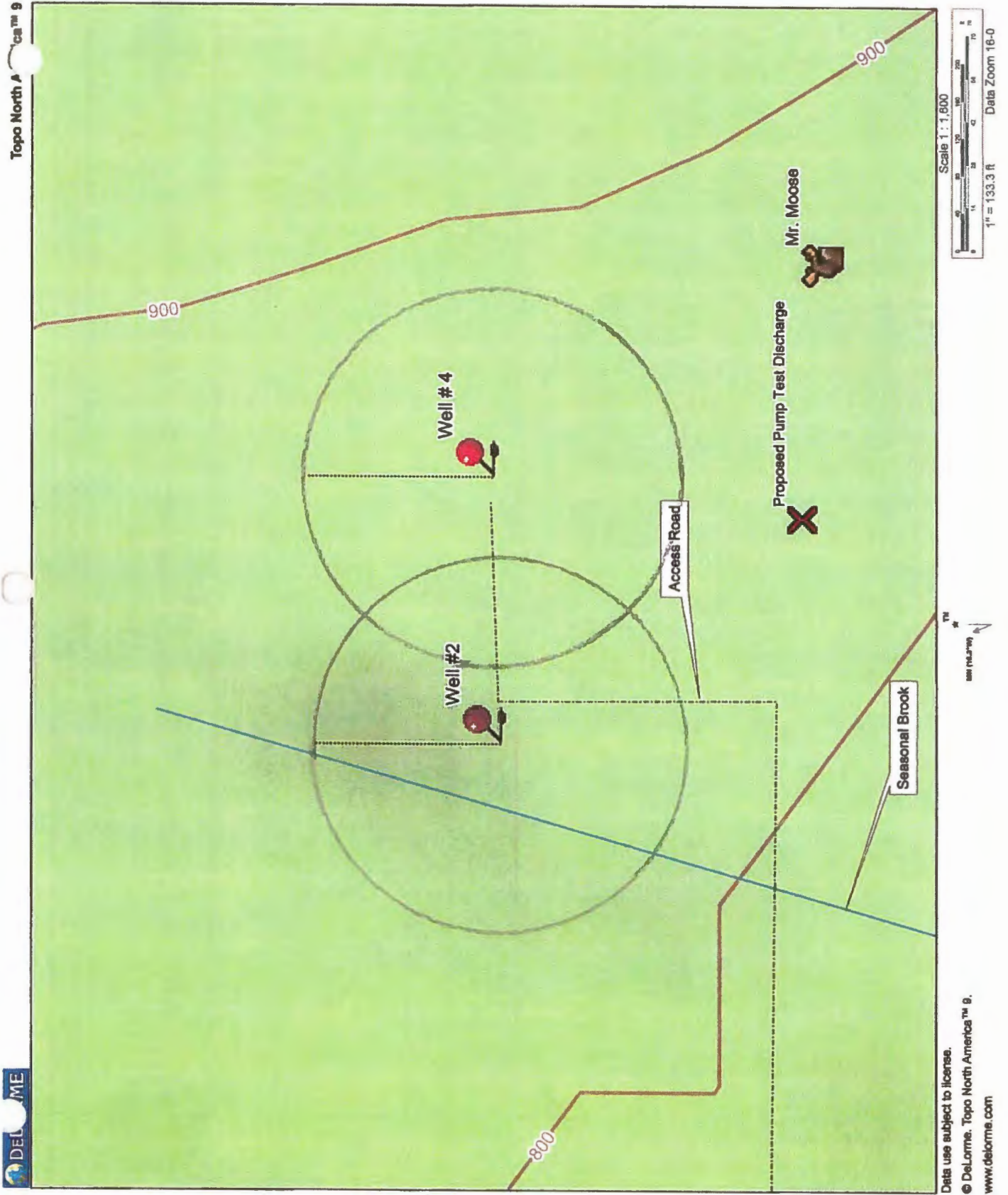
ATTACHMENTS

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



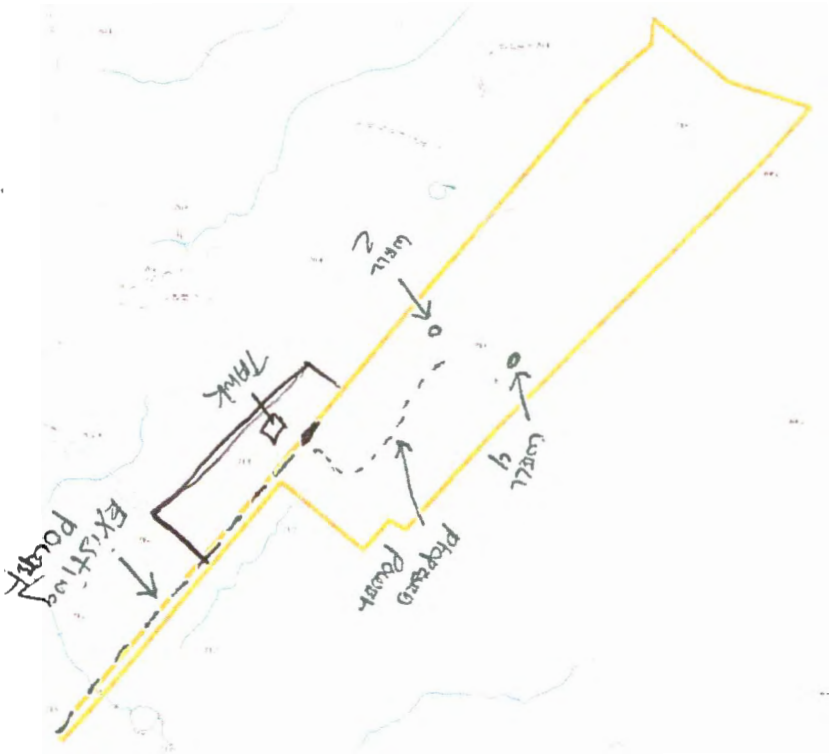


1.3a & 1.3d Site Sketch



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1.3a & 1.3d Site Sketch
(Enlarged)



Mt. Roberts
Moultonborough, NH

1 Inch = 744 Feet



CARTOGRAPHIC ASSOCIATES, INC.

www.ca1-info.com

Data shown on this map is provided for planning and informational purposes only. The Town of Moultonborough and Cartographic Associates, Inc. are not responsible for any use for other purposes or misuse or misrepresentation of this map.

1612010 Moultonborough, Paradise Shores-Balmoral / Suissevale water system

Design Flow and Source Capacity Review by C.Klevens, P.E. / S. Roy, P.G.

Prepared, March 4, 2011

Description	Paradise Shores - Balmoral	Suissevale POASI	Combined Water System
PWS #	1612010	1612130 (PORS)	1612010
# Services (current)	375	352	727
Population (current)	993	888	1881
# Services (build-out)	425	402	900 projected
Population (build-out)	1060 est	1000 est	2250 projected
Well sources	006 BRW 5 - 75 gpm 007 BRW 6 - 35 gpm	10 inactive wells	
Storage (gallons)	325000	24000	325000
Design Requirements	Env-Ws 372 Small CWS	(Env-Ws 372)	Env-Ws 374 Large systems
Min source reqts	2 x design flow	2 x design flow	Avg day w/largest well offline Peak day w/all wells online
Min storage reqts	Design flow	Design flow	Avg day
Meter Records 2007 (1)			
Max Day, gallons	50000	78000	128000
gpm	35	54	89
Avg Day Summer, gal	35028	44026	79054
gpm	24	31	55
Meter Records 2010 (2)			
Max Day, gallons ESTIM	60000	92000	152000
gpm ESTIM	42	64	106
Avg Day Summer, gal	53755	69527	123282
gpm	37	48	86
Design Flow based on Meter Records 2007			
Based on Max Day	50000	78000	128000
gpm	35	54	89
Min SOURCE Capacity 2007	69	108	55 gpm w/largest well offline
Min Storage Capacity 2007	50000	78000	79,054 Avg Day Summer
Min SOURCE Capacity 2010	83	128	86 gpm w/largest well offline
Min Storage Capacity 2010	60000	92000	123282 Avg Day Summer
a) Is more source capacity reqd?	NO (2007 or 2010)	n/a	YES (2007 and 2010)
b) Is more storage reqd?	no	yes	no

References

(1) Lewis Engineering response to LOD DWGB 08-033 Item 2, Assessment of Present and Future Water Demands, 4/28/08

(2) LRWC response to DES request for flowmeter records, 3/2/11

Worksheet A: Calculation Sheet for Source Capacity Requirements

Step 1. Calculate Source Capacity Required for Residential Uses

Identify Non-Senior Housing

- a. Number of service connections 727
 b. Number of bedrooms per connection 2.5

Calculate

- a. Design Flow (727) x (2.5) x (150gpd bdrm) = 272,625 gpd
No. Connections No. Bedrooms/Connection
- b. Source Capacity (272,625) x (2) = 545,250 gpd
Design Flow Source Capacity

OR

Identify Senior Housing

- a. Number of service connections _____
 b. Number of bedrooms per connection _____

Calculate

- a. Design Flow (_____) x (_____) x (150gpd/1-bdrm units/100 gpd/2-bdrm units) = _____ gpd
No. Connections No. Bedrooms/Connection
- b. Source Capacity (_____) x (2) = _____ gpd
Design Flow Source Capacity

Step 2. Calculate Source Capacity Required for all Non-Residential & Irrigation Uses.

Use #1. Irrigation.

Estimate shall reflect system type, total irrigated area, system design components (# of heads, flow rates, etc), and overall system size. Contact DES staff at (603) 271-6685 for guidance. Please attach a detailed estimate from the irrigation system designer including the above components.

Total Irrigation Water Use 0 gpd.

Use #2. Type of Use _____

Number of Units (i.e., bedrooms, seats, sites, etc.) _____

Calculate

- a. Design Flow (_____) x (_____) = _____ gpd
No. Units Flow/Unit
- b. Source Capacity (_____) x (_____) = _____ gpd (Use #2)
Design Flow Multiplier from 372.11 Source Capacity Multiplier from 372.11

Step 3. Calculate Total Source Capacity Required for Water System

(Total capacity is all residential and all non-residential uses)

Add all Source Capacity calculated in Step 1 and Step 2 above

(_____) + (_____) + (_____) + (_____) = _____ gpd



APPROXIMATE SCALE IN FEET
 800 0 800

NATIONAL FLOOD INSURANCE PROGRAM

FHBM
FLOOD HAZARD
BOUNDARY MAP

TOWN OF
 MOULTONBOROUGH,
 NEW HAMPSHIRE
 CARROLL COUNTY

PANEL 2 OF 8
 (SEE MAP INDEX FOR PANEL NOT PRINTED)

CONVERTED BY LETTER
 EFFECTIVE 3/1/00

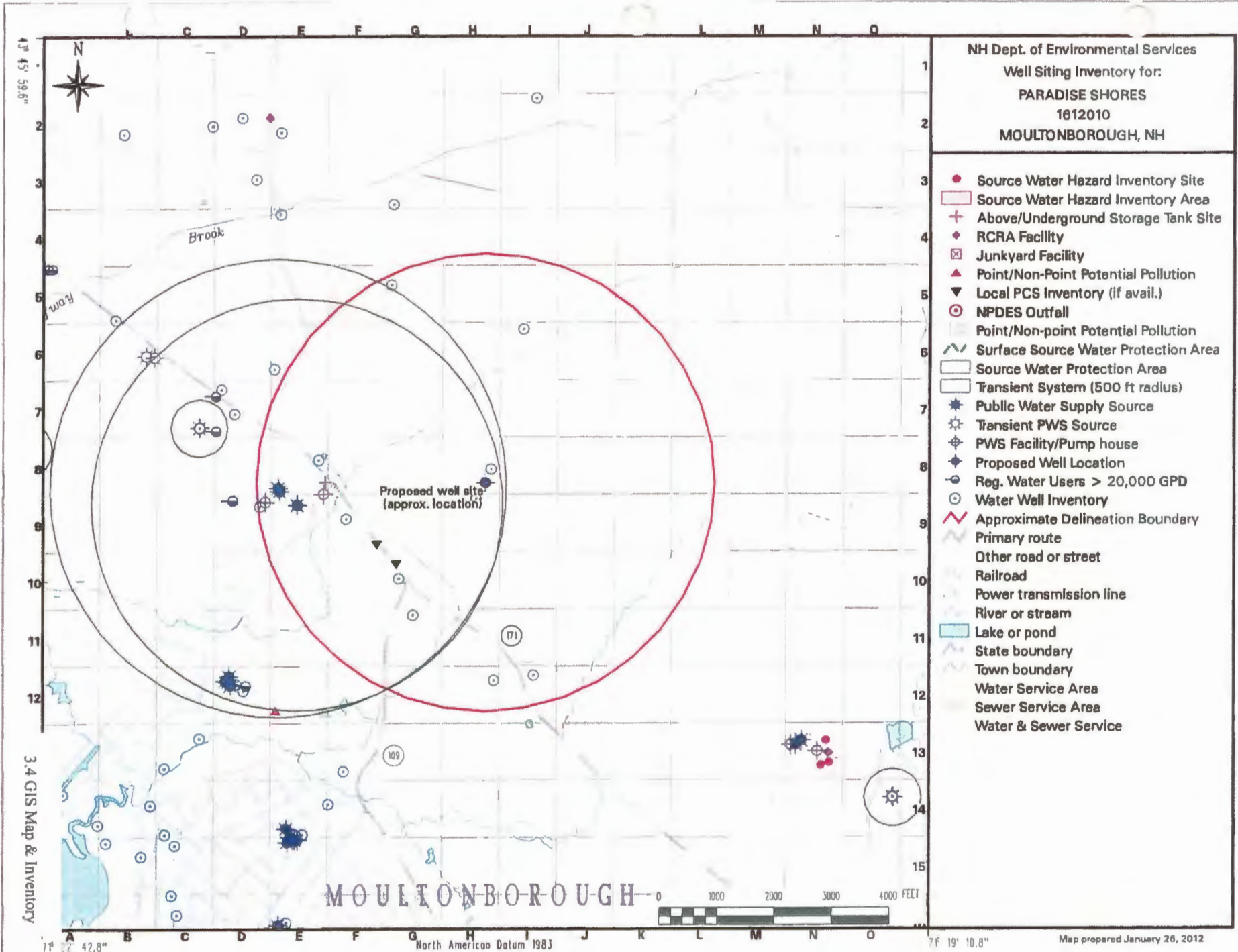
COMMUNITY-PANEL NUMBER:
 330015 0002B

MAP REVISED:
 DECEMBER 21, 1979



U.S. DEPARTMENT OF HOUSING
 AND URBAN DEVELOPMENT
 FEDERAL INSURANCE ADMINISTRATION

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps, check the FEMA Flood Map Store at www.msc.fema.gov



**State of New Hampshire Department of Environmental Services
Well Siting Inventory of Potential and Existing
Sources of Groundwater Contamination for:**

SYSTEM NAME: PARADISE SHORES
ADDRESS: 1612010
TOWN: MOULTONBOROUGH

- Notes:**
1. Report prepared January 26, 2012 by the NHDES Drinking Water and Groundwater Bureau.
 2. The map-cell column in the report indicates which 1000-foot grid cell the site or facility is located on the accompanying map. For example, a map-cell value of "G-11" indicates column "G" and row "11".
 3. Please refer to Attachment A for a description of Hazard Inventory Sites Land Use Codes and their associated potential risk.

Source Water Hazard Inventory Sites

This includes all Groundwater Hazard Inventory, Remediation Sites, and Initial Response Spill Sites regulated by NHDES to ensure water resource protection.

MAP CELL	FACILITY SITE#	FACILITY NAME AND ADDRESS	PROJECT TYPE
<< NO SITES PRESENT >>			

Aboveground Storage Tank Facilities

These are facilities where there are, or where in the case of inactive sites, aboveground storage tanks. If there is a documented release from a tank, it becomes a LAST project type and is also listed in the Source Water Hazard Inventory.

MAP CELL	FACILITY SITE#	FACILITY NAME AND ADDRESS	# TANKS
<< NO FACILITIES PRESENT >>			

Underground Storage Tank Facilities

These are facilities where there are, or where in the case of inactive sites, underground storage tanks. If there is a documented release from a tank, it becomes a LUST project type and is also listed in the Source Water Hazard Inventory.

MAP CELL	FACILITY SITE#	FACILITY NAME AND ADDRESS	# TANKS
E-08	0111749	SKELLEYS MARKET 374 RTE 109 S MOULTONBOROUGH TAX MAP: 83, LOT: 100-B	TANKS: 2

Automobile Salvage Yard Facilities

MAP CELL	FACILITY SITE#	FACILITY NAME AND ADDRESS	STATUS
<< NO FACILITIES PRESENT >>			

PARADISE SHORES
1612010, MOULTONBOROUGH

2

Local Potential Contamination Source Inventory Sites

Includes potential contamination sources within a source water protection area. The sites were located by Public Water Systems applying for a sampling waiver, or by NHDES-WSEB staff during "windshield surveys".

MAP CELL	SITE#	SITE NAME AND ADDRESS	PROJECT TYPE
F-09	16120107A	Wally's Marine Service 426 Gov. Wentworth Hwy, Rte 109 MOULTONBOROUGH	GSR
G-10	16120105B	Homestead Taxidermy 465 Gov. Wentworth Hwy MOULTONBOROUGH	LAB

National Pollutant Discharge Elimination System (NPDES) Outfalls

All facilities which discharge any pollutant from point sources to surface waters (directly or indirectly) are required to obtain a federal permit from the US Environmental Protection Agency and a State Water Discharge Permit from NHDES.

MAP CELL	OUTFALL ID#	FACILITY NAME AND ADDRESS	STATUS TYPE CATEGORY WATER BODY
<< NO OUTFALLS PRESENT >>			

Point/Non-point Potential Pollution Sources

These include local land-use inventories performed by the Regional Planning Commission in 1995.

MAP CELL	SITE#	SITE NAME AND ADDRESS	PROJECT TYPE
E-09	99-18	BALMORAL STORM DRAINS PARADISE RD MOULTONBOROUGH	SD
E-10	99-17	BALMORAL STORM DRAINS PARADISE RD MOULTONBOROUGH	SD

Resource Conservation & Recovery Act (RCRA) Sites

These are facilities that generate hazardous waste. If a release is documented, it is also listed under the Source Water Hazard Inventory Sites.

MAP CELL	FACILITY SITE#	FACILITY NAME AND ADDRESS	STATUS REGULATED GEN. TYPE
<< NO SITES PRESENT >>			

PARADISE SHORES
1612010, MOULTONBOROUGH

3

Registered Water Users

"Use of water" includes the withdrawal of water from the ground or surface water body, the delivery of water from another supplier to the user indicated, the release of water from the user indicated to another facility, and/or the return of water to the environment.

MAP CELL	SDID	FACILITY NAME AND ADDRESS	ACTION TYPE WATER BODY
<< NO REGISTERED WATER USERS PRESENT >>			

Water Well Inventory

Inventory of privately owned water wells registered with the NHDES Geology Unit since 1984. Note that only 30% of all wells in the inventory have been field located.

MAP CELL	WRB#	WELL OWNER AND ADDRESS	DATE OF COMPLETION
G-05	164.0252	DOMINIK & STENHOUSE KENT RD MOULTONBOROUGH	07/09/1987 Map 97, Parcel 11
I-06	164.1746	SALCHLI UKON TRAIL MOULTONBOROUGH	10/19/2009 Map 97, Parcel 2
E-08	164.0475	WISE RTE 109 MOULTONBOROUGH	08/01/1990 Map 83, Parcel 8
H-08	164.1736	LRW WATER SERVICES GOVERNOR WENTWORTH HWY MOULTONBOROUGH	10/21/2008 Map 71, Parcel 13
D-09	164.1271	LAKES REGION WATER CO PARADISE DR MOULTONBOROUGH	06/12/2002
F-09	164.0411	MASON RTE 109 MOULTONBOROUGH	02/15/1989 Map 83, Parcel 18
H-09	164.1653	LRW WATER SERVICES RTE 109 MOULTONBOROUGH	11/22/2006
G-10	164.0160	IVES RTE 109 MOULTONBOROUGH	11/24/1987 Map 85, Parcel 19
G-11	164.1607	JOSEFEK VICTORY LN MOULTONBOROUGH	03/08/2006
H-12	164.1666	LRW SERVICES RTE 109 MOULTONBOROUGH	07/18/2007
I-12	164.1697	WESTGATE 171 LLC OLD MOUNTAIN RD MOULTONBOROUGH	11/09/2007 Map 94, Parcel 5.1

Public Water Supply Sources and Facilities

- Notes:**
1. The map-cell value (indicating which 1000-foot grid cell the source or facility is located on the accompanying map) is shown in parentheses in the PWSID field of the report.
 2. Please refer to Attachment B for a description of the report fields and the field values.

PWSID	SYSTEM NAME AND ADDRESS	SYS. TYPE	SYS. ACTIVE	SRC. TYPE	SRC. ACTIVE	SRC. REC.	WELL TYPE	WELL DEPTH	POP. SERVED
1612010-009 (E-08)	PARADISE SHORES PARADISE SHORE DR MOULTONBOROUGH	C	A	G	I	SG	BRW	0	1881
1612010-505 (E-08)	PARADISE SHORES PARADISE SHORE DR MOULTONBOROUGH	C	A	E	I	PT		0	1881
1612010-006 (E-08)	PARADISE SHORES PARADISE SHORE DR MOULTONBOROUGH	C	A	G	A	SG	BRW	522	1881
1612010-506 (D-09)	PARADISE SHORES PARADISE SHORE DR MOULTONBOROUGH	C	A	E	A	PT		0	1881
1612010-007 (E-09)	PARADISE SHORES PARADISE SHORE DR MOULTONBOROUGH	C	A	G	A	SG	BRW	650	1881

DISCLAIMER: The coverages presented in this program are under constant revision as new sites or facilities are added. They may not contain all of the potential or existing sites or facilities. Feature attribute data are periodically (approximately once a month) updated from associated DES databases. The NH Department of Environmental Services is not responsible for the use or interpretation of this information.

Worksheet C

Worksheet for Reporting on Windshield Survey

Water System Name Paradise Shores

Date 2/1/12

Table 1. Potential Contamination Sources Found

Business Name or Resident	Land Use	Address	Location Marked on Map?

Note Make copies of this form if you identify more sites.

Table 2. Activities on the NHDES GIS Inventory that are no longer PCSs

Business Name or Resident	Address	Old PCS Activity (from GIS Inventory)	New Non-PCS Activity (from windshield survey)
<u>Homestead Temporary</u>	<u>465 GWH</u>	<u>LAIB</u>	<u>Residential property</u>

Report Form for Water Conservation Plans Small Community Water Systems

PROJECT NAME: Paradise Shores (Mt Roberts) – Small Community Water System
TOWN/CITY: Moultonboro, NH
EPA ID # 1612010
DATE: February 29, 2012

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: Derek Bennett
 NHDES – Drinking Water & Groundwater Bureau
 29 Hazen Drive, PO Box 95
 Concord, NH 03302-0095

PROJECT/CONTACT INFORMATION

The Preliminary Well Siting report is being submitted concurrently to the NHDES for review.

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:

The water system owner is: Thomas Mason Jr, President
 Lakes Region Water Company Inc.
 PO Box 389, Moultonboro NH 03254
 (603) 476-2348

The well site owner is: Thomas & Barbara Mason
 PO Box 389, Moultonboro NH 03254
 (603) 476-5150

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.

SOURCE & SYSTEM OVERVIEW

- Reason for New Source:** As stated in the Paradise Shores Preliminary Well Siting Report, Mt Roberts Well #2 and #4 will be used to supplement the declining yield of existing system wells along with improving capacity for an increase in demand. Beginning in the summer 2008, the Paradise Shores CWS began "running out of water" during times of peak demand. Peak demand is realized during the summer months, especially during the busy July 4th, Labor Day, and Memorial Day holiday weekends. Emergency approval was utilized during times of high demand to successfully provide consistent, safe, water service to all customers.
- Service Connections/Types:** The Paradise Shores CWS consists of 391 existing service connections, all of which are residential homes. There are NO known industrial, commercial, institutional, or municipal connections. Suissvale is the only service connection that receives more than 20,000 gpd which is regulated by the NHDES as a Privately Owned Redistribution System (PORS). There are an estimated 50 additional service connections within the Paradise Shores CWS 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. Any new service connections that are added will have meters installed in a timely manner.
- Population Trends:** The majority of the Paradise Shores 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 average daily use is usually less than 55,000 gpd, with maximum daily use of less than 180,000 gpd occurring during the busy July months, where peak use is realized and temperatures are usually the highest. Maximum daily yields of each well source will be re-determined during the 48 hour pumping test to be performed following the Preliminary Well Siting Approval.

SYSTEM METERING

- Water Sources:** There are 2 active well sources currently in use for the Paradise Shores CWS and 10 inactive well sources. Each of these are drilled, bedrock wells. The active ones are named BRW #5 and BRW #6. We are currently seeking approval for two additional sources, Mt. Roberts BRW 2 and Mt. Roberts BRW 4, which were drilled in 2007.
- Source Meters:** There is 1 source meter for the current active wells as the system is designed as a blended source. This meter is a 2" Sensus W-160 meter with flow ranges of 4 – 160 gpm. The blended source is typically read at least once a day, but they are always read at least once every 3 days. Also, meter flows are recorded in a Telemetry portal in 1 minute increments 24 hours a day 365 days a year. Flow alarms which are forwarded to Lakes Region Water Company staff via cell phone are utilized to quickly and accurately determine leak events. The last meter test date was in 2012, but we will continue to test once every 4 years as required by NHPUC rules and AWWA standards. The new wells, BRW 2 and BRW 4 will utilize individual 2

inch Badger magnetic flow meters capable of reporting to the Telemetry portal in the same manner as expressed above. The Badger magnetic flow meter will be calibrated as per NHPUC rules and 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 390 Paradise Shores CWS customers are considered residential in nature and have Sensus SR 5/8" water meters currently installed. The remaining service for Suissevale is metered by an Elster 4" QV4 magnetic flow meter. Any new service connections will have meters installed according as soon as possible; however, no new service connections have been recently added. We test according to AWWA and NHPUC rules, which requires a 5/8" meter to be tested no less than once every 10 years. Customer meters are read once every 90 days (once per quarter) using a Sensus Handheld AR5001 and Autogun for touch readings.

Service meters will continue to be selected, installed and maintained in accordance with "Manual of Water Supply Practices, Water Meters-Section, Installation, Testing, and Maintenance," document identification number AWWA M6, American Water Works Association, 1999.

WATER AUDITS & LEAK DETECTION

- **Estimated Unaccounted for Water:** Lakes Region Water Company Inc. estimates for unaccounted for water at least annually, but typically about once per quarter. We review customer meter records as compared to source meter records, taking into account any excess kilowatt hours used by the pump stations (2) and any customer complaints or insight that is available to help us identify any potential leaks. We also perform system inspections about once per week, noting any significant changes in activity and perform leak detection as necessary, but at least once per year. The most recent estimate of unaccounted for water was calculated in June 2010 in which 0.66 gpm was unaccounted for and considering lost due to leakage.

Lakes Region Water shall prepare and submit a response plan to the NHDES Water Conservation Department within 60 days anytime the percentage of unaccounted for water in the West Point CWS exceeds 15% of the total water introduced into the system, identifying how we intend to reduce the percentage to below 15% within 2 years or less.

- **Water Audits & Leak Detection:** 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. Our most recent leak detection was performed in January 2012, where a small 5 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), which is considered true water loss. This process typically occurs following an unaccounted for water estimate, but no less than once per year.

The Paradise Shores CWS also utilizes 24hr/365day telemetry to identify water use trends that may indicate abnormal water flows. This system has proven to be effective in minimizing water loss and is encouraged for other CWS's by Lakes Region Water Company.

The Paradise Shores CWS is comprised of approximately 8000 feet of 6" diameter PVC pipe; 11,000+ feet of 4" PVC; 6,000 feet of 3" PVC; 31,000 feet of 2"; and 4,000 feet of miscellaneous pipe. The age of the pipe varies significantly as replacements and extensions have been added since the 1960's. 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.

Since this system has only 52,000 feet of water main and an overall low consumption volume, it is not cost effective or necessary to install zone meters to assist in leak detection. At the conclusion of this assessment, any damages to existing structures will be noted and replaced as soon as possible, but no later than 60 days.

- **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 Paradise Shores CWS currently operates at pressures between 40 psi and 100psi. Pressure reduction is not necessary because there are no zones that exceed maximum operating pressures allowed by State Rules. If the pressure exceeds 100 psi, pressure-reducing valves will be installed on the service line or water main to maintain the pressure below 100 psi.

Lakes Region Water will perform a water audit & leak detection in accordance with "Manual of Water Supply Practices, Water Audits & Leak Detection" document identification number AWWA M36, American Water Works Association, 1999. 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.

CONSUMPTION MANAGEMENT

- **Conservation Rate Structure:** Paradise Shores community water system is charged in accordance with our Company Tariff which is NHPUC approved. Each customer receives a quarterly water bill comprised of two (2) separate charges. The first is a minimum “base rate” that is charged to each customer per quarter regardless of how much water is used. In addition to this flat fee, each customer is charged for the total amount of water that passes through their individual water meter, which encourages judicious use of water. There are no seasonal rate structures in place, and the billing policies described above will remain in effect indefinitely.
- **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 the new source (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 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
- Marie Samaha, Chairperson
Town of Moultonboro, Conservation Commission
PO Box 139, 6 Holland Street
Moultonboro, NH 03254

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: _____

A handwritten signature in black ink, consisting of a large, stylized initial 'S' followed by a series of loops and a long horizontal stroke extending to the right.

Date: **February 29, 2012**

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

February 29, 2012

Governing Board
Address
City, NH Zip code

Re: Water Conservation Plan for Paradise Shores Community Water System, Moultonboro 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: Derek Bennett
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,

Jake Dawson
Supervisor, Lakes Region Water Company Inc
Water Conservation Plan Project Contact

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

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Draft Cover Letter to
Governing Boards

**-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



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



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.