



The State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES



Thomas S. Burack, Commissioner

AMENDED
WATER CONSERVATION PLAN APPROVAL

February 24, 2014

Robert Dalton
Gunstock Acres Village District
PO Box 7118
Gilford, NH 03247

Subject: Gilford, Gunstock Acres Village District (PWS ID: 0881020)
Water Conservation Plan, Design Review # 999570

Dear Mr. Dalton:

On June 13, 2007, the Department of Environmental Services ("DES") Drinking Water and Groundwater Bureau approved a Water Conservation Plan for Gunstock Acres Village District. A waiver was also approved waiving the requirement to install service meters and bill by usage on the conditions that a zone metering program be implemented, as well as implementation of demand management strategies. On January 10, 2014, DES received an Amended Water Conservation Plan (the "Amended WCP") for the system with additional details about the zone metering program and other requirements. The purpose of this letter is to approve the Amended Water Conservation Plan signed by you on December 17, 2013, per the following conditions:

1. By **March 31, 2014**, to come into compliance with meter maintenance requirements, submit to DES for review a meter testing and calibration schedule for all existing meters. Testing and calibration shall begin this year and the meters depended on for night flow analysis shall be a priority. A staggered schedule for testing and calibration over the next three years shall be considered.
2. Night flow data and analysis shall continue to be submitted to DES within 15 working days of the end of each quarter. In lieu of submitting a leak log with the three year ongoing compliance reports, GAVD may instead choose to submit a quarterly leak log as described in 4.b. below along with the night flow analysis.
3. GAVD shall issue water efficiency materials to customers twice a year, as well as implement other demand management strategies.
4. Ongoing three year compliance reports shall continue to be submitted every three years from the date of the original Water Conservation Plan Approval, June 13, 2007. The next compliance report is due on **June 13, 2016**. Attached to the three year ongoing compliance report shall be:

DES Web Site: www.des.nh.gov

P.O. Box 95, 29 Hazen Drive, Concord, New Hampshire 03302-0095

Telephone: (603) 271-2513 Fax: (603) 271-5171 TDD Access: Relay NH 1-800-735-2964

- a. The leak log for the prior three years, including the dates the leak was discovered and repaired, the closest address to the leak, the type of leak (ex. main, service, hydrant), and the estimated size of the leak (gpm); and
- b. A summary of all outreach and education initiatives, including the materials issued to customers twice a year and additional outreach efforts.

5. Revisions to the Amended WCP shall not be implemented without further approval from DES.

A copy of the Amended WCP and the *Water Conservation Plan Ongoing Compliance Form* may be located by going to the DES website, www.des.nh.gov, clicking on the "A-Z List" in the top right corner of the page, and scrolling down to Water Conservation.

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

Sincerely,



Stacey Herbold
Water Conservation Program
Drinking Water and Groundwater Bureau

cc: Alex Crawshaw, Primary Operator

RCVD 1/10/14

Gunstock Acres Village Water District
Amended Water Conservation Plan
December 2013

Introduction

A. Contact Information

1. Name and location of system.

Gunstock Acres Village Water District / Gilford, NH

2. Owner of system and mailing address.

**Gunstock Village Water District
c/o Robert Dalton, Commissioner
PO Box 7118
Gilford, NH 03247**

B. System Overview

1. Reason for new source. **BW 7C and BW 7D were proposed to supplement the needs of the system.**

2. Number of existing and proposed connections for each of the following classes:

- a) Residential. **576**
- b) Industrial/commercial/institutional. **2 commercial**
- c) Municipal.

3. Description of any connections that currently receive or will receive more than 20,000 gpd. **N/A**

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

1. Existing and anticipated seasonal fluctuation in water use and reason for fluctuation. **Existing and anticipated seasonal fluctuation in water use and reason for fluctuation. Fluctuation in population from winter to summer varies because some people come up to ski but others come to the lake in the summer. The main reason we see so much more water used in the summer is lawn watering. ~75% of the community are full time residents now.**

2. Anticipated growth in population and seasonal fluctuation in population. **There is a potential for 150 more houses to be built and connected to the system in the future, 3 of which will probably be connected before snowfall this year.**

3. Maximum day yield of existing sources based on 24-hour pumping.

DUG#5 15 gpm

BRW#1 10 gpm

BRW#1-A 34 gpm

BRW#1-B 10 gpm

BRW #1-C 9 gpm

BRW#7 60 gpm

BRW#7-A 40 gpm

BRW #7-B 40 gpm

BRW#7-C 60 gpm

BRW# 7-D 60 gpm

4. Average daily water use. **120,000 gpd**
5. Maximum daily water use. **170,000 gpd**
6. Minimum hourly flows (if available).

II. System Side Management

A. Source Meters and Zone Meters

| | METER MAKE | METER MODEL | METER SIZE (inches) | LAST REPLACED | LAST CALIBRATED |
|---------------|-------------------|--------------------|----------------------------|----------------------|------------------------|
| BRW 1 | Sensus | W 160 Turbine | 2 | >20 yrs | |
| BRW 1A | Sensus | I pearl | 1 | 2013 | |
| BRW 1B | Sensus | SR | 1 | 2012 | |
| BRW 1C | Sensus | I pearl | 2 | 2013 | |
| Dug 5 | Badger | Magnetoflow | 2 | 2009 | |
| BRW 7 | Badger | Magnetoflow | 4 | 2009 | |
| BRW 7A | Badger | Magnetoflow | 4 | 2009 | |
| BRW 7B | Badger | Magnetoflow | 4 | 2009 | |
| BRW 7C | Badger | Magnetoflow | 2 | 2009 | |
| BRW 7D | Badger | Magnetoflow | 2 | 2009 | |
| PS1 Z1 | Badger | Magnetoflow | 4 | 2009 | |
| PS1 Z2 | Badger | Magnetoflow | 4 | 2009 | |
| PS3 | Badger | Magnetoflow | 3 | 2009 | |
| PS5 | Badger | Magnetoflow | 3 | 2009 | |
| PS6 | Badger | Magnetoflow | 3 | 2009 | |
| PS 7 | Badger | Magnetoflow | 4 | 2009 | |

1. Frequency that source meters will be tested/calibrated.

Meters will be tested or replaced at the frequency as follows:

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

If a new meter is installed and the manufacturer warrants the accuracy of that meter beyond that of the testing rate above, testing may be delayed until the expiration of the accuracy warranty as long as the meter is not suspected of being inaccurate.

The meter testing rate may be adjusted with DES approval if testing reveals there is a need to test more or less frequently.

2. Frequency that source meters will be read (at least every 30 days). **Meters are read at least daily by a SCADA system and weekly in person.**
3. **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

Service meters were not installed as GVWD received a waiver to this requirement.

C. Water Audit

A formal water audit is not applicable as an audit cannot be done without service meters.

D. Leak Detection

A high resolution zone metering program has been implemented to track night flows for potential leakage.

Leak Detection Methodology for Gunstock Acres

Methodology

Each of the five pump stations has mag meters for outgoing flow into individual zones, except PS1 which has outlet flow into both Zone 1 and Zone 2. The SCADA monitoring program monitors each mag meter's instantaneous flow between 12am and 5am, theoretically the time of the least amount of system usage since everyone should be in bed. Starting at midnight, the SCADA system will record the maximum and minimum flow each mag meter records over the course of that hour and save that number in the appropriate chart in the “leak detection” screen on the main SCADA program. At 5am the leak detection chart will include 5 maximum flows and 5 minimum flows readings from each pump station going to each pressure zone.

Analysis

The results are analyzed daily. Theoretically, in the middle of the night there are times when nobody is using water and minimum flow is zero. If flow is never zero this may indicate a leak. Despite tightening up the system by conducting acoustic leak detection surveys and repairing leaks, some of the larger parts of the system still never record zero flow. This is largely due to more frequent water use in the middle of the night in more populated zones. To address the difference in low flows across zones, baseline flows are established based on patterns in usage and used to indicate if a leak has occurred. Low flows have been tracked over many years from a time where this was much more leakage in the system to less leakage due to leak detection and repair, of which when baseline flows were established.

The following includes details of interpreting night flows at the various pump houses:

Zone 1 from PS7:

PS 7 feeds Zone 1. Water is supplied from a hydroneumatic tank. This is the largest zone in Gunstock Acres supplying over 50% (340) of the homes in the community. A larger population means more residents using water in the middle of the night, making it less likely that hourly minimum flows will equal zero and making it difficult to track and identify small leaks as demand is greater at any given time. Baseline low flow is set higher than the other zones to account for the variation. Maximum flows are also monitored and compared to baseline low flows to further confirm any changes in usage.

- If all minimum flows are single digits, a leak is not suspected.
- If all minimum flows are above 9 gpm for more than two days a leak is suspected.
- Normal maximums flows are between 30 gpm to 50 gpm. Maximum flows above 50 gpm indicate a leak.

Zone 1 from PS5:

PS5, by design, is disabled from Zone 1 between midnight and 5 am. Minimum and maximum flows will be zero unless PS1 is down for maintenance or if there is a large known leak.

Zone 1 from PS1:

PS 1 by design, is disabled from Zone 1 between midnight to 5 am. Minimum and maximum flows will be zero unless PS1 is activated in the evening to help narrow down the location of a leak.

Zone 2 and Zone 3 from PS1:

PS1 feeds into Zone 2 off a VFD booster pump which supplies approximately 90 homes and provides water to PS3, a booster station pumping water to Zone 3.

- Normal minimum flows for this zone is zero. Leaks are not suspected if flows remain zero.
- If maximums flows exceed 23gpm a leak is suspected in Zone 2.
- If minimums flows are zero but maximums are in the 60s, this would indicate that the booster pumps in PS1 are being called due to high usage and pushing a lot of water into the system at once. Sometimes this will cause the pumps to shut down due to this high volume, falsely showing low readings (This is why low flows will be above normal and then drop to zero and back up again). The system is running correctly when the jockey pumps at 22 gpm and is able to pump enough water to shut off and wait for more water usage.

Zone 3 from PS3.

PS3 feeds into Zone 3 off a VFD booster pump which supplies approximately 22 homes with water on demand. PS3 is a booster station fed from PS1.

- Normal minimum flows are between zero and 1 gpm. Leaks are not suspected as long as nightly minimum flows vary between zero and 1 gpm.
- If two or more minimum flows are above 1 gpm a leak is suspected.
 - If two or more minimum flows are above 1 gpm and below 9 gpm, flows are again analyzed the following night to determine if results are the same. If results are the same a leak is suspected.
 - If two or more minimum flows are above 8 gpm a leak is suspected.
- If maximum flows exceed 21 gpm a leak is suspected.

Zone 4 from PS6:

PS6 feeds Zone 4 and supplies about 70 homes with on demand water. There is one main VFD driven jockey pump that supplies a constant pressure at the bottom of the hill. In the middle of the night when no service connection is using water and if there are no leaks in the system, this pump will pump zero flow into the system; therefore, minimum hourly flows will register zero.

- If minimum flows register zero for at least 2 of the 5 hours, a leak is not suspected.
- If minimum flows are greater than zero, but lower than 9 gpm for 3 or more hours, a leak is suspected.
 - Flows are again analyzed the following night to determine if results are the same. If results are the same or flows are even higher, a leak is suspected.
- If minimum flows are greater than 9 gpm or greater for three or more hours, a leak is suspected. (Note* Anything over 8 gallons per minute has characteristics of higher flow than a single hose running.)
- Not having zero flow in hour 4 and hour 5 is not uncommon especially in the summer time because people begin to get up and get ready to work between the hours of 4 and 5 am. This is also a time when lawn watering is popular. Normal maximum flows range from 10 to 20 gallons per minute consistently at this time; therefore if flows are above this and minimum flows in the first three hours are above zero, a leak is suspected.

1. Summary of findings for the most recent acoustic leak detection surveys including the following information:

a) Year(s) conducted.

5/25/2010 - July 9, 2010 – Heath Consultants conducted a leak detection survey across the entire system. Four service line leaks were discovered totaling 24 gpm.

5/30/2013 – M2 Services conducted a leak detection survey across the entire system and found one curb stop leak (4gpm) and one main line leak (?gpm).

2. Are pipe locations known? Yes
3. Breakdown of pipe material, age, and length.

| Pipe Material | Age | Length | Percentage of |
|---------------|-----|--------|---------------|
|---------------|-----|--------|---------------|

| | | System | |
|--------------|---------------|--------|-----|
| Cast Iron | approx 50 yrs | 9.3 | 60% |
| PVC | approx 50 yrs | 5.4 | 35% |
| Ductile Iron | approx 50 yrs | 0.75 | 5% |

4. Availability of contact points and adequacy of spacing. ????
5. Will future acoustic leak detection surveys be conducted in-house or contracted out? **Both**
6. If in-house, what equipment will be used and what training will be required? **Metrotech HL400**
7. If in house, describe the leak detection method to be used? **Listening location are curb stops and valves but also I can locate pipe and listen on the pavement above the line for leak.**
8. **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).**
9. **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. Existing minimum distribution pressure. **40 psi**
2. Existing maximum distribution pressure. **160 psi**
3. How is pressure monitored and how will pressure continue to be monitored? **SCADA**
4. What method will be used to reduce pressures in zones found to be in excess of 80 psi? **N/A**
5. What will be the timeframe for reduction (at least within 1 year of source water approval)? **N/A**
6. If pressure reduction is not feasible, please explain why and describe what additional steps the water system will take to monitor and repair leakage within these zones. **Elevation change is too great. Infrastructure is graded at 200 psi.**

F. Intentional Water Loss

1. Are there “bleeders” used within the system at dead ends to improve water quality or prevent freeze-up? If yes, what looping opportunities exist? **Alpine for freezing. Looping would be too costly.**
2. Are storage tanks intentionally allowed to overflow because of system hydraulics or water quality concerns? If yes, what opportunities exist for the installation of altitude valves or tank mixing systems? **No**

III. Consumption Side Management

A. Conservation Rate Structure and Billing

Not applicable as the requirement for service meters was waved. A flat rate is charged for water use.

B. Educational Outreach Initiative

1. Informational materials that will be used: DES and EPA Water Efficiency Fact Sheets
2. Rate of dissemination: **At least twice a year.**
3. Does the water system intend on becoming a WaterSense partner? **Yes**
<http://www.epa.gov/watersense/>
4. Will a rebate program be offered to replace older fixtures with WaterSense certified fixtures? **No**
5. Will customer audits be offered? **Yes**
6. Other outreach plans? **GAVD plans to implement additional educational and outreach efforts to promote water efficiency to meet the intent of implementing a conservation rate structure and billing. GAVD will become a WaterSense partner and using their materials to promote different initiatives throughout the year such as fixing leaks/blue dye tablets.**

IV. Zoning Ordinance / Bylaws

A. Are connections to the water system subject to any of the following water efficiency ordinances or bylaws?

1. Indoor
 - a) Water efficient fixtures beyond the existing plumbing code. **No**
2. Landscaping
 - a) Minimum topsoil requirements. **No**
 - b) Use of native/drought tolerant plants and grasses. **No**
 - c) Area and slope restrictions for turf grass. **No**
3. Irrigation System
 - a) Prohibition or restrictions to irrigation systems. **Yes**
 - b) Require soil moisture sensors. **Working on right now.**
 - c) Require rain sensors. **Working on right now.**
4. Other water efficiency ordinances? **No.**

V. Water Use Restrictions

A. What is the water system's plan relative to implementing water restrictions?

The district will implement the following water conservation measures as necessary in the event of a water system emergency:

1. Watering lawns and other landscaped areas will be restricted at a minimum or banned entirely.
2. Washing cars, trucks, boats, RV's, etc., will be restricted at a minimum or banned entirely.
3. Using water from a house to rinse or clean sidewalks, driveways, decks, etc. will be restricted at a minimum or banned entirely.
4. Filling swimming pools will be restricted at a minimum or banned entirely.
5. Residents will be required to follow indoor water use restrictions adopted from DES Fact Sheet #WD-DWGB-26-2 that lists water efficiency practices for indoor domestic water use.
6. In a prolonged or dire emergency requiring reliance on bulk water, rationing will be implemented.
7. Water users will be notified by radio, newspaper, signage at entrance to Gunstock Acres, and/or letters.

B. Who is responsible for enforcing restrictions? **The commissioners.**

VI. Reporting and Implementation

A. Include the following statements:

1. **The water system will submit a form supplied by DES once every three years documenting how compliance with the requirements of Env-Wq 2101 is being achieved.**
2. **Activities outlined in the water conservation plan will be completed by water system personnel under the supervision of a certified water system operator.**

VII. 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): R H DeVan Commission GAVUT

Owner Signature: [Signature] Date: 12/17/10

