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# ***UDWS WATER CONSERVATION PLAN***

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## **UNH/ Durham Water System**



### **Water Conservation Plan**

**July 1, 2014**

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#### **SECTION 1 - INTRODUCTION**

The UNH/Durham Water System (UDWS) has maintained a water conservation program for a decade; however in 2007 it created a comprehensive written plan to be more easily shared and referenced by the Durham and UNH community. Much like all water conservation plans, this is an adaptive plan that requires regular updates as conditions and needs change. This Water Conservation Plan (Plan) operates within the boundaries of the UDWS's Water Resource Management Plan and is being updated in association with the connection of a new groundwater source known as the Spruce Hole Well or UNH/Durham Production Well #2 and installation of an artificial recharge facility located near the production well. The written water conservation plan was originally submitted in draft form as part of the Preliminary Hydrogeological Investigation Report prepared by Emery & Garrett Groundwater, Inc. (EGGI) dated May 2008 and entitled Preliminary Hydrogeological Investigation, Town of Durham-University of New Hampshire, Groundwater Development, UNH/Durham Production Well #2 (DGD-PW2), commonly referred to as the "Spruce Hole Well", and the associated Large Groundwater Withdrawal Permit Application for a proposed public water supply well. This new overburden production well DGD-PW2 was installed in the winter of 2010 in what is known as the Spruce Hole Aquifer. Once DGD-PW2 is connected to the distribution system in the fall of 2014, this new well will service both the Town and UNH.

This updated version of the Plan includes new information related to a new automatic radio controlled water metering program for the water system's sources of supply and

the system's individual customer meters. It also provides updated information as required in the New Hampshire DES's written comments on the draft submittal issued via letter to EGGI on August 11, 2008. The Plan provides updated information in Section 5 relating to the UDWS's outreach efforts and water conservation measures implemented in response to drought conditions experienced during the late summer of 2010, and the Source Water Management Protocol recently developed to balance the use of the system's water sources when peak demand coincides with limited surface water availability.

In accordance with New Hampshire RSA Chapter 485-C:61, "The application (for a new large groundwater withdrawal permit) shall be based on a demonstrated need for the withdrawal." This need shall include a conservation management plan. Following the guidance given in Env-Wq 2101, this conservation plan was developed for the UDWS and is also part of the DGD-PW2 Large Groundwater Withdrawal Permit application. The following list provides a summary of the requirements per the New Hampshire Department of Environmental Services (NHDES):

**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 including reading water meters and billing all customers at least quarterly.
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, 2009.
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.
6. Develop and implement a cross-connection control program.

per: [http://des.nh.gov/organization/divisions/water/dwgb/water\\_conservation/documents/summary\\_of\\_rule.pdf](http://des.nh.gov/organization/divisions/water/dwgb/water_conservation/documents/summary_of_rule.pdf)

## SECTION 2 – WATER METERING AND BILLING

### **2.1 - Source and Customer Meters**

All sources that distribute potable water into the UDWS are currently metered with two (2) master meters and the information is recorded daily by the UDWS. These sources include water treated at the Arthur Rollins Water Treatment Plant (WTP) and the Lee Well. Water that is treated at the Water Treatment Plant originates at either the Oyster or Lamprey River, and the Spruce Hole Well will soon be included. These sources are also individually metered. Before the end of 2014, the Spruce Hole Well (DGD-PW2) will be included as one of the UDWS's water sources and this source water will be fed through the WTP and treated prior to entering the distribution system. The following is a table of information with pertinent to the source meters:

<b>SOURCE</b>	<b>MAKE</b>	<b>MODEL No.</b>	<b>INSTALL DATE (TUBE/DP)</b>	<b>SIZE (INCHES)</b>
Finished Water at Treatment Plant	PFS Tube Foxboro DP	843DP-M211SK-M	1999/2012	8
Oyster River	Badger Tube Foxboro DP	DDP10-D22B21F-M1L1V	1992	10
Lamprey River	Badger Tube ABB DP	600T	1974(approx)/2002	12
Lee Well	Venturi Disc Foxboro DP	IDP10	1980	6

All service connections within the UDWS are metered. The Town's individual water customers and Town facilities are all metered as are all of UNH's facilities. Final construction plans for the DGD-PW2 include the installation of a new mag meter prior to the well being put into service in the fall of 2014.

## **2.2 - Meter Sizing**

The UDWS's source meters are sized in accordance with manufacturer recommendations. The UDWS performed a water audit in 2007, which included a measurement of the accuracy of the two source meters. The findings were as follows:

Master meter tests were conducted at the Town's Lee Well and at the WTP. The Lee Well master meter was found to be over-registering by 9.5 percent, which is outside the allowable limits of accuracy (+/- 5%). The meter at Lee Well has since been recalibrated. The master meter at the Water Treatment Plant was also found to be over-registering by 3.6 percent, which is within the allowable limits of accuracy. Information from this audit is included in the Water Audit Work Sheet in Appendix A of this Plan.

According to the UDWS chief operator, the source water meters in the system are regularly calibrated. The master meter at the WTP is calibrated twice annually and the meter at the Lee well is calibrated at least once annually. Both source meters were recalibrated in May 2012. The future plan is to continue this practice and replace the source meters if they fall outside the accepted operating range and cannot be recalibrated. When the calibration of the production meters at the WTP and the Lee Well were checked in January 2014, it was discovered that they were out of calibration by 9.5 and 3.6 percent respectively. It was also discovered that the contractor who had been calibrating the meters for the past number of years had not been calibrating the meters correctly. It is possible the production meter readings have been in error for a significant number of years. The meters were properly calibrated in January 2014 and as indicated in Water Audit Worksheet (Appendix A), the estimation of Unaccounted-for-Water for the month of February 2014 was 6.5 percent.

The 2007 water audit also included testing of 32 large customer meters. These tests results suggest that approximately 1/3 of these meters may be under-registering. In an effort to address this, the Town recieved New Hampshire DES SRF funding in 2011 to

upgrade all of their meters in the system to radio controlled Automatic Meter Read (AMR) units. This has allowed for replacement of all the older meters in the system and has given the ability to read all customer meters in less than a day. Formerly, it took nearly two weeks to read approximately 1,100 meters in the Town's portion of the system. This made it difficult to compare source water meters with customer meters and required averaging use and comparing data over an extended period of time rather than being able to read the source and customer meters on the same day. The project qualified for SRF funds and received 20% forgiveness on a loan of approximately \$418,000. In April 2012, the Town sent out the following notification to all Durham water system customers describing the project:

"In a continuing effort to improve our water service to you, the Town of Durham is implementing a Town wide upgrade to the water meter reading system for all of our 1,100 water system customers. This work will include inspecting all existing water meters and, if necessary, replacing that water meter. These new water meters will be connected through existing water meter wires to an outside mounted radio module that will be used to transmit water meter data to Town staff via a radio system on a monthly basis. Locations that do not need a new water meter will be retrofitted with a new radio module to enable monthly meter readings. This work is mandatory for every customer in our system. To facilitate this work the Town will be hiring a contractor to coordinate the work, schedule appointments and perform the necessary work to upgrade all water meter services. This work is scheduled to begin in June 2012 and is anticipated to be completed by October 2012. The program, once completed will increase the reliability and accuracy of water meter reading operations and the efficiency of our reading and billing operation. We request your cooperation as we implement this important program for the Town."

An analysis performed in 2012 as part of the design of the customer water meter upgrade project for the Town of Durham revealed that 25 meters in the system qualified for downsizing. Therefore, as part of the water meter upgrade project, 19 meters were downsized from 1-inch to 5/8-inch by the installation contractor and six two-inch meters

were downsized to 1-inch meters. This has already improved the low-flow accuracy of the water being delivered to these customers. Overall, a total of 498 older meters in the system were replaced with new Sensus meters and AMR equipment, equating to approximately 39% of Durham's customer water meters. The result of replacing these old water meters has been a notable increase in revenue. The remaining meters were relative recently replaced (within the past 10 years) and all received at least new meter heads and AMR equipment.

Based on AWWA recommendation for routine testing of meters in service, UDWS plans to test meters on average, as follows:

Meter sizes 5/8 in. to 1 in = Every 10 years

Meter sizes 1 in. to 4 in. = Every 5 years

Meter sizes 4 in. and larger = Every year

### **2.3 - Meter Reading and Billing**

The Town and UNH are committed to read all customer and facility meters at least quarterly, however the goal is to read all meters monthly. UNH bills their customers monthly, and currently the Town bills their customers twice a year (in April and October). The Town is formulating plans to bill quarterly within the next 5 years (see below for waiver request). As described in the previous section, the Town upgraded all their water meters with an Automatic Meter Read (AMR) radio-controlled system in 2012 and began reading all meters monthly in December 2013. UNH already meters all its buildings via a separate AMR system from the Town's system, and have further upgraded their system to allow for real-time meter reading. This has given UNH the ability to identify and track consumptive patterns within UNH and track down potential leaks and high use facilities on a more frequent basis. Combined, these two upgraded systems provide the UDWS managers the ability to have a much clearer picture of UDWS demands and helps identify problems such as leaking toilets before they become even bigger problems. They will also have the capability to identify high water users by category and direct customer outreach to those high users. Providing this



feedback will improve customer service and likely result in much more efficient water use throughout the entire system.

The Town plans to upgrade its water billing system software within the next five years and transition to billing at least quarterly at that time in order to comply with Env-Wq 2101.11(d) (including Table 2101-2). In accordance with Env-Wq 2101.23, a letter requesting a 5 year waiver of the quarterly billing requirement is provided in Appendix B.

## **SECTION 3 - WATER AUDIT and LEAK DETECTION PROGRAM**

### **3.1 – Water Audit and Leak Detection**

As mentioned previously, the UDWS performed a water audit and leak detection study in 2007. The findings and recommendations of that study are currently being implemented. Metering at the sources and point of use allows the ability to track system unaccounted-for water. This analysis was performed during the 2007 water audit and again as part of this Plan (see Water Audit Worksheet in Appendix A). The findings of the analysis were as follows:

- 2007 Water Audit – 5.7% unaccounted for 2006 to 2007 time period (this included adjustments in source and customer meter inaccuracies);
- 2008 Water Conservation Plan (draft) water use analysis – 7.8% unaccounted-for water for the 2005 calendar year (no adjustments to source or customer meters); and
- 2014 Unaccounted-for Water Assessment – 6.5% (see Appendix A).

The UDWS also performed leak detection during the 2007 Water Audit. According to the report, the leak detection survey conducted during this study on approximately 25 miles of water main identified an estimated 15,000 gallons per day of leakage from one (1) main leak on Oyster River Road at Croghan Lane (*the leak was determined to be from a*

*belowground fitting of a fire hydrant that may have had an encounter with a motor vehicle and was immediately repaired).* The estimated 15,000 gpd of leakage from the fire hydrant represents approximately 1.9 percent of the average daily production. A comprehensive leak detection survey is being conducted in the summer of 2014 in association with a grant program administered by NHDES.

Estimates of unaccounted-for water will be performed at least once a year, and a system is being developed to perform this task monthly and part of the coordinated monthly read between the Town and UNH. If unaccounted-for water exceeds 15 percent, the system shall develop a response plan in accordance with Env-Wq 2101.05(j) and (k), and submit it to the DES within 60 days. In accordance with NHDES's regulations, the UDWS will make every attempt to implement the response plan soon after receiving approval from DES, and UDWS operations staff, and/or a qualified leak detection firm, will promptly initiate a leak detection survey. Leaks identified by the survey will be repaired within 60 days of discovery unless a waiver is obtained from the DES. Those performing the surveys will follow the standards set forth in AWWA M36, Manual of Water Supply Practices, Water Audits and Leak Detection.

### **3.2 – Tracking Unaccounted-for Water**

The UDWS currently has a "Main Breaks" procedure included in its Emergency Response Plan. This procedure will continue to be adhered to and updated as necessary. The UDWS will continue to utilize all of these tools to track their leaks, including regular unaccounted-for water assessments and overall water system efficiency measures. In accordance with Env-Wq 2101.09, if the unaccounted-for water exceeds 15% of the total volume of water introduced to the water system the UDWS shall prepare and submit a response plan to NHDES within 60 days as noted above. If such a response plan becomes necessary, the UDWS will implement the response plan in accordance with the above schedule upon receiving approval from the NHDES.

The 2012 water meter upgrade project implemented by the Town upgraded all its meters with AMR units, which complements UNH's AMR system. This will provide the UDWS with much improved ability to track unaccounted-for water. The following is the UDWS's process for checking meter problems and reading variances. After all readings are recorded, a variance report is run on all meters to flag meters that are plus/minus 20% from both the previous month and same month of the previous year. The flagged entries are reviewed to determine whether the variance is indicative of meter error, a leak, or seasonal use (i.e. variation associated with a customer being out of town for an extended period or associated with a UNH out-of-session vacancy). If an explanation is not already available a Water System Technical or Manager physically investigates the meter to determine if it appears broken or if the reading suggests further investigation is necessary (i.e. a plugged meter, etc.). Depending on the results on this investigation, a work order is issued to Town of Durham Water Division or UNH Energy & Utilities Department to correct the problem and/or replace the meter.

### **3.3 - Water System Pressure**

The UDWS currently operates two pressure zones. The main system pressure zone includes most of the system and is supplied primarily from the water treatment plant. Typical operating pressures in this zone are 58 to 68 psi. A relatively higher pressure zone of limited extent consist primarily of the 12-inch diameter transmission main from the Lee well to the Beech Hill Water Tank and is necessary to pump water from this source to the tank. Typical operating pressures in this zone are 80 to 120 psi. The high pressure zone currently services one industry (Goss International) and approximately 150 customer connections. All customer services in this zone have pressure reducer equipment installed on their services lines or at branches off the main to reduce pressure and flow delivered to their services.

The 0.6 million gallon (MG) Beech Hill Water Tank is located within the high pressure zone, and the 1.0 MG Edgewood Road Water Tank and 3 MG Foss Farm Road Water Tank are both located within the low pressure zone. Water can be fed from the high

pressure zone to the low pressure zone via a pressure-reducing valve (PRV). Water can also be back-fed from the low pressure zone to the high pressure zone via a bypass valve and a booster pump located in the PRV vault, however, the Lee Well must operate at a lower level or be shut off completely in order for the low pressure zone to back-feed the high pressure zone.

In accordance with Env-Wq 2101.10, the UDWS has considered the need for pressure reduction in other parts of the distribution system and determined that the pressures in the system are consistent with water system industry standards and regulations. In addition, the current system pressures are necessary for public health and safety considerations with regard to maintaining adequate pressures for fire suppression sprinkler systems throughout the Town and UNH.

#### **SECTION 4 – RATE STRUCTURE**

Since the UDWS is jointly operated by the Town and UNH, the UDWS's capital and operational costs are shared through a written agreement between the Town and UNH that balances the totals costs based on actual water used. All UNH buildings are metered separately and UNH Facilities bills it's largest users (i.e. residence halls, dining halls, and departments that occupy an entire building) on actual metered usage. Some academic and administrative departments share the same buildings, and therefore to divide the usage equitably these individual departments are billed on an average consumption per net square foot basis.

The Town of Durham customers pay for their water through the Town billing system and UNH customers pay for their water through a separate University billing system. The Town's customers pay for water based on a unit price, which is currently \$4.69 per 100 cubic feet (2014 rates). The rate is reviewed annually and adjusted as needed by the Town [when this Plan was originally prepared in 2008, the Town's unit price for water was \$2.93 per 100 cubic feet]. The Town's rate structure is the same for all customer classes. If excessive customer water use becomes an issue in the future, the Town

may consider implementing an inclining block rate, where rates would increase with the volume of water consumed.

## **SECTION 5 – WATER CONSERVATION OUTREACH**

The UDWS regularly circulates water conservation outreach information and materials both in the Town and UNH portions of the system. The following water conservation outreach measures will be implemented by the UDWS as deemed necessary:

### **5.1 - Town of Durham**

The Town of Durham periodically sends out water conservation outreach materials with its bi-annual water bills. Past items have included:

- Toilet tank displacement devices, which reduce the amount of water flushed in an old-style toilet by 3 quarts.
- Customer leak detection tablets and information.
- Water saving tips are regularly published in the Town’s “Friday Updates” on its list server (see below) and UNH’s email notices.

The UDWS ramps up these efforts when peak water demand coincides with limited surface water availability. During these times UDWS provides water system information and water saving tips as part of a weekly Town newsletter that is emailed to well over 2,500 recipients each Friday. The following excerpts provide examples of this information:



**"FRIDAY UPDATES"**  
**MAY 9, 2008**

**HYDRANT FLUSHING**

*A reminder that hydrant flushing began on May 5 and will continue through May 15th from 11PM to 7AM (overnight). During flushing there is a high chance of discolored water. If this happens, run water from the faucet until it becomes clear. It is advisable to wash white laundry on the weekend or when the water clears to avoid discoloring of whites. This is the process by which Public Works staff goes to each hydrant and flushes them at maximum capacity for a few minutes to flow out any debris that may have collected in the system. There are two vehicles involved with emergency lighting for the protection of the employees and to warn people to take caution around the water flow. Please do not be alarmed if you see these orange flashing lights during flushing times. Questions: call UNH Water Treatment plant, Wesley East at 862-1390 or Durham Public Works at 868-5578. Thank you for your cooperation during this routine maintenance.*

**“FRIDAY UPDATES”****FRIDAY, APRIL 25, 2008****SPRING WATER AND SEWER BILL**

*The spring water and sewer bill has been mailed to property owners. Payments are due May 27, 2008.*

**SPRING WATER CONSERVATION TIPS**

*Spring is here and everyone is anxious to get their landscaping underway. Here are a few tips for water conservation relative to the season:*

- *If you water with a sprinkler system, make sure to audit your system regularly for leaks. In addition, install water-conserving devices like a rain shut-off device and/ or soil sensors.*
- *When choosing plants, shrubs, or trees for your property try to choose species that are native to our New England climate or ones that require little watering. These species will cut down on your water use and will prosper with lower maintenance. Check with local nurseries or gardening centers to see what your choices are.*
- *Mulch, mulch, mulch - Mulching helps to slow the evaporation of moisture from the soil and keeps the soil and roots cool. It also protects the soil and roots from events such as freezing, which we all know is not out of the realm of possibility up here in New Hampshire, even if it's late April.*

**5.2 - University of New Hampshire**

UNH has been active with implementing sustainability initiatives throughout their campus and curriculum. Tom Kelly, Director of the UNH Office of Sustainability has stated in UNH's "Sustainability Program Profile" that, "Ours is an endowed, university-wide effort to integrate sustainability into the fabric of the institution in a comprehensive and systematic way." Part of that effort is to make their buildings as efficient as possible, including their water use. A commitment to install only Energy Star appliances in their

facilities will provide the added benefit of water use reduction, as Energy Star appliances such as washers and dishwashers are also more efficient with respect to water use. UNH is also incorporating water conservation measures in their building projects. These include installing low-flow showerheads and faucets, high-efficiency toilets and waterless urinals. The 2010 James Hall renovation project included a rainwater cistern and gray water recycling system which provides all the water needed for toilet flushing within the building.

### **5.3 - Water Supply & Demand Status**

The UDWS has established a Water Supply and Demand Status system to graphically inform water customers of the current status of water availability within the system, and the corresponding five (5) stages of water conservation measures to ensure that adequate water capacity for domestic/commercial uses and public safety is available, while maintaining a sustainable yield of the system's four water sources.

As stated earlier, the UDWS currently relies upon two surface water sources - the Oyster and Lamprey Rivers – that supply water to the Arthur Rollins Water Treatment Plant (WTP), and two groundwater sources - which is a gravel pack well located in the Town of Lee known as the Lee Well. Groundwater from the Lee Well is disinfected at the wellhead and pumped directly into the high pressure zone of the distribution system. Groundwater from the Spruce Hole Well is pumped to the WTP. There are also two artificial recharge basins located within the 400 foot sanitary protective radius of the Spruce Hole Well that receive surface water from the Lamprey River through new piping and related infrastructure installed in 2014 as part of the Spruce Hole Well & Artificial Recharge construction project. All four sources are blended within UDWS's approximately 25 miles of water distribution piping.

When surface water sources are limited during periods of drought the UDWS's source water availability of becomes a factor of diminishing water stored in the system's two reservoirs and the sustainable safe yield of the Lee Well and the Spruce Hole Well.



Drought conditions sometimes persist into August and September which ends up overlapping with the UDWS's annual period of peak demand; at which time carefully balancing the use of the four water sources becomes critically important. The period of overlapping peak demand and limited source water availability has a typical duration of approximately 60 days from about August 15th to October 15th. Prior to August 15th, the summer population of Durham is relatively low because the UNH resident student population is reduced with system demand being typically less than about 60-70% of the total available source capacity. On or around August 15th, the UNH students begin returning for the fall semester and water system demand noticeably increases. By about September 1<sup>st</sup> each year, system demand typically reaches its peak and if the surface water is critically limited because of low flow river conditions the system demand has the potential to increase above 75% of the available combined source water capacity. October 15th is approximate the date when the Lamprey River flow increases significantly due to the start of NHDES Dam Bureau's release of water from Lake Pawtuckaway and Mendums Pond for the regular annual winter drawdown of these two water bodies.

The UDWS's approach to balancing its use of the four water sources is based on a comparison of System Demand and Maximum Available Capacity according to the following definitions:

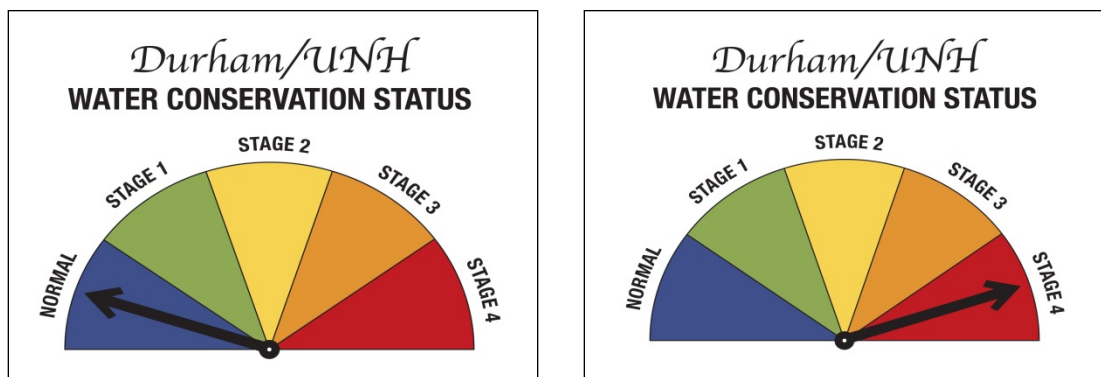
System Demand is calculated as the sum of the production from the WTP and the withdrawal from the Lee Well and Spruce Hole Well. System Demand is an average gallon per day (gpd) rate based on averaging at least the previous 3 days of production to smooth out operational high and lows (i.e. topping off water tanks for the weekend, filling heating and cooling systems, backwashing, etc.).

Maximum Available Capacity is calculated as the sum of the daily available water storage volume in the Wiswall and Oyster River reservoirs, plus the available instream flow from the Lamprey or Oyster Rivers, plus the combined safe yield of the Lee Well and the Spruce Hole Well. (Water stored in the UDWS's three

water tanks is small compared to the Wiswall and Oyster River Reservoirs, and their primary purpose is to maintain adequate pressure in the system; therefore, water tank storage is not factored into the Maximum Available Capacity equation.) Maximum Available Capacity, like System Demand, has units of gallons per day (gpd) and is calculated on a daily basis by estimating the total available storage on a given day in the top 18" of the Wiswall Reservoir and the top 5 feet of the Oyster River Reservoir, and dividing it by the number of days remaining until October 15 (to produce a gpd capacity), while adding that to the combined available instream flow (in gpd), plus the safe yield of the Lee Well and Spruce Hole Well (in gpd).

### **5.3.1 Water Conservation Status Chart System**

During periods of drought, the UDWS steps up its implementation of water conservation measures. The **Water Conservation Status** that corresponds with the graphical Water Conservation Status chart system introduced above includes five levels: Normal, Stage 1, Stage 2, Stage 3, and Stage 4. The following graphic is utilized for public outreach to communicate the system's Water Supply & Demand Status:



**Examples of UNH/Durham Water Conservation Status  
Stage Graphics for Public Outreach**

The water supply and demand status and protocol for balancing the four water sources, as well as the water conservation measures to be implemented with each Stage is as follows:

**5.3.2 Normal** water system conditions are typically experienced between late October and May. Normal status is evident when the Lee Well and Spruce Hole Well are fully operational, and both the Oyster River and the Lamprey River have abundant available water for withdrawal by WTP. Even when the system status is Normal, residents are encouraged to use water responsibly and routinely practice water conservation, such as never leaving a running faucet unattended, watering lawns and gardens during early morning or evening hours, maintaining plumbing in good working order, repairing all leaks immediately, and replacing inefficient water fixtures and appliances with more efficient ones.

**5.3.3 Stage 1** is declared when the Lamprey River flow approaches 16 cfs, no substantial rain is in the near or extended forecast, and system demand is at or approaching 75% of the maximum available source water capacity at which time the Oyster River is used to supply the WTP. Whether the WTP is drawing from the Oyster River or the Lamprey River at this stage may depend on a variety of factors including operational conditions and/or the relative water quality of one surface source compared to the other. Currently, the WTP prefers to utilize the Lamprey River due mostly to its relative ease of treatment, however the Lamprey River is subject to withdrawal restrictions when instream flow reaches 16 cfs in accordance with the recently adopted Lamprey River Water Management Plan. It is expected that upon declaration of Stage 1 the WTP would cease withdrawing from the Lamprey River and start withdrawing from the Oyster River if it isn't already doing so. Regardless of river flow conditions, Stage 1 might also be triggered by a condition of degraded water quality, unusually high system water demand (or anticipated water demand in September when UNH classes begin), and/or an operational problem in the distribution system or at either the WTP, the Lee Well, or Spruce Hole Well.

Declaration of Stage 1 will be communicated through a public notification process (i.e. mailings, posters, emails, Town and University Websites, etc.) to Durham residents and the UNH Campus and to encourage the following voluntary water conservation measures:

- Limiting watering of gardens, landscaping and lawns to the hours of 8 PM and 7 AM;
- Refraining from washing vehicles and non-essential equipment (boats, motorcycles, etc.), or washing of pavement;
- Refraining from filling swimming pools, or other outdoor recreation that uses water;
- Generally limiting all unnecessary outdoor water use; and
- Check all indoor and outdoor water fixtures to ensure they are leak free.

Community members are also encouraged to conserve on indoor water use such as only doing full loads of laundry, reducing length of showers, etc. The goal of Stage 1 measures is to hold water demand at constant rate for at least a two week period following its implementation.

The Lamprey River Pump Station would be operated on a limited basis during Stage 1 in accordance with instream flow and stage level monitoring procedures as defined in the Lamprey River Water Management Plan, or else the pump station would not be activated and the Lamprey River will be reserved for emergency use. Stage 1 was formerly referred to as “Drought Watch”.

**5.3.4 Stage 2** is declared when the Lamprey River flow has been below 16 cfs for 10 or more days, no substantial rain is in the near or 7 day forecast, and system demand (as defined above) is  $\geq 80\%$  of the maximum available source water capacity. Upon the declaration of Stage 2, the WTP would return to withdrawing from the Lamprey River. Only water from storage in the Wiswall Reservoir would be used (i.e. maintaining reservoir inflow effectively equal to outflow) with a maximum drawdown rate of 1-inch

per day and maximum total drawdown of the Wiswall Reservoir of 18 inches (1.5 feet). Each day the UDWS would assess how many days remain until October 15th and to what degree the withdrawal from the Lee Well and/or Spruce Hole Well could be increased to optimize the maximum available capacity in order to satisfy demand needs through to October 15th. Regardless of river flow conditions, Stage 2 might also be triggered by a condition of degraded water quality, unusually high system water demand (or anticipated peak water demand in September), and/or an operational problem in the distribution system or at either the WTP, the Lee Well, or the Spruce Hole Well.

Declaration of Stage 2 will be communicated through a public notification process (i.e. mailings, posters, emails, news media, Town and University Websites, etc.) to Durham residents and the UNH Campus requiring the implementation of mandatory water conservation measures which are to include, but not limited to the following:

- A ban on washing vehicles and non-essential equipment, filling of private recreational pools, tubs, and spas holding more than 100 gallons, or washing of pavement;
- Watering of lawns, landscaping, and ornamental gardens is only permitted on even days of the month (trees, shrubs, plants, and vegetable gardens may be watered any day using a handheld container);
- A shut-down of non-essential water consumptive cooling systems where possible;
- Generally limiting all unnecessary outdoor water use;
- Check all indoor and outdoor water fixtures to ensure they are leak free;
- Community members are further encouraged to conserve on indoor water use where possible such as only doing full loads of laundry, reducing length of showers; and

A goal of decreasing average daily demand by 10 percent within two weeks of its implementation is currently being suggested for Stage 2.

If Stage 2 is declared, the Lamprey River Pump Station would be operated on a limited basis in accordance with instream flow and stage level monitoring procedures as defined in the Lamprey River Water Management Plan, or the pump station would not be activated and Lamprey River will be reserved for emergency use. Stage 2 was formerly referred to as “Drought Warning”.

**5.3.5 Stage 3** is declared when the Wiswall Reservoir is drawn down 18 inches (1.5 feet), the Lamprey flow has been below 16 cfs for 15 or more days, no substantial rain is in the near or 7-day forecast, system demand is  $\geq 85\%$  of the maximum available capacity, and the withdrawal from the Lee Well and/or the Spruce Hole Well is at its maximum safe yield. At this time, the WTP would switch back to the Oyster River and drawdown the Oyster River Reservoir a maximum of 5 feet while continuing to release enough water from the dam’s outlet structure to sustain an acceptable quantity of instream flow downstream from the Oyster River Reservoir. Regardless of river flow conditions, Stage 3 might also be triggered by a condition of degraded water quality, unusually high system water demand (or anticipated water demand in September when UNH classes begin) and/or an operational problem in the distribution system, at the WTP, the Lee Well, or the Spruce Hole Well.

Declaration of Stage 3 will be communicated through a public notice process (i.e mailings, posters, emails, news media, Town and University Websites, etc.) to the residents and the UNH Campus requiring the implementation of a heightened level of mandatory water conservation measures. The below mandatory measures are to include, but not limited to the following:

- A ban on washing vehicles and non-essential equipment, and filling of private recreational pools, or washing of pavement;
- No irrigating of lawns, landscaping or ornamental gardens;
- Watering of vegetable gardens only on even days of the month using irrigation systems using potable water, and during the hours of 8 PM and 7 AM (trees,

shrubs, plants, and vegetable gardens may be watered any day using a handheld container);

- Continued shut-down of non-essential water consumptive cooling systems;
- No consumptive use of water for outdoor fountains, artificial ponds and streams;
- Continued shut-down of non-essential water cooling systems; and

A goal of decreasing average daily demand by 25 percent is currently being suggested for Stage 3 within two weeks of its implementation.

If Stage 3 is declared, the Lamprey River Pump Station would be operated on a limited basis in accordance with instream flow and stage level monitoring procedures as defined in the Lamprey River Water Management Plan. Stage 3 was formerly referred to as Drought Pre-Emergency.

**5.3.6 Stage 4** (Water Supply Emergency) is declared when the forecast of no substantial rain continues, system demand is  $\geq 90\%$  of the maximum available capacity, the Oyster River Reservoir is drawn down 5 feet, or the Oyster River water quality has degraded to the point where the WTP has difficulty satisfactorily treating it. Declaring Stage 4 is effectively declaring a “water supply emergency” in accordance with the Town’s Water Ordinance Chapter 158 of the Town of Durham Code, and would be considered a “water supply inadequacy” as defined in Env-Dw 503. The UDWS would immediately notify NHDES of the nature and cause of the condition, and unless NHDES issued a written disapproval within 24 hours, the UDWS would begin drawing down the storage in the Wiswall reservoir beyond 18 inches below the Wiswall Dam spillway crest. Although, there is no record of the UDWS ever declaring a “water supply emergency”, the likelihood of doing so is elevated when the Oyster and Lamprey Rivers are at critically low flows for more than a few weeks. Regardless of river flow conditions, Stage 4 might also be triggered by a condition of seriously degraded water quality, an environmental accident (i.e. oil tanker spill near the Oyster River), unusually high system water demand (or anticipated water demand in September when UNH

classes begin), and/or an operational problem in the distribution system or at either the WTP, the Lee Well, and/or the Spruce Hole Well.

Declaration of Stage 4 will be communicated through a public notice process (i.e mailings, posters, emails, news media, Town and University Websites, etc.) to Durham residents and the UNH Campus mandating the implementation of strict water conservation measures. These measures are mandatory and include a ban on all non-essential outdoor water use as described below, but are not limited to the following:

- No washing of sidewalks, driveways, parking areas, buildings, gutters, tennis courts, patios or other paved areas;
- No washing of any motor vehicle or trailer;
- No washing of any boat, recreational vehicle or off road motorized vehicle;
- No operation of ornamental fountains or ponds except where necessary to support aquatic life when such use is kept to the minimum necessary;
- No filling, refilling or adding of water to any private swimming pool, wading pool, hot tub or spa;
- No use of water for recreational purposes such as water slides or yard play equipment;
- No use of permanently installed lawn or landscape sprinkling or irrigation systems;
- No use of hose end sprinklers;
- No watering of lawn, ornamental gardens or landscape areas. Trees, shrubs, plants, and vegetable gardens may be watered from a handheld container;
- Shut-down of all cooling systems and ice makers, with the exception of some systems that are critical to research and operations;
- No commercial laundry facilities;
- No daily use permits; and

A tentative goal of decreasing average daily demand by at least 40 percent is currently being suggested for Stage 4.



If Stage 4 is declared, the Lamprey River Pump Station will be operated in a controlled fashion and monitoring of stage levels and instream flow conditions will be conducted in accordance with the Lamprey River Water Management Plan. Stage 4 was formerly referred to as “Drought Emergency”.

The conditions triggering the above water conservation stages may be revised if supply increases (i.e. a new source is added) above the trigger levels set for each stage or demands are cut to the extent that the water system is capable of serving an increase population. These stages do not apply to water and irrigation systems supplied by their own separate water source (well or other) within the extent of the UDWS. A list of these systems will be maintained by the UDWS. Users of these systems must demonstrate that their systems are physically separated from the UDWS and will be subject to inspection for verification. A summary of water conservation measures individually implemented by the Town and UNH may be found in Appendix C.

#### **5.4 Enacting Water Conservation Measures During the Summer of 2010**

The summer of 2010 became hot and dry in August. Subsequently, flows in the UDWS’s sources reached points where they required the activation water conservation measures. The following excerpts provide the timeline of the outreach effort that UNH and the Town jointly performed. Articles appeared on both websites, and local newspapers published articles that notified Durham residents and those at UNH that water conservation measures were necessary. This effort was quite effective and at no time did the UDWS experience water demands that exceeded their supply capabilities. This 2010 drought resulted in declaration of Stage 2 which lasted in effect for approximately 3 weeks until substantial rain occurred and River flows returned to normal levels. The following graphics highlight some of the outreach components:

Article published Jul 14, 2010

### Durham residents asked to conserve water as river levels lower

DURHAM — Residents are asked to keep water conservation in mind as the extended hot and dry weather is causing low water levels in rivers that supply the municipal water system for the town and the University of New Hampshire.

Director of Public Works Mike Lynch said the water level at the Oyster River reservoir has reached the trigger point for Stage 1 of the town's water emergency response plan.

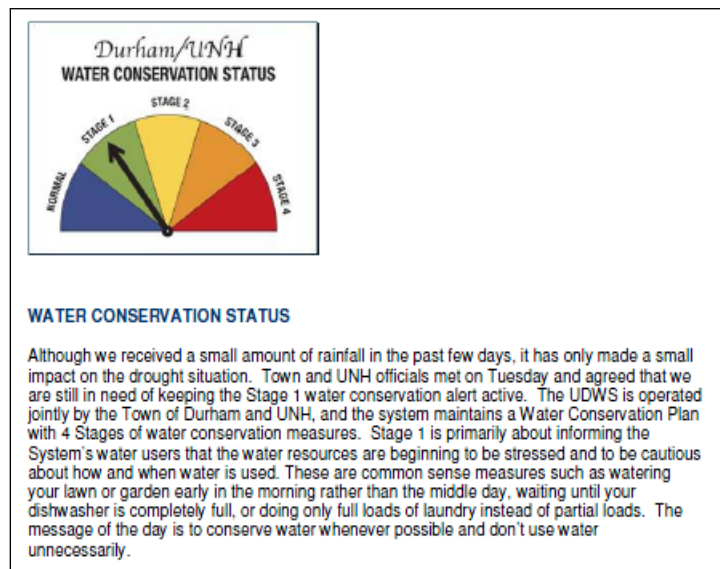
Lynch said Stage 1 isn't a critical point.

"It's a friendly reminder to conserve when you can," Lynch said. "It's meant to draw attention to the fact that it's hot out and we haven't had substantial rain in a long time."

The town's water emergency response plan has five levels, from Normal to Stage 4.

Voluntary conservation measures suggested by the town include limiting watering of gardens and lawns, less frequent vehicle washing and refraining from filling swimming pools.

**Excerpt from Foster's Daily Democrat Newspaper – July 14, 2010**



**Town of Durham Weekly Update Excerpt – August 26, 2010**

[Contact](#) [Directories](#) [Map](#) [MyUNH](#) [Emergency/Storm](#) Search

## Don't Let the Rain Fool You; Stage 1 Drought Conditions Remain in Effect

### Stage 1 Drought Conditions Remain in Effect

Dry weather and low water levels in rivers that supply the municipal water system for Durham and UNH are continuing into the start of the fall semester. Stage 1 of the UNH/Durham water emergency response plan remains in effect. The water emergency response plan has five levels, from Normal to Stage 4. Members of the UNH community and Durham residents normally practice water conservation, however current conditions call for voluntary conservation measures above and beyond normal practices. Recommended Stage 1 voluntary water conservation measures include limiting watering of gardens and lawns, less frequent vehicle washing and refraining from filling swimming pools. Additional water conservation tips include doing only full loads of laundry, taking shorter showers, shutting of the water while brushing your teeth and not leaving faucets running when not needed.

Unless we have significant and prolonged rainfall events, it is likely that water levels will reach the trigger point for Stage 2 mandatory water conservation measures within the next week or two. Stage 2 mandatory water conservation measures include a ban on vehicle washing and filling of swimming pools, limited watering of lawns and gardens, and a shutdown of non-essential water cooling systems. Future updates on water supply conditions will be posted on UNHtoday as warranted. Thank you for your efforts to conserve water.

### University of New Hampshire Website – August 26, 2010

Article published Aug 26, 2010

## Durham still on water plan watch despite recent rain

DURHAM — Despite what has seemed like an endless amount of rain the last few days, the town continues to ask residents to be cautious of their water use.

Mike Lynch, the town's director of public works, said Stage 1 of the UNH/Durham water response plan remains in effect. The water emergency response plan has five levels, from Normal to Stage 4.

Stage 1 of the plan call for voluntary conservation measures, such as limiting watering of gardens and lawns, less frequent vehicle washing and refraining from filling swimming pools, to name a few.

Lynch said the wet weather will provide a few days of relief but noted the extended forecast is calling for dry and hot conditions.

In addition, the town is getting ready to welcome back thousands of UNH students on Friday.

"It's definitely a concern," Lynch said. "Our water usage obviously goes up. You can't add 14,000 people all of a sudden and not use more water."

It's possible the town could soon move into Stage 2 of the water response plan. Stage 2 contains several mandatory water conservation measures, such as a ban on vehicle washing and filling of swimming pools, limited watering of lawns and gardens, and a shutdown of non-essential water-cooling systems.

"We'll make that call on a daily basis and just keep an eye on the water levels," Lynch said.

### Excerpt from Article Published in Foster's Daily Democrat Newspaper – August 26, 2010

### **5.5 - Town of Durham Water Ordinance**

The Code of the Town of Durham, NH includes Chapter 158 Water Ordinance. The Town updated this Code section in 2013 to include water conservation measures for all customers, water use restriction provisions, and enforcement for use during drought and water supply emergencies, specifications for water use and collection of fees, as well as backflow prevention and construction design standards.

### **5.6 - Additional Water Conservation Measures**

In addition to the items already mentioned in this plan, the Town of Durham's portion of the UDWS will explore other options for improving water efficiency. These options include:

- Exploring options for providing low-flow plumbing fixtures for retrofits of existing Town of Durham water customers.
- Performing water audits on the Town's high use customers to identify areas where they can improve efficiencies.
- Exploring the potential implementation of seasonal water rates or drought rates to implement during high-demand or drought situations.
- Requiring that the installation of new irrigation systems be performed by landscape irrigation professionals who are certified by EPA's WaterSense program to implement water efficiency best practices.
- Requiring new water use applicants to project water demand for both indoor and irrigation water use. These applications will also promote best practices for utilizing water efficiency measures with new construction.
- Consider adopting landscape water efficiency measures into the Town's water ordinance for all new customers and encourage these measures through outreach to all existing customers.

### **5.7 - Utility Membership in EPA's WaterSense Program**



The UDWS is considering applying to be utility member of the EPA's WaterSense program as a utility member. As a member, they will have access to public outreach materials, including:

- Ideas for promotional items, including bill stuffers, magnets, and stickers.
- Templates for a press release, letter-to-the-editor, and opinion-editorial column.
- Guidelines for using the program and partner logos and the promotional labels, as well as electronic versions of these marks.

The UDWS would utilize this information to augment their current outreach efforts, in print, on their website and through bill-stuffers.

## **SECTION 6 - IMPLEMENTATION**

The UDWS will implement the applicable public notification and outreach requirements to municipal governments within its service area in accordance with Env-Wq 2101.12; and the UDWS will continue to implement an educational outreach initiative for its customers to promote water conservation. These activities shall be completed by UDWS personnel under the supervision of a certified operator pursuant to Env-Dw 502.

In accordance with Env-Wq 2101.12, upon submission of this Water Conservation Plan copies of the Plan and the cover letter found in Appendix D will be sent out via certified mail to the following governing bodies and regional planning organization:

**Town of Durham Town Council**

Todd Selig, Town Administrator  
Town Hall  
15 Newmarket Road  
Durham, NH 03824

**Town of Lee Board of Selectmen**

David Cedarholm, Chairman  
Town Hall  
7 Mast Road  
Lee, NH 03861

**Strafford Regional Planning Commission**

Cynthia Copeland, AICP  
Executive Director  
2 Ridge Street, Suite 4  
Dover, NH 03820-2505

Copies of this Water Conservation Plan were also sent to the following organizations as a courtesy:

Lamprey River Local Advisory Committee  
Richard Snow, Chair  
P.O. Box 10037  
Candia, New Hampshire 03040-0037

Lamprey River Water Management Planning Area Advisory Committee  
Richard Kelley, Chair  
47 Stagecoach Road  
Durham, NH 03824

Oyster River Local Advisory Committee  
Eric Fiengenbaum, Chair  
6 Moharimet Drive  
Madbury, NH 03823

**Section 6.1 – Signature Page**

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

**TOWN OF DURHAM**

Owner Name (print): Michael Lynch, Director of Public Works

Owner Signature: 

Date: 7-8-14

**UNIVERSITY OF NEW HAMPSHIRE**

Owner Name (print): Paul Chamberlin, P.E., Associate Vice President for Facilities

Owner Signature: 

Date: 7/9/2014

Owner Name (print): Wesley East, Chief Operator, UNH Water Supply

Owner Signature: 

Date: 9 Jul 14

# **APPENDIX A**

## **Water Audit Worksheet**



## Water Audit Worksheet

	Year 1**	Year 2	Year 3
Please provide the dates/time period for which the water use data provided is relevant. (M/D/YR)	Start Date: <u>May, 2006</u> <u>May, 2007</u> End Date:	Start Date: <u>October 1, 2011</u> <u>March 31, 2012</u> End Date:	Start Date: <u>January 31, 2014</u> <u>February 28, 2014</u> End Date
Unit of Volume: <u>gal</u> (ex. gal, K gal, mil gal)			
a. <b>Volume From Own Sources:</b> The volume of treated water input to system from own production facilities.	298,913,000 (818,948 gpd)	141,113,750	22,934,440
b. <b>Water Imported:</b> Bulk water purchased to become part of the water supplied. Typically this is water purchased from a neighboring water utility.	N/A	N/A	N/A
c. <b>Water Exported:</b> Bulk water sold and conveyed out of the water distribution system. Typically this is water sold to a neighboring water utility.	N/A	N/A	N/A
d. <b>Water Supplied</b> <b>a + b - c</b>	818,948 gal/day	141,113,750	22,934,440
e. <b>Billed Metered Use:</b> All metered consumption which is billed. This includes all groups of customers such as domestic, commercial, industrial or institutional. It DOES NOT include water sold to neighboring utilities (Water Exported) which is metered and billed and DOES NOT include any unmetered use. For example, if a water meter IS NOT used to determine hydrant flushing volumes, even if volume is estimated by flow rate and time, then flushing should not be included in this calculation.	(a) UNH = 457,121 gpd (b) Town = <u>274,269 gpd</u> (c) 731,390 gpd	(c) UNH = 74,720,874 (d) Town = <u>45,438,262</u> (c) 120,159,136	(a) UNH = 13,560,377 (b) Town = <u>7,887,211</u> (c) 21,447,588
f. <b>Unbilled Metered Use:</b> Metered Consumption which is for any reason unbilled.	N/A	N/A	N/A
h. <b>Unaccounted for Water</b> <b>d - e - f</b>	87,558 gpd	20,954,614	1,486,852
i. <b>% Unaccounted for Water</b> <b>(h / d) x 100</b>	10.7	14.8	6.5
j. <b>Billed Unmetered Use:</b> All billed consumption which is calculated based on estimates or norms but is not metered.	N/A	N/A	N/A
k. <b>Unbilled Unmetered:</b> Any kind of Authorized Consumption which is neither billed nor metered. In most water utilities it is a small component which is very often substantially overestimated. (Examples: fire fighting, flushing of mains and sewers, irrigation, swimming pools, street cleaning, frost protection, construction sites etc.)	Est 15,000 gpd for leak which was repaired, plus 11,000 gal/day for spring and fall flushing = 26,000 gpd	2,000,000	
l. <b>Authorized Consumption:</b> <b>e + f + j + k</b>	757,390 gpd	122,159,136	21,447,588

m.	<b>Source Meter Error (+/-):</b> An estimate or measure of the degree of inaccuracy in the meters measuring the Volume from own sources. This information may be determined by referring to the meter calibration certificate. Please also indicate if the meter over or under registered with a +/-.	+3.6% WTP +9.5% Lee Well Flow Weighted Error = 5.7% or 44,370 gpd		
n.	<b>Water Losses:</b> <b>d +/- m - l</b>	818,948 - 44,370 - 757,390 = 17,188 gpd		
o.	<b>Unauthorized Consumption:</b> Includes water illegally withdrawn from hydrants, illegal connections, bypasses to consumption meter or meter reading equipment tampering. If a good estimate is not available, insert zero.	0	0	0
p.	<b>Customer Meter Inaccuracies:</b> Apparent water losses caused by the collective under-registration of customer water meters. If the auditor has substantial data from service meter testing to arrive at volume of such losses, this volume may be entered directly. If meter testing data is not available, please insert zero, and fill out and attach Appendix B. Comprehensive Service Meter Log. Appendix B. is located on the DES website. See page 1 of the compliance form for navigation instructions.	6.1% or 44,615 gpd		
q.	<b>Data Handling Errors (+/-):</b> Apparent water losses caused by systematic data handling errors in the meter reading and billing system. If data handling errors are unknown, insert zero.	0		
r.	<b>Apparent Losses:</b> <b>o + p +/- q</b>	44,615 gpd		
s.	<b>Real Losses:</b> <b>n - r</b>	17,188 - 44,615 = - 27,427 gpd		
t.	<b>Non-Revenue Water:</b> <b>n + f + k</b>	17,188 + 0 + 26,000 = 43,188 gpd		

Note \* This information was modified from the American Water Works Association (AWWA) M36 2009 manual (third addition).

\*\* This information is from May 2006 to May 2007 and compiled in a report by Earth Tech entitled *Water Audit Leak Detection for Durham, NH and UNH*, dated March 2008.

## **APPENDIX B**

### **Waiver Letter**



DEPARTMENT OF PUBLIC WORKS  
TOWN OF DURHAM  
100 STONE QUARRY DRIVE  
DURHAM, NH 03824  
603/868-5578  
FAX 603/868-8063

July 1, 2014

Stacey Herbold  
NHDES Drinking Water and Groundwater Bureau  
29 Hazen Drive; P.O. Box 95  
Concord, NH 03302-0095

SUBJECT: Water Conservation Plan | UNH/Durham Water System  
Durham, NH

Dear Ms. Herbold,

In accordance with Env-Wq 2101.23, the Town of Durham hereby request a waiver of conducting quarterly billing of all water account holders (i.e. customers) as required by Env-Wq 2101.11(d). The Town has had the practice of billing all customers twice per year and it will be result in a significant cost impact to increase the frequency of billing to 4 times per year. The Town plans to upgrade its water billing software in 4 years and will incorporate a routine of quarterly billing at that time. Please also note, the UDWS began reading meter monthly this past year in order to track leaks and address problems such as leaking toilets that have a tendency to generate large unexpected bill if left unattended.

Please contact me if you have any concerns or questions related to this subject.

Sincerely,

Michael Lynch  
Director of Public Works

# **APPENDIX C**

## **Water Conservation Summary Table**

**UNH/Durham Water System – Water Conservation Summary Table**

Stage	Town Water Conservation Measures (potable water only)	UNH Water Conservation Measures (potable water only)	Triggers (1 or more may apply)	Operational Measures & Goals
<p><b><u>Stage 1</u></b> Voluntary Outdoor Water Use Restrictions</p>	<ul style="list-style-type: none"> <li>• Limit watering of gardens, landscaping and lawns, and during the hours of 8 PM and 7 AM.</li> <li>• Refrain from washing vehicles and non-essential equipment (boats, motorcycles, etc.), or washing of pavement.</li> <li>• Refraining from filling private recreational pools, tubs and spas.</li> </ul>	<ul style="list-style-type: none"> <li>• Limit watering of gardens, landscaping and lawns.</li> <li>• Post signs in residence halls asking for specific water conservation measures from students.</li> </ul>	<ul style="list-style-type: none"> <li>• Lamprey River flow approaches 16 cfs.</li> <li>• No substantial rain is in the near or extended forecast.</li> <li>• System demand is at or approaching 75% of the maximum available source water capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• UNH Water Treatment Plant source water is taken from the Oyster River, and/or from Lamprey instream flow River until flow reaches 16 cfs.</li> <li>• Lee Well withdrawal held constant.</li> </ul> <p><b>Goal:</b> Decrease or hold average daily demand constant.</p>

Stage	Town Water Conservation Measures (potable water only)	UNH Water Conservation Measures (potable water only)	Triggers (1 or more may apply)	Operational Measures & Goals
<p><b><u>Stage 2</u></b></p> <p>Mandatory Outdoor Water Use Restrictions</p>	<ul style="list-style-type: none"> <li>• No washing of vehicles and non-essential equipment.</li> <li>• No filling of private recreational pools, tubs, and spas holding more than 100 gallons.</li> <li>• No washing of pavement.</li> <li>• No Watering of lawns, landscaping, and ornamental gardens is only permitted on even days of the month (trees, shrubs, plants, and vegetable gardens may be watered any day using a handheld container).</li> <li>• Shut-down of non-essential water consumptive cooling systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Stop adding water to the outdoor pool.</li> <li>• No watering of Memorial Field for field hockey practices.</li> <li>• Defer annual hydrant flushing.</li> <li>• Defer filling large tanks such as wave tanks at Chase Engineering.</li> <li>• No washing of vehicles.</li> </ul>	<ul style="list-style-type: none"> <li>• Lamprey River flow has been below 16 cfs for 10 or more days.</li> <li>• No substantial rain is in the near or 7 day forecast.</li> <li>• System demand is at or approaching 80% of the maximum available source water capacity.</li> </ul>	<ul style="list-style-type: none"> <li>• UNH Water Treatment Plant source water is taken from the Lamprey River and water is drawn from available Wiswall Reservoir storage at maximum rate of 1 inch per day and a maximum depth of 1.5 feet.</li> <li>• Oyster River Reservoir storage is allowed to recover and then preserved for Stage 3.</li> <li>• Withdrawal from the Lee Well is gradually increased up to its maximum safe yield.</li> </ul> <p><b>Goal:</b> Decrease average daily demand by 10 percent within two weeks of Stage 2 implementation.</p>

Stage	Town Water Conservation Measures (potable water only)	UNH Water Conservation Measures (potable water only)	Triggers (1 or more may apply)	Operational Measures & Goals
<p><b><u>Stage 3</u></b></p> <p>Mandatory Outdoor Water Use Restrictions</p>	<ul style="list-style-type: none"> <li>• No washing of vehicles and non-essential equipment.</li> <li>• No filling of private recreational pools.</li> <li>• No washing of pavement.</li> <li>• No irrigating of lawns, landscaping or ornamental gardens.</li> <li>• Watering of vegetable gardens only on even days of the month using irrigation systems using potable water, and during the hours of 8 PM and 7 AM (trees, shrubs, plants, and vegetable gardens may be watered any day using a handheld container).</li> <li>• Continued shut-down of non-essential water consumptive cooling systems.</li> <li>• No consumptive use of water for outdoor fountains, artificial ponds and streams.</li> </ul>	<ul style="list-style-type: none"> <li>• Defer filling the campus heating system.</li> <li>• Switch to paper plates and plastic utensils in the dining halls.</li> <li>• No watering Memorial Field for field hockey games.</li> <li>• Shut-down of non-essential water consumptive cooling systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Wiswall Reservoir is drawn down 18 inches (1.5 feet).</li> <li>• Lamprey flow has been below 16 cfs for 15 or more days.</li> <li>• No substantial rain is in the near or 7day forecast.</li> <li>• System demand is at or approaching 85% of the maximum available capacity.</li> <li>• The withdrawal from Lee Well is at its maximum safe yield.</li> </ul>	<ul style="list-style-type: none"> <li>• UNH Water Treatment Plant source water is taken from the Oyster River and water is drawn from available Oyster River Reservoir storage to a maximum depth of 5 ft.</li> <li>• Withdrawal from the Lee Well is maintained at maximum safe yield.</li> </ul> <p><b>Goal:</b> Decrease average daily demand by 25 percent below Stage 1 average demand within two weeks of Stage 3 implementation.</p>



Stage	Town Water Conservation Measures (potable water only)	UNH Water Conservation Measures (potable water only)	Triggers (1 or more may apply)	Operational Measures & Goals
<b><u>Stage 4</u></b> (Emergency) Mandatory Outdoor Water Use Restrictions	No outdoor use of potable water including: <ul style="list-style-type: none"> <li>• No washing of any motor vehicle or trailer, boat or recreational vehicle, any form of pavement.</li> <li>• No operation of ornamental fountains or ponds except where necessary to support aquatic life when such use is kept to the minimum necessary.</li> <li>• No filling, refilling or adding of water to any private swimming pool, wading pool, hot tub or spa.</li> <li>• No use of water for recreational purposes (i.e. as water slides or yard play equipment).</li> <li>• No use of permanently installed lawn or landscape sprinkling or irrigation systems.</li> <li>• No use of hose end sprinklers.</li> <li>• No watering of lawn, gardens, trees, shrubs, plants, or landscape areas except from a handheld container.</li> </ul>	<ul style="list-style-type: none"> <li>• Shut down essential water consumptive cooling systems (dining halls).</li> <li>• Consider closing the campus if Stage 4 conditions are expected to continue for a week or more.</li> </ul>	<ul style="list-style-type: none"> <li>• Town Administrator declares a Water Supply Emergency.</li> <li>• Continued forecast of no substantial rain continues.</li> <li>• System demand is <math>\geq 90\%</math> of the maximum available capacity.</li> <li>• Oyster River Reservoir is drawn down 5 feet, or the Oyster River water quality has degraded beyond the Water Treatment Plant's ability.</li> <li>• Other source water or operational failures/disasters, or severe drought conditions causing Water Supply Emergency.</li> </ul>	<ul style="list-style-type: none"> <li>• UNH Water Treatment Plant source water is taken from the Lamprey River and water is drawn from Wiswall Reservoir storage below 1.5 feet.</li> <li>• Withdrawal from the Lee Well is maintained at maximum safe yield.</li> </ul> <p><b>Goal:</b> Continue decreasing or maintain average daily demand below Stage 3 average demand.</p>

# **APPENDIX D**

## **Letter to Neighbors**



University of  
New Hampshire

UNH/DURHAM WATER SYSTEM

UNH – Water Utilities  
Tel: (603) 862-1390  
Fax: (603) 862-0143



Town of Durham Public Works  
Tel: (603) 868-5578  
Fax: (603) 868-8063

July 1, 2014

Todd Selig, Town Administrator  
Town Hall  
15 Newmarket Road  
Durham, NH 03824

Subject: Water Conservation Plan for the UNH/Durham Water System | Durham, New Hampshire

Dear Mr. Selig:

Applicants applying to the New Hampshire Department of Environmental Services (NHDES) for approval of new drinking water sources for Community Water Systems and applicants for Large Withdrawal Permits are subject to the requirements of Env-Wq 2101, *Water Conservation Rules*. As part of the UNH/Durham Production Well #2 (DGD-PW2) application process, the UDWS is providing the enclosed Water Conservation Plan for your review and comment. The UDWS is also required to perform the following Public Notification tasks:

- Provide copies of a summary of Env-Wq 2101 (prepared by NHDES) and the 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.
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We respectfully request that you review the enclosed materials, provide any comment on the Water Conservation Plan you may have, and promote water conservation practices within your jurisdictional area. You have twenty-one (21) days to review and provide comment to NHDES on the UDWS's updated 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:

Stacey Herbold  
NHDES-DWGB  
P. O. Box 95  
Concord, NH 03302-0095

Thank you for your time and cooperation.

Sincerely,

Michael Lynch  
Director of Public Works



University of  
New Hampshire

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July 1, 2014

David Cedarholm, Chairman  
Board of Selectmen  
Town Hall  
7 Mast Road  
Lee, NH 03861

Subject: Water Conservation Plan for the UNH/Durham Water System | Durham, New Hampshire

Dear Mr. Cedarholm:

Applicants applying to the New Hampshire Department of Environmental Services (NHDES) for approval of new drinking water sources for Community Water Systems and applicants for Large Withdrawal Permits are subject to the requirements of Env-Wq 2101, *Water Conservation Rules*. As part of the UNH/Durham Production Well #2 (DGD-PW2) application process, the UDWS is providing the enclosed Water Conservation Plan for your review and comment. The UDWS is also required to perform the following Public Notification tasks:

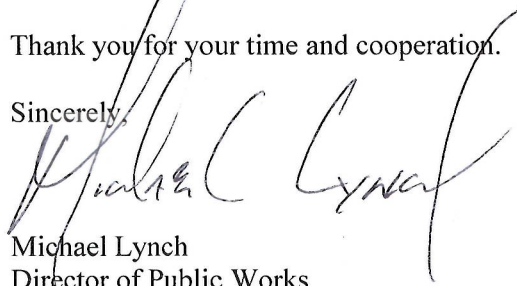
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July 1, 2014

Cynthia Copeland, AICP  
Executive Director  
2 Ridge Street, Suite 4  
Dover, NH 03820-2505

Subject: Water Conservation Plan for the UNH/Durham Water System | Durham, New Hampshire

Dear Ms. Copeland:

Applicants applying to the New Hampshire Department of Environmental Services (NHDES) for approval of new drinking water sources for Community Water Systems and applicants for Large Withdrawal Permits are subject to the requirements of Env-Wq 2101, *Water Conservation Rules*. As part of the UNH/Durham Production Well #2 (DGD-PW2) application process, the UDWS is providing the enclosed Water Conservation Plan for your review and comment. The UDWS is also required to perform the following Public Notification tasks:

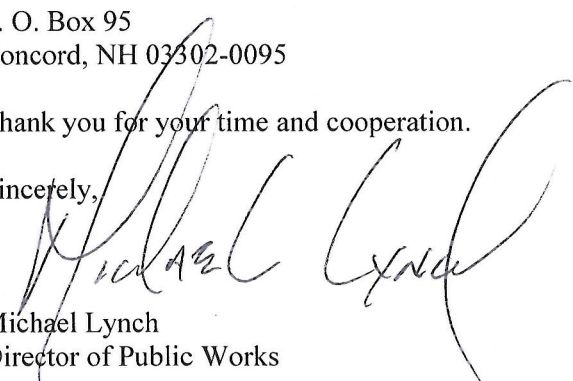
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Michael Lynch  
Director of Public Works



University of  
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July 1, 2014

Lamprey River Local Advisory Committee  
Richard Snow, Chair  
P.O. Box 10037  
Candia, New Hampshire 03040-0037

Subject: Water Conservation Plan for the UNH/Durham Water System | Durham, New Hampshire

Dear Ms. Copeland:

Applicants applying to the New Hampshire Department of Environmental Services (NHDES) for approval of new drinking water sources for Community Water Systems and applicants for Large Withdrawal Permits are subject to the requirements of Env-Wq 2101, *Water Conservation Rules*. As part of the UNH/Durham Production Well #2 (DGD-PW2) application process, the UDWS is providing the enclosed Water Conservation Plan as a courtesy for your review. The UDWS is also required to perform the following Public Notification tasks:

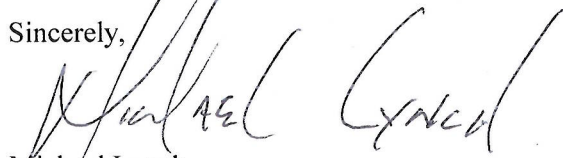
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Michael Lynch  
Director of Public Works



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July 1, 2014

Oyster River Local Advisory Committee  
Eric Fiegenbaum, Chair  
6 Moharimet Drive  
Madbury, NH 03823

Subject: Water Conservation Plan for the UNH/Durham Water System | Durham, New Hampshire

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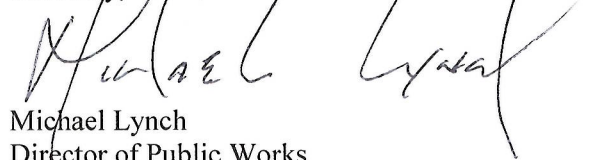
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