



Lee Well and Groundwater Awareness Program

An Outreach Program of the Lee NH Sustainability Committee

Moving forward, Lee embraces the concept of sustainable living through how we use energy manage natural resources, and support locally grown products.

- Town of Lee's 2016 Master Plan Vision Statement

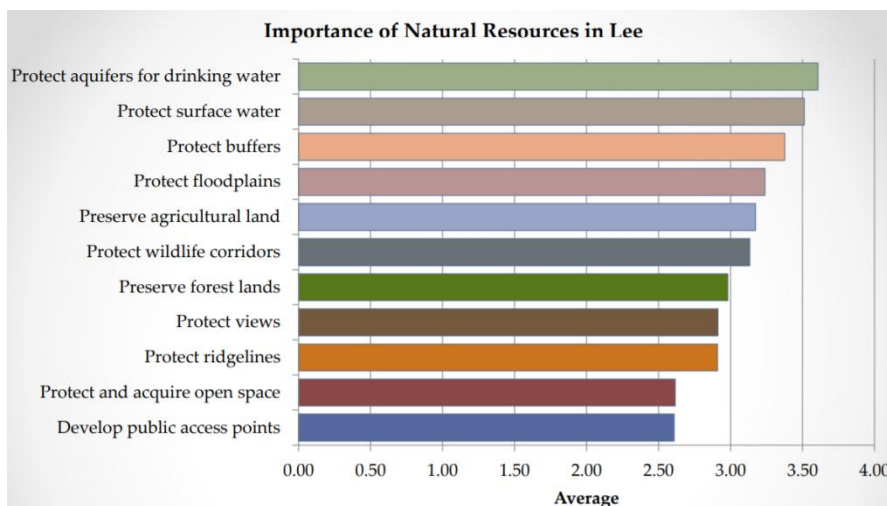
The Lee Sustainability Committee (LSC) is proud to distribute our new document, the **Lee Well and Groundwater Awareness Program**. As part of our education mission, the LSC has produced this document to inform Lee residents about their water supply. Our primary goal is to raise community awareness around water use in order to promote sound conservation practices. We were fortunate to work directly with the NH Department of Environmental Services (NHDES) on this project. Much of our document is based on information from NHDES and the 2016 - 2026 Lee Master Plan.

This document includes a form below which you can fill in with information about your own well and household water system for future reference. We urge you to record details now, before a problem develops. The form is electronic, so you may save this file on your computer, open it, type in your answers directly, and save again. Of course if you prefer, you may print the document and fill it out with a pen. Paper copies are available at the Lee Town Hall and Lee Public Library.

Our motivation to undertake this project was the drought, which got severe in the summer of 2016. Over 60% percent of the state was in a severe or extreme drought condition, with the worst concentrated here in the southeast. Fortunately the drought is over. Nonetheless we realized that we have very little information about how much available water is in the ground in the Town of Lee. We have anecdotes of wells failing but no overall picture of how healthy our water supply is.

Our Mission

According to the 2016 Lee Master Plan Survey results, protecting the town’s drinking water ranks as the highest natural resource priority for Lee residents (Town of Lee, 2016). In the section on our water resources, Lee’s Master Plan 2016-2026 states, *“The protection of groundwater resources, both in quality and in quantity, is an important objective for the Town. The intent is to ensure that the resource is not degraded or depleted so that there will continue to be water available to meet the needs of the Town and its residents”* (p. 12). Further, the Lee Conservation Commission identified a goal to *“conserve and protect the integrity of the Town’s groundwater resources in their quality and quantity”* and *“educate residents and businesses on the value of water resources”* (p. 12).



The Lee Sustainability Committee's (LSC) mission is to provide sustainability education and outreach, and to encourage residents to conserve natural resources. We’ve therefore prepared this *Well and Groundwater Awareness Program*, using information provided by the New Hampshire Department of Environmental Services (NHDES), in order to help the town meet its Master Plan’s objectives.

The purpose of the program is to assist Lee homeowners in acquiring and recording information about their residential wells, and to educate and encourage good stewardship of Lee’s groundwater resources. Participation is entirely voluntary; it takes little time and can be done entirely from home. Once completed, the resident/homeowner will have a personal record of their water system for future reference, along with the accompanying educational materials on water conservation and Lee’s water resources. The resulting record is intended for

personal use only, but such records will increase the data Lee residents have on the town's groundwater, thereby allowing the potential to track changes through time.

Who should participate in this program?

Households on private wells, with or without water supply problems, should consider participating in this program.

What are the program's goals?

- ✓ To develop a personal household water system record for homeowner's for future reference and use.
- ✓ To raise household and community awareness of water use and sound conservation practices.
- ✓ To provide a possible future base of information for the town of Lee, including histories, water quality issues, and the impact of droughts on Lee residents.

How it Works

This packet is organized into two sections:

Part 1: Educational information and other information participants may need to fill out Part 2 (the worksheet or record). Topics include:

1. Groundwater Resources in the Town of Lee
2. The Importance of Water Conservation
3. Well and Water System Information
4. Water Testing
5. Symptoms of Well Failure
6. Well Improvement Options

Part 2: A worksheet which will help participants construct a personal record of their household water system, including well location, construction, pump, water quality, and general history.

Potential Privacy Concerns

Please note that the Lee Sustainability Committee and the Town of Lee are not collecting any data. This document is for your use alone. However, the NH Department of Environmental Services requests notification if your well has run dry or otherwise failed. This is your decision and strictly voluntary, but the LSC recommends such cooperation with the NHDES in their mission to monitor and safeguard NH groundwater reserves. If you do offer information to NHDES, all submissions are considered to be part of the public record. Therefore, other entities conducting Right-to-Know requests may be allowed access to this information.

Part 1: Helpful Information

1. Groundwater Resources in the Town of Lee

Plentiful groundwater is one of Lee's most valuable renewable resources.

Groundwater is subsurface water that flows through the rock and gravel under our feet and collects in deposits of permeable rock, known as aquifers. This water is continually replenished ("recharged") by rainfall, but the rate at which it percolates through the soil is variable. Lee is almost 25% wetlands and these critical areas serve as important portals for groundwater recharge, collecting surface water and purifying it while allowing relatively quick percolation.

Almost all Lee residents get their household water from private wells designed to collect groundwater. Water flows into your home from your well, and exits through your septic and leach systems. While this means that you are technically returning much of your household water to the soil, note that this returned water is not suitable for reuse until it too has percolated through the soil to a suitable depth. Residential wastewater is also frequently polluted with household chemicals, many of which are slow to be eliminated by natural processes.

Lee's groundwater is a precious resource and yet very little information is available to our community about residents' experience and histories. Of the 1592 residential wells in Lee, the town has no record of wells that have failed or run dry, or wells that have a diminishing water supply. In addition, the Town of Durham's water system includes two municipal wells in Lee, which draw large amounts of water : the Lee Well (a.k.a. the "Five Corners Well", which was established in 1998, and the Spruce Hole Municipal Well and Artificial Recharge Project, which was commissioned in 2014. The only other residential water system is located at Thurston Woods; it is owned by Pennichuck Water Works. Other large use private wells exist at the Lee Circle and at Noble Farm.

2. The Importance of Water Conservation

“The Town continues to monitor and plan for threats to these resources, actual or potential, including: climate change, invasive species, and unregulated development, among others. Understanding and planning for these issues attempts to maintain our natural resources for future generations and creates a more resilient community.” from the Town of Lee’s 2016 Master Plan

According to the U.S. Global Change Research Program, climate change is expected to have dramatic effects on water resources in the United States. Temperature change affects many natural processes that in turn affect the quality and quantity of available fresh water (EPA, 2017). While Lee’s water resources appear excellent at present, conserving them should be a major goal of the town. Last year, N.H. suffered its worst drought in 40 years; climate change models predict an increased likelihood of such events. Adopting personal conservation habits will protect your well’s water supply today and help to ensure water availability to future generations.

Below are steps you can take to conserve water. These may prevent your well from failing or mitigate problems of insufficient water supply.

1. **Cut-out non-essential water use.** You can reduce your water use 25% to 50% by eliminating lawn watering, car washing, and other non-essential activities. Note that the perennial grasses constituting most lawns will not die if allowed to turn brown in summer; Rather, these grasses will go dormant (dying back above ground) and send out new green shoots when moister conditions resume. Studies show that *sparse* watering in dry conditions can actually weaken many perennial grasses, and that it’s preferable to let them go dormant.
2. **Cultivate habits that conserve water.** Cutting back on shower times, only doing full loads of laundry, and turning off the faucet while brushing teeth, doing dishes, and washing hands can save hundreds of gallons of water per week. Also, be sure to fix any leaks or drips in your household water system, including outside fixtures and hoses. Leaky toilets can waste as much as 200 gallons each day!
3. **Update fixtures and appliances.** Top-loading washing machines built before 2003 and toilets older than 1994 are known to be the largest water-wasting culprits in the home. Shower heads older than 1994 can also waste a great deal of water, as can older bathroom sink aerators. For the greatest savings and guaranteed performance, replace old washing machines with ENERGY STAR® certified machines and replace old water fixtures with

EPA WaterSense certified fixtures. For more details, see the NHDES Water Conservation Program's water efficiency fact sheets.

4. **Reduce or eliminate harmful chemicals.** Many ordinary household cleaning products contain chemicals that can pollute groundwater when they accumulate in your septic and leach systems. According to the EPA, product labels are designed to make you aware of this potential (EPA, 2002):
 - The words "Danger" or "Poison" indicate that the product is highly hazardous.
 - The word "Warning" indicates that the product is moderately hazardous.
 - The word "Caution" indicates that the product is slightly hazardous.
 - The word "Biodegradable" indicates that the product breaks down within a reasonably short period of time, under natural conditions.
 - The terms "Nontoxic," and "Septic Safe" were created by advertisers and are not regulated terms.

Consider using only the safest products available and never allow gasoline, oil, pesticides, antifreeze, or paint down your drains.

5. **Time your water use effectively.** Spread out water-using tasks to give water stores time to replenish. Allow time for your well to refill.
6. **Encourage children.** Lee kids in Oyster River Cooperative Schools are fortunate to be part of an environmentally conscious School District. They may know more about conserving natural resources than you do! Encourage them to share and practice what they've been taught. Make conserving a family practice!

3. Well and Water System Information

This information may help you answer questions #2, 6 & 7.

It's a good practice for homeowners to maintain records regarding well construction, pump work, and any water quality system you may have in place (such as filters and softeners). It is important to have a record showing the exact location of the well, and to always maintain a well location marker so that your well can be identified in all seasons.

Since 1984, well drillers have been required to fill out and submit a well completion report for each well they construct. You may find your records by clicking on the NHDES OneStop button at www.des.nh.gov and querying 'water well information' or by contacting the NHDES Drinking Water and Groundwater

Bureau. Records of wells constructed prior to 1984 may be available from the original well driller, or from any contractor that provided maintenance on the well or pump. In the event of a problem with your well or water system this information will be useful to the licensed professional you contact for help.

There are several types of wells:

➤ **Dug wells** are commonly 3 or 4 foot diameter wells constructed by excavation and are usually not much deeper than 15 feet below land surface. Older dug wells are lined with fieldstone but more recent construction utilizes inter-locking concrete tile. These wells are generally easy to identify in your yard because they are relatively large stone or concrete objects protruding from the ground and many have well houses built over them for protection or ornamental purposes.

➤ **Drilled bedrock wells** are almost always 6 inch diameter wells drilled into solid bedrock and cased with steel pipe. These wells are drilled through unconsolidated earthen deposits into the upper surface of the bedrock and range in depth from less than 100 feet to more than 1,000 feet. They should be easily identified as that odd looking 6 inch steel pipe sticking out of the ground.

➤ **Point driven wells** are typically driven with a percussion hammer, or by hand, or “jetted” into the ground. Point wells are used exclusively in sand and gravel formations - also known as aquifers - where the water table is high and relatively stable year round. The presence of larger stones, cobbles or boulders will typically prevent the installation of a point well casing into the earth.

Most Lee residences have drilled bedrock wells.

4. Water Testing

This information may help you answer questions #9 & 10.

Because most Lee residents own private wells, it's up to each of us to make sure that our own water is safe to drink. NHDES recommends comprehensive testing every five years, and annual testing for bacteria and nitrates.

In our area there is a certified water testing lab and several well and water system vendors offering residential water testing. Most offer three main drinking water analyses: a test for standard contaminants (approximately \$100), a test for radioactive contaminants (approximately \$50), and a test for Volatile Organic Compounds (approximately \$165). The analysis for standard contaminants tests for arsenic, bacteria, chloride, copper, fluoride, hardness, iron, lead, manganese, nitrate/nitrite, pH, sodium, and uranium. The analysis for radioactive contaminants tests for radon, uranium, and alpha radiation. The analysis for VOCs tests for MTBE and benzene (both from gasoline) as well as various industrial solvents. Also offered is an analysis for bacteria and nitrate alone (\$50). This is a useful and recommended annual checkup in between your five year comprehensive tests.

The prices above assume you are doing the collection yourself. To get started you'll need to stop by your vendor and pick up a collection kit. The kit will include collection containers and instructions on how to collect a sample of your water directly from your household faucet. For accurate results, it's important to follow the directions and to return the sample within 24 hours. For an additional \$50 some vendors will send their own personnel to collect the sample for you.

Your lab results will contain brief explanations of what your water tests revealed, including any values that signal an issue. More detailed information can be found at the NHDES' website "The Be Well Informed Guide" below. Most problems uncovered by testing can be mitigated at reasonable expense. Note: Entering your information into the NHDES system may have privacy implications.

Useful NHDES Links:

The Be Well Informed Guide: Information and Guidance for Treating Your Well Water <https://www4.des.state.nh.us/DWITool/>

Private Well Testing Program

https://www.des.nh.gov/organization/divisions/water/dwgb/well_testing/

Drinking Water/Ground Water Fact Sheets

<https://www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/>

5. Drought Conditions and Symptoms of Well Failure

This information may help you answer question #11.

Wells which are the most susceptible to failing during drought conditions include dug wells, shallow bedrock wells, wells located near topographic high points, and wells constructed in areas where bedrock is close to the surface. The typical homeowner does not have a means of determining a well's water level, although symptoms of well failure may be obvious. These symptoms may include:

- No water.
- Sudden drops in water pressure or pressure surges.
- Air bubbles coming out of non-aerated faucets.
- Cloudy or heavily silted water.

The cause of well failure may be a shortage of water or other problems associated with the well casing, valves, waterlines, pumps, or pressure tanks. It is important to work with a licensed pump installer and/or well driller to diagnose the problem and determine the appropriate corrective action to take. If you are experiencing any of the above issues in your water system, address them immediately as completing the work in the winter may not be possible and/or could be more costly.

6. Well Improvement Options

This information may help you answer questions #13, 14 & 15.

A licensed well driller or licensed pump installer will be able to assist you in determining if your water supply is diminishing, troubleshooting other well issues, and recommending actions to help remedy the problem. To search for a licensed well water contractor, go to the NHDES OneStop website:

http://www2.des.state.nh.us/OneStop/Water_Well_Contractors_Query.aspx.

In New Hampshire, most residents on private wells have a dug well or a bedrock well. If your well is failing due to lack of supply, the options below may help to

mitigate the issue. Included are factors you should discuss with a licensed well driller or licensed pump installer.

- Lowering the pump or pump intake of the bedrock or dug well, in order to access more usable water. As lowering the pump means the pump will have to work harder, a more powerful pump may be necessary. There are also potential water quality issues that could occur as a result of lowering the pump.
- Increase the water holding tank size to provide additional water storage. For a well with a slow recovery rate, the additional storage will reduce demand on the well during periods of high water use; During lower use periods, more extracted water can be stored in a bigger tank.
- Deepen the existing well to increase the yield of the well and/or to lower the pump to increase usable storage in the borehole. Note that the yield of a bedrock well will only increase if new water bearing fractures are encountered. A dug well can only be deepened if it is not underlain by bedrock. Driving a steel metal rod into the bottom of a dug well is a common test to determine if bedrock is present.
- Construct a new well to be used in tandem with or replace an existing water source. It is advisable to check the well database on NHDES OneStop with respect to the depths and yields of other wells in the area, to determine if there is good chance of a new well supplying the yield needed.
- Purchase water tanks which may be filled by a bulk water hauler. A list of bulk water haulers may be found at <http://des.nh.gov/organization/divisions/water/dwgb/wseps/documents/bulk-haulers-providers.pdf>.
- Hydro-fracture the existing bedrock well to increase water flow by flushing out and opening fractures in surrounding rock. Factors to discuss with a licensed well driller/pump installer include:
 - If the well was previously developed by hydro-fracturing and the yield has again diminished, a second attempt to hydro-fracture may be initially successful, but it will likely not be sustained over time.
 - It is recommended that shallow bedrock wells be deepened to 400 or 500 feet to obtain additional supply prior to considering hydro-fracturing.

This provides adequate surface area in the well borehole to develop deeper and more sustainable water-bearing fractures, providing a good chance of increasing yield.

- A completely dry well is not a great candidate for hydro-fracturing because the well must have some water-bearing fractures to start with.

References

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U.S. Environmental Protection Agency. (2002). Homeowner's Guide to Septic Systems. https://www3.epa.gov/npdes/pubs/homeowner_guide_long.pdf

U.S. Environmental Protection Agency. (2017). Watershed Academy: The Effect of Climate Change on Water Resources and Programs.

https://cfpub.epa.gov/watertrain/pdf/modules/climate_change_module.pdf

U.S. Geologic Survey. (2016). Water Science School: Aquifers and Groundwater.

<https://water.usgs.gov/edu/earthgwaquifer.html>

Part 2 : A History and Record of Your Well

Please print this worksheet, fill out and save, or complete on your computer and save.

1. Vendor contact information:

Well installer: _____

Water system vendor: _____

Other vendors: _____

2. Describe the location of your well.

3. What is the primary use of this well?

_____ Household

_____ Agriculture/Irrigation

_____ Combination: Household/Agriculture

4. If the well is for household use, what type of household is the well supplying?

_____ Owner occupied

_____ Renter occupied

_____ Other:

5. How many people live in the household? _____

6. What type of well do you have? (Most Lee residences have drilled bedrock wells.)

- _____ dug well
- _____ drilled bedrock well
- _____ point driven well

Dug Well



Drilled Bedrock or Point Driven Well



7. When was your well installed? What is its service history?

Date Drilled/Dug/Driven: _____

Service Record:

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

8. What are the details and service history of your water holding tank?

Date Installed: _____

Holding Tank Capacity: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

Date: _____ Event: _____ Vendor: _____

Comments: _____

9. How often do you have your water tested and what do you test for?

Attach water results here.

Date: _____ Test: _____ Vendor: _____

Results: _____

Date: _____ Test: _____ Vendor: _____

Results: _____

Date: _____ Test: _____ Vendor: _____

Results: _____

Date: _____ Test: _____ Vendor: _____

Results: _____

Date: _____ Test: _____ Vendor: _____

Results: _____

10. Do you have any water quality issues?

If yes, do you have a system in place to mitigate the issue(s)?

If you have a water quality system in place (softener, filtration, etc.) describe it here. *Attach any paperwork, details, and service history you may have.*

11. Have you experienced any symptoms of well problems/failure within the last year? If so, please check all that apply and describe the water issue that you had/are having.

_____ Well is dry and no longer producing water.*

_____ Well pump is intermittently sucking air; must wait for the well to recharge to be able to pump again.

_____ Water pressure is low and/or you are experiencing lower flows out of fixtures.

_____ Well is pumping sand and/or muddy water.

_____ Water quality has been reduced.

**Note: The N.H. Department of Environmental Services keeps a record of failed wells; Please consider contacting NHDES with this information.*

12. If you've experienced problems with your well in the last year, has the problem been solved? (Check all that apply.)

- Yes, the pump was lowered.
- Yes, the well was deepened.
- Yes the well was hydro-fractured.
- Yes, a replacement well was drilled.
- No, water is being trucked in.
- No, we are getting water from another source (neighbors, etc.).
- No, we are on the drilling wait list.
- No, we cannot afford to finance the solution.
- Other, please specify:

13. Record details of any problems you've had. Please describe any attempted repair, including vendors involve, work performed, outcome and cost. Attach any paperwork.

Date: _____ Event: _____ Vendor: _____
Comments: _____

Date: _____ Event: _____ Vendor: _____
Comments: _____

Date: _____ Event: _____ Vendor: _____
Comments: _____

14. Is there any other information you would like to add?

Final Note: If you have questions or would like additional information about the Lee Well and Groundwater Awareness Program, please contact the Lee Sustainability Committee at the following email address: sustain@leenh.org