



The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**



**Thomas S. Burack, Commissioner**

**WATER CONSERVATION PLAN**

December 8, 2016

Douglas Steele II  
Dover Water Department  
288 Central Avenue  
Dover, New Hampshire 03820

**Subject: Dover – Dover Water Department (PWS ID#: 0651010)  
Water Conservation Plan**

Dear Mr. Steele:

This letter is to confirm that the Water Conservation Plan (“WCP”), approved on June 10, 2014 by the Department of Environmental Services (“DES”) Drinking Water and Groundwater Bureau, for Dover Water Department is active and shall be implemented.

The WCP was originally developed as a requirement of the permitting process for Well DWP-PW2 near Willand Pond (DES Design Review #999345). Due to the water system’s lack of control of the well’s Sanitary Protective Area, DES has not issued community well siting approval or a large groundwater withdrawal permit for this well.

On June 15, 2016, the DES Drinking Water and Groundwater Bureau issued approval of one new large community production well (Well DPH #1) and a large groundwater withdrawal permit for Well DPH #1 for the Dover Water Department. Implementation of the WCP, in accordance with Env-Wq 2101, is required as part of the conditions of the large community well siting approval and large groundwater withdrawal permit. Therefore, the WCP that was approved on June 10, 2014 is active and shall be implemented.

As stated in the June 10, 2014 WCP approval letter, WCP approval is based on the following conditions:

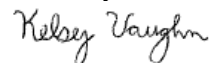
1. No later than the source activation, all source and distribution meters shall be installed.
2. No later than the source activation date, source meters and distribution meters shall be read at least monthly - no sooner than 27 days and no later than 33 days from the last meter reading.
3. All service connections shall remain metered and all new connections shall be installed with a meter and a remote reading device.
4. Service meters shall continue to be read at least on a quarterly basis.
5. No later than source approval, a water balance, the difference between the system input volume and the metered authorized consumption, shall be reported annually to DES. The water balance shall be reported by March 1 for the prior year using the online reporting tool.

6. A conservation rate structure shall continue to be implemented for residential customers. Consumers shall continue to be charged based on the amount of water each residence uses and the rate shall be structured so that the cost per gallon(s) is either constant or increasing with the amount of water used.
7. Customers shall continue to be billed at least quarterly.
8. Within one year of source approval, a leak detection and repair program shall be implemented in accordance with the WCP – 25% of the system to be surveyed for leaks per year.
9. Within one year of source approval, a water efficiency and outreach program shall be implemented in accordance with the WCP.
10. No later than the source approval date, a meter maintenance plan for all meters shall be implemented in accordance with the schedule proposed in the WCP.
11. From the date of the WCP Approval, any non-metallic pipes to be installed in the system shall be outfitted with detectable tracer tape or detectable tracer wire, or be GPS located and maintained in a GIS system.
12. The system shall continue reporting to the DES Water Use Registration and Reporting.
13. Every three years from the date of the WCP Approval, a *Water Conservation Plan Ongoing Compliance Form* shall be submitted to DES documenting how the system has maintained compliance with the WCP. The following records shall be maintained by the water system to include with the report:
  - a. A leak log including the date a leak was discovered, the date a leak was repaired, the type of leak (ex. water main, service line, hydrant, valve), and the approximate size of the leak (gpm).
  - b. The title and date of all water efficiency promotional events or actions.
  - c. Date of installation and replacement of all meters and testing and calibration records.
14. Proposed changes to the WCP shall not be implemented unless approved by DES.

A copy of the WCP as well as the online *Annual Water Balance Reporting Form* and the *Water Conservation Plan Ongoing Compliance Reporting Form* may be located by going to the DES website ([www.des.nh.gov](http://www.des.nh.gov)), clicking on the “A-Z List” in the top right corner of the page, and clicking “Water Conservation.” The WCP can be located by clicking the “Approved Plans” link under “Permits,” and the forms may be found under “Forms/Applications.”

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

Sincerely,



Kelsey Vaughn  
Water Conservation Program  
Drinking Water and Groundwater Bureau

ec: Bill Boulanger, City of Dover  
Christine Bowman and Stacey Herbold, DES



The State of New Hampshire  
**DEPARTMENT OF ENVIRONMENTAL SERVICES**



**Thomas S. Burack, Commissioner**

**WATER CONSERVATION PLAN APPROVAL**

June 10, 2014

Doug Steele  
Dover Water Department  
271 Mast Road  
Dover, New Hampshire 03820

Subject: Dover, Dover Water Department (PWS ID#: 0651010)  
Water Conservation Plan Approval

Dear Mr. Steele:

On May 19, 2014, the New Hampshire Department of Environmental Services (“DES”) Drinking Water and Groundwater Bureau received a Water Conservation Plan (the “WCP”), signed on May 12, 2014, for the Dover Water Department located in Dover, New Hampshire. Pursuant to RSA 485:61 and Env-Wq 2101, community water systems seeking permits from DES for new sources of groundwater shall submit a water conservation plan to DES. Based on review of the WCP, DES has determined the WCP complies with Env-Wq 2101, *Water Conservation* rules.

Pursuant to Env-Wq 2101, the Town of Rollinsford, the Town of Madbury, and the Strafford Regional Planning Commission were provided a copy of the WCP, along with other required materials.

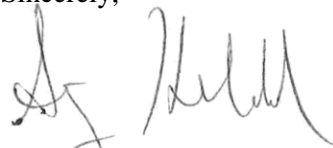
DES approves the WCP based on the following conditions:

1. No later than the source activation, all source and distribution meters shall be installed.
2. No later than the source activation date, source meters and distribution meters shall be read at least monthly - no sooner than 27 days and no later than 33 days from the last meter reading.
3. All service connections shall remain metered and all new connections shall be installed with a meter and a remote reading device.
4. Service meters shall continue to be read at least on a quarterly basis.
5. No later than source approval, a water balance, the difference between the system input volume and the metered authorized consumption, shall be reported annually to DES. The water balance shall be reported by March 1 for the prior year using the online reporting tool.
6. A conservation rate structure shall continue to be implemented for residential customers. Consumers shall continue to be charged based on the amount of water each residence uses and the rate shall be structured so that the cost per gallon(s) is either constant or increasing with the amount of water used.
7. Customers shall continue to be billed at least quarterly.

8. Within one year of source approval, a leak detection and repair program shall be implemented in accordance with the WCP – 25% of the system to be surveyed for leaks per year.
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11. From the date of this WCP Approval, any non-metallic pipes to be installed in the system shall be outfitted with detectable tracer tape or detectable tracer wire, or be GPS located and maintained in a GIS system.
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  - a. A leak log including the date a leak was discovered, the date a leak was repaired, the type of leak (ex. water main, service line, hydrant, valve), and the approximate size of the leak (gpm).
  - b. The title and date of all water efficiency promotional events or actions.
  - c. Date of installation and replacement of all meters and testing and calibration records.
14. Proposed changes to the WCP shall not be implemented unless approved by DES.

Please feel free to contact me with any questions at (603) 271-0659 or via e-mail at [stacey.herbold@des.nh.gov](mailto:stacey.herbold@des.nh.gov) .

Sincerely,



Stacey Herbold  
Water Conservation Program  
Drinking Water and Groundwater Bureau

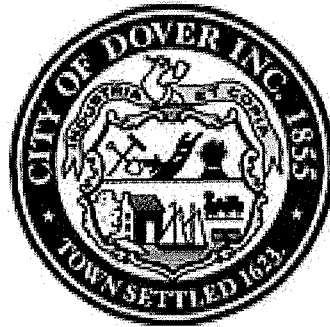
ec: Bill Boulanger, City of Dover  
Christine Bowman, NHDES  
Town of Madbury  
Town of Rollinsford  
Strafford Regional Planning Commission  
Jim Flood, Underwood Engineers  
Michael Unger, Underwood Engineers

*Code: AC*

RWD 5/19/2014

# WATER CONSERVATION PLAN

CITY OF DOVER, NH



May 2014

**Underwood Engineers**  
**Portsmouth and Concord, New Hampshire**  
FILE NO. 1820

# Dover Water Conservation Plan

## I. Introduction

### A. City of Dover Public Water System

Owner: City of Dover  
C/o Douglas Steele, Community Services Director  
288 Central Avenue  
Dover, NH 03820

Conservation Plan Designer  
William Boulanger, Superintendent of Public Works and Utilities  
288 Central Avenue  
Dover, NH 03820

### B. System Overview

1. Dover is a growing community with limited additional water supply available to accommodate future demand.
2. Dover has a total of 8,600 connections to the water system.
  - a) Residential connections: 7,800
  - b) ICI connections: 800
  - c) Municipal connections: 31
3. Currently, there are no connections in Dover that use more than 20,000 gpd. The following is a list of large water users connected to the Dover system and description of their activities:

<u>Customer Name</u>	<u>Activities</u>
Strafford County	Courthouse, Jail, Nursing Home, Government
Wentworth Douglas Hospital	Hospital
The New Meadows Inc.	Apartment Complex
Plaza Drive Investment Properties	Apartment Complex
Redden Gardens	Apartment Complex
Dover Housing Authority	Federal Housing
Granite Village Apartments	Apartment Complex
Sawyers Mills Assoc. Inc.	Apartment Complex
Liberty Mutual Insurance	Commercial
Jensen's Residential Communities	Mobile Home Park
White Cliff Apartments	Apartment Complex
Dover Rehabilitation	Rehabilitation Center
Holgate Limited Partnership	Apartment Complex
Windshire Gardens	Apartment Complex

Langdon Place of Dover	Assisted Living
James W Varney	Dry Cleaners
Dover Mills LP	Commercial Space/Residential
Olde Madbury Lane Inc.	Apartment Complex
Comfort Inn & Suites	Hotel
LaFrance Bowden Hospitality II	Hotel

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

1. Dover experiences seasonal fluctuation in water use each year. During the summer and prolonged periods with little rainfall during the growing season, water use spikes to accommodate the irrigation of landscaped areas.
2. Dover has been the fastest growing community in the State of New Hampshire in recent years. The 2010 Census showed an increase in population over the 2000 Census from 26,884 to 29,987. Dover does not have a significant seasonal fluctuation in population, although during the summer months, a portion of the student population from the University of New Hampshire leaves. That summer population loss is more than offset by summer landscape and irrigation demand on the water system.
3. Maximum daily yield of existing sources occurs during the summer.
4. Average daily use for the system is 3.0 MGD.
5. Maximum daily use for the system is 4.3 MGD.
6. Minimum hourly flow for the system is 900 GPM.

## II. System Side Management

### A. Source Meters

1. Dover currently draws water from eight well sites. A ninth site adjacent to Willand Pond is currently proposed to have two additional wells. The Willand Pond wells will be metered at the wellheads when approved and put online.
2. The Smith Well and Cummings Well are located in the same aquifer and pump water from the wellheads in a common pipe to the Lowell Avenue Water Treatment Plant where the combined flow is metered. The Smith Well has its own meter at the source, so flow from Cummings Well can be calculated as the difference of Lowell WTP and Smith Well. The City intends to install a meter at Cummings Well as part of the proposed Willand Pond Well capital project.
3. The Bouchard Well pumps water to the French Cross Water Treatment Plant. Flow is metered at the wellhead.
4. The Calderwood Well and Campbell Well are located on Glen Hill Road. Both are metered at the wellhead.
5. The Griffin and Ireland Wells are located in the Pudding Hill aquifer. Both are metered at the wellhead.

6. The Hughes well is located adjacent to Barbados Pond and is metered at the wellhead.
7. All distribution meters are placed after any water consuming processes.
8. Water is treated at three active water treatment facilities:
  - a) Griffin WTP
    - a. Treats water from Griffin Well
  - b) Lowell Ave. WTP
    - a. Treats water from Smith and Cummings Wells
  - c) French Cross Rd. WTP
    - a. Treats water from Bouchard Well
  - d) Water at the remaining wells all receive chemical addition for disinfection and corrosion control prior to distribution.

The following table lists Well and Production Meter information:

Source	Meter Manufacturer	Size	Year Installed	Most Recent Calibration
Griffin WTP	Krohne	6"	1997	2005
Griffin Well	Fischer Porter	4"	Pre 1995, 1980 +/-	Unknown
Ireland Well	Badger Meter	6"	2007	2007
Hughes Well	Badger Meter	6"	2007	2007
French Cross Rd. WTP	Krohne	8"	2006	2006
Bouchard Well	Badger Meter	6"	2007	2007
Calderwood Well	Badger Meter	6"	2013	2013
Campbell Well	Badger Meter	6"	2007	2007
Lowell Ave. WTP	Fischer Porter	8"	Unknown	2005
Smith Well	Badger Meter	6"	2013	2013



Source	Meter Manufacturer	Size	Year Installed	Most Recent Calibration
Cummings Well	No meter, production measured at Lowell Ave. WTP			

9. The Willand Pond wells pending development and connection to the system will have wellhead metering. A request for proposals to design the extension of supply lines and wellhead development is expected in 2014. The construction of improvements is anticipated in 2014 at which time the meter information will be available.
  10. Wellhead flow meters will be tested and calibrated annually starting August 2014 (after annual budget is passed). If meters repeatedly prove to be accurate, testing will be less frequent (every 2 – 3 years), pending approval by DES.
  11. Source flow meters are read daily with the SCADA system. Flows are downloaded into an Excel spreadsheet. The City recently purchased an Excel recorder to help keep track of the well and treatment facility flow meters.
  12. All source meters will be selected, installed, and maintained in compliance with “Manual of Water Supply Practices M6. Water Meters-Selection, Installation, Testing, and Maintenance” (American Water Works Association, 1999).
- B. Service Meters
1. There are 8,600 service meters in place.
  2. Separate irrigation meters are permitted but not required. There are currently 785 irrigation meters, but the breakdown of residential and ICI is unknown. Irrigation meters are left in year round, and are not charged for sewage rates.
  3. 8,000 service meters are read quarterly.
  4. 600 meters are read monthly, most are industrial, and some are residential.
  5. Service meters are radio read.
  6. It takes 9 days to read the entire set of service meters.
  7. Any meters that are brought up for abatement are tracked for consumption and any leaks, and tested for accuracy. The City averages about 13 abatements per month (156 per year).
  8. Meter testing and replacement is occurring annually. 5/8” and 3/4” and 1” are replaced not calibrated. Size and age are logged in our Water and Sewer Billing Office. A breakdown of residential and industrial meters will be completed in the next year to aid in meter replacement.
    - a) Meters 0-5 years old: 2370 (28%)
    - b) Meters 5-10 years old: 2746 (32%)

- c) Meters 10+ years old: 3478 (40%)
  - 9. Approximately 200 meters are replaced each year, which is 2-3% of total meters. Dover is currently seeking more funding to replace additional meters, with a goal of 5% of meters being replaced per year.
  - 10. Dover's current priority is the replacement, testing, and confirmation of correct meter size for the larger industrial user meters. These larger meters have the most potential for impacting metered water records if they are not accurate.
  - 11. The City is currently in the process of purchasing e-meters from Badger which will not require replacement for 20 years. These meters send readings to City Hall directly, and will not require drive by readings.
  - 12. To ensure all meters are sized correctly, the City currently uses the AWWA standard for sizing meters.
- C. Water Balances and Water Audits
1. An annual water balance will be submitted to DES by March 1 for the prior year using the online reporting form. A water balance is the difference between the system input volume and metered consumption.
  2. Dover shall prepare and submit a water audit and response plan if more than 15% of system input volume cannot be accounted for by authorized metered consumption. The response plan shall identify how the water system intends to reduce the percentage to below 15% within two years.
  3. The most recent Water Audit was completed in 2014 by Underwood Engineers (attached). The estimated non-revenue water was 8% for the study year (2012 after adjusting for a large leak found and fixed by the City in June 2013).
    - a) System input value: 745.1 Million Gallons
    - b) Authorized meter consumption: 685.8 Million Gallons

**Water Balances for Recent Years**

Year	Total of Source Meters (MG)	Total of Billed & Unbilled Metered Flow (MG)	Unaccounted for Water (MG)	Unaccounted for Water (%)
2012 Raw Data	1,114	685	428	39%
2012 Adjusted (Study Year) <sup>1</sup>	745	685	60	8%
2013 <sup>2</sup>	982	688	294	30%
2013, 3 <sup>rd</sup> and 4 <sup>th</sup> quarter <sup>2</sup>	436	374	62	14%

1) Study year indicates estimated production after correcting for large leak that the City fixed in June 2013.

- 2) Large leak was corrected in June 2013, so 3<sup>rd</sup> and 4<sup>th</sup> quarter are more representative of current conditions.
  4. Because the attached water audit performed by Underwood Engineers shows that once the major leak was fixed in June 2013, UAW drops down to 8% for the 2012 study year. A significant decrease in UAW is also represented by the 3<sup>rd</sup> and 4<sup>th</sup> quarter billing periods of 2013, where UAW is at 14%.
  5. A proactive leak detection effort plan is laid out in the following section to ensure leaks are found and fixed early.
  6. A water audit will be calculated in accordance with “Manual of Water Supply Practices M36, Water Audits and Loss Control Programs” (American Water Works Association, 2009).

#### D. Leak Detection

1. The City previously used Guterman Loggers which were found to be unreliable. The City applied to the State of NH for a leak detection grant. The grant was approved to cover the entire City and was completed in 2013.  
Summary finding for the most recent leak detection survey:
  - a) Date: 6/23/13
  - b) Number of leaks found:
    - a. 3 hydrant: 3 gpm
    - b. 3 curb stop 2.75 gpm
    - c. 2 main: 732 gpm (Large leak under Coheco Mills was finally located, which has been an issue since 2009)
  - c) Leaks called in by residents
    - a. Date: 7/1/2012 – 1/24/2013
    - b. Number of leaks: 15
    - c. Estimated losses recovered: 239 gpm
2. The Dover water system is mapped and updated regularly as extensions occur or corrections discovered on the City’s GIS computer system. Leaks are not logged in GIS, but are logged using the VUEWorks software. Beginning in July 2014 all new leaks will be logged into GIS.
3. The breakdown of pipe material, age, and length is available in the electronic GIS database. Updates will be completed mid-2014. Old pipes are not being lined with concrete. All new pipes are Ductile Iron with concrete lining.
4. Majority of pipe is metallic, with a very small percentage PVC.
5. Future leak detection surveys will be conducted in –house.
6. The City purchased Guterman Loggers in 2010 and 2011. A survey was conducted which covered half of the city. The loggers did not pick up any leaks. Staff spent six months conducting the survey without any concrete results. Leaks were found using the ground microphone within the same area that the loggers were used. The City is currently seeking funding to purchase a new correlator in 2014.

7. The City will conduct leak detection surveys with the use of a new correlator. Areas where correlators are found to be inaccurate, a ground mic will be used. In addition, the SCADA system is constantly monitored to pick up any large leaks. New customer meters have the capability to detect leaks on the customer end and notify City Hall directly.
8. The City plans to monitor a quarter of the system each year, allowing the entire City to be completely monitored for leaks once every four years.
9. All leak detection will be conducted in accordance with "Manual of Water Supply Practices M36, Water Audits and Loss Control Programs" (American Water Works Association, 2009)
10. All leaks will be repaired within 60 days of discovery unless a waiver is obtained in accordance with Env-Wq 2101.09.

E. Pressure Management

1. Minimum: 55 psi
2. Maximum: 125 psi. 70% of system is currently over 80 psi. There is no opportunity to place PRV's due to the fact that it would cause too many dead ends. PRV's lower the pressure in the system, preventing water from flowing in a continuous loop, creating different pressure zones.
3. Pressure information about the system is obtained when the City conducts fire flows in different areas of the system.
4. The City purchased a pressure logger to install on hydrants if monitoring is necessary for an extended period of time.
5. Individual homeowners reduce pressure after the meter if they find it necessary.

F. Intentional Water Loss

1. Backwash
  - a) Water is lost to backwashing at the Lowell Ave and Griffin WTP.
  - b) Backwashed water at the French Cross Rd. WTP is recycled.
2. Firefighting:
  - a) Only large fire flows can be tracked through the SCADA system.
  - b) Beginning in 2014 the Fire Dept. will keep track of the amount of water used by estimating and recording flow rates and length of time.
3. Unidirectional flushing is performed annually in the fall for the entire system. The amount of water used is estimated through average flow rate and length of time. The amount of water will be recorded and tracked.
4. Storage tanks are not intentionally allowed to overflow and there are no bleeders on either of the storage tanks.

III. Consumption Side Management

A. Conservation Rate Structure and Billing

1. The City of Dover has a flat block rate structure. Each unit consists of 748 gallons. One unit of water costs \$4.69. One unit of sewer costs \$6.53. There is also a meter rent associated with each residence with a rate depending on the size of the meter. Water rates will continue to be a flat block rate or an increasing block rate. Rates and investment fees for new hookups to the system are adjusted annually. Rates are never decreased.
  - a) The first quarter of the calendar year covers roughly January to March, and the bill is mailed on or about the end of April.
  - b) The second quarter of the calendar year covers roughly April to June, and the bill is mailed on or about the end of July.
  - c) The third quarter of the calendar year covers roughly July to September, and the bill is mailed on or about the end of October.
  - d) The fourth quarter of the calendar year covers roughly October to December and the bill is mailed on or about the end of January.
  - e) Water and Sewer bills for ICI properties are mailed monthly.
2. Owners are responsible for providing their own meter to measure outdoor water use if they choose to do so. The same rate is applied to all usage, but sewer rates are not charged on outdoor use.
3. A seasonal rate structure will not be utilized in addition to the general rate structure.
4. Dover bills quarterly for most users as noted above, and will continue to bill at least quarterly. Monthly bills will be phased in with new meter replacement.
5. City Hall is currently working on including past usage history for consumption and gallons of water consumed on the bills to educate consumers.

B. Educational Outreach Initiative

1. Have a table at Apple Harvest Day annually promoting water conservation.
2. Send out water conservation tips with water bills at least annually.
3. Use Channel 22 and Dover Download for notifications about water conservation tips and resources on a rotating basis.
4. At this time, Dover does not wish to be a WaterSense partner.

IV. Zoning Ordinance / Bylaws

- A. There are currently no water efficiency ordinances or bylaws in the City of Dover.

V. Water Use Restrictions

- A. Water restrictions will only be put in place in the case of an emergency where demand must be lowered. The City has not yet required a water use ban. Instances where a water ban might be put in place include:

1. Droughts
2. Fires
3. Major distribution interruption

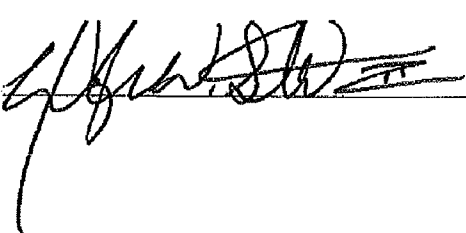
4. Major well taken offline

VI. Reporting and Implementation

- A. Every three years from the date of this approval, a *Water Conservation Plan Ongoing Compliance Form* shall be submitted to DES documenting how the system has maintained compliance with the WCP. The following records shall be maintained by the water system to include with the report:
1. A leak log including the date a leak was discovered, the date a leak was repaired, the type of leak (ex. water main, service line, hydrant, valve, and the approximate size of the leak (gpm).
  2. The title of water efficiency materials distributed and the date of distribution.
  3. Date of installation and replacement of all meters and testing and calibration records.
- B. Activities outlined in the water conservation plan will be completed by water system personnel under the supervision of a certified water system supervisor.
- C. The system shall continue reporting to the DES Water Use Registration and Reporting Program.

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

Owner Name (print): DOUGLAS W. STEELE II

Owner Signature:  Date: 5/12/14