Borough of Mountain Lakes
Master Water Usage Plan
8-17-2016

With Thanks and respect for the efforts of all those residents who have worked on this goal over the years, including but not limited to the Environmental Commission, the League of Women Voters, the water study group and a special recognition to Lynn Uhrig.

John Lester - Borough Council

Master Water Usage Plan

8/17/2016

Introduction

In simplest terms, water makes up about 71% of the Earth's surface, while the other 29% consists of continents and islands.

To break the numbers down, 96.5% of all the Earth's water is contained within the oceans as salt water, while the remaining 3.5% is freshwater lakes and frozen water locked up in glaciers and the polar ice caps.

Meanwhile, the amount of water that exists as groundwater, rivers, lakes, and streams would constitute just over 10.6 million km^3, which works out to a little over 0.7%. Seen in this context, the limited and precious nature of freshwater becomes truly clear. (http://www.universetoday.com/65588/what-percent-of-earth-is-water/)

According to other sources, only 2.5% of the world's water is potable.

Couple this with the fact that the world population is increasing.

Climate change and variances are causing our water sources to become depleted and to not be renewed

Water moves from higher concentrations to lower concentrations, sometimes horizontally.

The supply of water to Mountain Lakes is subject to the demands of our neighbors and other municipalities on the route.

The options to better manage this scarce resource are limited:

- Find additional water (not a real option)
- Desalinization (expensive & not a realistic option for Mountain Lakes)
- Conservation

Overview

The objective of this Master Water Usage report (MWU) is to understand our water system, with its constraints, and to make recommendations to mitigate the potential of a reduction of water supply.

This report will utilize existing public domain documentation and will illustrate the appropriateness of aspects of those documents while highlighting the inaccuracies.

NOTE: Some of the documentation is either not relevant or out of date. The intent is to place all documentation in one location.

The MWUP will focus on the following:

- GENERAL INFORMATION
  - Where water comes from
  - The Mountain Lakes water system
  - The maintenance of it
  - Regulations (external imposed)
  - Users and Usage
  - External influences / influencers
  - The Highlands report – What is it really saying?
- RECOMMENDATIONS
  - Enforcement / Regulatory
  - Conservation
  - Education

NOTE: This report does not address maintaining water quality, however it is a very important consideration and does need to be addressed.

Next Steps

- Council Discussion Item in August
- Determine appropriate goals, actions and timeframes
- Council actions (if any)
- Implement

GENERAL INFORMATION

Overview

History of System

The Mountain Lakes Water Utility, as it is known, was created in the early 1900's, probably around 1930, coinciding with the development of the borough. Interestingly, it wasn't concentrated in a single part or parts of the borough as many systems are, but appears to have been built out all over town as development progressed. It operates under the general direction of the Director of the Department of Public Works.

Statistics

The system services 1,892 residential customers and 87 commercial customers through a network of 33.5 miles of mains. There are several locations within the borough where interconnections with other water systems are located. While they are not used on a regular basis, they can provide the borough with limited water supply in the event of an emergency. The mains themselves consist of various size piping from 4" to 12" with 8" being the most commonly used. There are wells at four (4) locations producing upwards of 25 Million gallons of clean, drinking quality water each month and there are two (2) storage tanks on Lookout Road of 1-Million-gallon capacity and 0.5-Million-gallon capacity. In addition, there are 282 hydrants scattered through the borough for firefighting purposes. At the present, there is an approximately 15% deviation between water pumped and water billed resulting in a potential loss of 30.75 Million gallons annually – this ratio is considered acceptable for a system of our size. Some of the loss is attributable to fire department use (fires), hydrant flushing, breaks and undetected leaks. In the mid 1990's there was a concerted effort to locate and replace/upgrade water mains to reduce the unaccounted for water; prior to that point the loss ratio was about 19%. Continued efforts to reduce the loss are encouraged through the contracting of a water leak detection contractor.

Allocation & Use

Under New Jersey Department of Environmental Protection (NJDEP) regulations, the borough is allowed to draw 30 Million gallons per month or 285 Million on an annual basis from the aquifer. There has been much discussion about firm capacity and what it means. Firm capacity (and firm is not an acronym), is determined by taking the production of all sources and then eliminating the highest producing well from the system. The balance is the water allocation that would be used to sustain the borough. In our case, the firm capacity would be determined using the following chart:

Well Number	Daily Production	Firm Capacity
Well 5	1.152 MGD	0.00 MGD
Well 4	0.397 MGD	0.397 MGD
Well 3	0.304 MGD	0.304 MGD
Well 2	0374 MGD	0.374 MGD
TOTAL	2.228 MGD	1.076 MGD

Note: There is no Well #1.

Our water is drawn from the Buried Valley Aquifer with the wells reaching upwards of 462' deep. The aquifer is part of the Upper Passaic, Whippany and Rockaway Watershed within the New Jersey Highlands Region. With respect to having an adequate supply, there is no empirical data as to the size of the aquifer, how quickly it recharges or if it is a finite supply.

The approved hotel project at the Villa at Mountain Lakes, has a projected use of 29,000 gallons per day (which has already been reduced from the current allocation) but the proposed housing development on the King of Kings property would need approximately 13,000 gallons per day or 390,000 per month.

Impact of Highlands Regional Master Plan

To put the regional water supply in perspective, the following information comes from the 2008 New Jersey Highlands Technical Perspective. While Mountain Lakes is a very small portion of the water derived from the aquifer, the aquifer itself plays an important role in the supply chain for the region.

"Between 1990 and 2000, an average of approximately 42 billion gallons of water per year was reported as being diverted in Water Management Area 6 (WMA 6) for public water supply purposes. About 1.3 billion gallons per year is used for industrial purposes. Approximately half of this water was from surface supply, half from ground water. Approximately 19 billion gallons per year of the public water supply total, mostly from surface water sources, is exported out of WMA 6. This includes diversions to the Boonton Reservoir System, reported as providing Jersey City with approximately 50 MGD. In addition, stream flow through WMA 6 supports downstream passing flow and water supply allocation requirements.

The public water supply used within WMA 6 is approximately 90% from ground water. The ground water characterization and assessment for this watershed indicates a variety of ground water sources that vary from low producing to prolific. Based on data from 1990-2000, ground water use in WMA 6 averaged approximately 22 billion gallons per year. About 21 billion gallons was for public supply use, and 1.3 billion gallons for industrial, commercial and irrigation use. Comparing current and projected ground water withdrawals to estimated ground water availability, there is evidence to suggest a growing ground water deficit. The watershed characterization and assessment report indicated that surface water supplies have almost been maximized, and projected growth, both in and out of the basin would require additional infrastructure projects or alternative water sources.

Although there are a few surface water intakes and water supply reservoirs within this WMA, the major users relying on surface water supply diversions from within WMA 6 are located outside of the WMA. It was reported that approximately 8 MGD of the water diverted from downstream of WMA 6 is pumped back into WMA 6 after treatment. In the eastern half of WMA 6, there is an extensive system of valley aquifers (the Buried Valley Aquifer System), which also have extensive surficial aquifers overlying them in most areas. In addition, there are surficial aquifers in the Great Swamp and in several of the river valleys, particularly in the Rockaway River watershed. If these aquifers were to become contaminated, it would have a dramatic effect on water supply within WMA 6".

Where water comes from

There are two basic sources of drinking water: ground water and surface water. Ground water is water found beneath the Earth's surface. Ground water comes from rain and snow seeping into rock and soil. It is purified naturally as it filters through layers of soil, clay, rock and sand in a process known as percolation. Ground water is stored in underground areas called aquifers. Aquifers supply wells and springs. Surface water is the water naturally open to the atmosphere, such as rivers, lakes, streams and reservoirs. Precipitation that does not infiltrate the ground or evaporate into the sky runs off into surface water bodies. Ground water can seep into a stream, river or other surface water body, recharging surface water bodies. Likewise, under some circumstances, surface water can seep into an adjacent aquifer. A water system obtains its water from 1) wells drilled into the ground that pump out ground water; 2) devices called surface water intakes placed on a river, stream, reservoir; or 3) both.

The Mountain Lakes Water System

The Mountain Lakes Water System is a groundwater based system, with water supplied by 4 production wells, two storage tanks and a network of underground pipes. The primary Well (Well #5) is located on Route 46 and supplies approximately 80% of the total water used by the homes and businesses in Mt. Lakes. Well 5 is equipped with an air stripper to ensure the water serving the community is of the highest quality. Well no.'s 3 & 4 are located near the Rockaway River in Denville Twp. Well no. 2 is located on Tower Hill Rd. in Mtn. Lakes. Mtn. Lakes has two storage tanks which hold 1 million gallons and 500,000 gallons respectively. There are 33.5 miles of water mains ranging from 12" to 4 ". *Please see an inventory of the system below:*

SYSTEM COMPONENT	QUANTITY
Water Mains	33.5 miles
12" Pipe	5,700'
10" Pipe	11,600'
8" Pipe	90,400'
6" Pipe	50,600'
4" Pipe	18,000'
Hydrants	262
Storage Tank No. 1	1,000,000 gals
Storage Tank No. 2	500,000 gals

Maintaining the System

Under the Federal and New Jersey Safe Drinking Water Regulations, all public water systems must routinely monitor for a number of contaminant categories including pathogens, nutrients, volatile organic compounds, synthetic organic compounds, pesticides, inorganics, radionuclides, and disinfection byproducts. Mountain Lakes performs all such testing and files reports of the results with NJDEP. Mountain Lakes complies with all drinking water standards. Treatment of Well 5 water is accomplished with a chlorine gas system. The well water produced by Wells 2, 3 & 4 are treated with a sodium hypochlorite (NaClO) disinfection system. The chlorine residual level is maintained at a .5 to .9 residual at the point of entry to the system. The Department is responsible for maintaining and upgrading the distribution system, and flushes the water mains on an annual basis. Please refer to Appendix B – "2015 Consumer Confidence Report" for further info.

Regulations

Mtn. Lakes is subject to water supply limits set by the NJDEP. This is the volume of water that may be legally withdrawn from a groundwater or surface supply in accordance with limits set by the NJDEP Bureau of Water Allocation. Mountain Lakes is allocated 30 million gallons per month, and 285 million gallons per year.

Mtn. Lakes is required by NJDEP to file bi-annual Water Conservation and Drought Water Supply Emergency Management Plan Reports. The reports include summaries of usage, lost water investigations and programs employed to minimize unaccounted for water.

Users & Usage

As of 2010 figures, Mtn. Lakes supplies a population of 4,400 with potable water.

	# of Connections	# of Meters	% of overall use
Residential	1416	1416	94%
Commercial	75	75	5%
Industrial	0	0	0%
Municipal	10	10	1%
Total	1501	1501	100%

*Unaccounted for Water is 15%

External Influences

Boonton Twp. Fire Dept. accesses Mtn. Lakes water via a fire hydrant located in front of the D.P.W. The purpose of their taking water is for training and firefighting.

MOUNTAIN LAKES WATER SYSTEM INFORMATION SUMMARY

April 20, 2016

WATER SOURCES

Water for the Mountain Lakes System is derived from four (4) production wells, 2 of which are located near the Rockaway River in Denville Township. The primary well (No. 5) is located on Route 46 in Mountain Lakes, and it supplies approximately 80% of the total water used by the homes and businesses in Mountain Lakes. The table below provides detailed information on each of the Borough's water supply wells.

	WELL #5 - TP001001 WL001002	WELL #4 - TP002004 WL002001	WELL #3 - TP003007 WL003001	WELL #2 - TP007017 WL007016
Location	Rte 46 E & Boulevard	Towpath Rd	Towpath Rd	Tower Hill Rd
DEP ID No.	WSWL 65016	WSWL 69996	WSWL 69995	WSWL 69997
DEP Permit No.	25-14698	45-00301	45-00300	45-00302
Date Drilled	1/8/1969	8/25/1947	7/25/1947	1/1/1922
Depth	333'	64'	64'	462'
Elevation	505'	504'	500'	566'
Casing Dia.	20"	12"	12"	8"
Pump Capacity	800 GPM	276 GPM	211 GPM	260 GPM
Pump Horsepower	75	40	25	40
Driller	CW Lauman & Co Inc			JJ Reilly
North Latitude	40° 52' 58"	40° 54' 14"	40° 54' 07"	40° 53' 31"
West Longitude	74° 27' 26"	74° 27' 39"	74° 27' 45"	74° 26' 40"
State Coord East	504,044.0	503,023.0	502,633.0	507,529.0
State Coord North	746,541.0	754,270.0	753,506.0	749,879.0
Geologic Name	Stratified drift	Stratified drift	Stratified drift	Precambrian
Hydrology	Glacial Sand and Gravel	Glacial Sand and Gravel	Glacial Sand and Gravel	metamorphic rock
Formation	Unconfined	Unconfined	Unconfined	Unconfined
Watershed	Upper Passaic, Whippany, and Rockaway	Upper Passaic, Whippany, and Rockaway	Upper Passaic, Whippany, and Rockaway	Upper Passaic, Whippany, and Rockaway
Province	Highlands	Highlands	Highlands	Highlands
Aquifer	Buried Valley Aquifer	Buried Valley Aquifer	Buried Valley Aquifer	

WATER DISTRIBUTION SYSTEM

The Mountain Lakes water system consists of the four (4) water supply wells as described above, a network of underground pipes for delivering the water to homes and businesses, and two (2) storage tanks. The system is operated and maintained by the Department of Public Works.

An inventory of the system components is presented in the following table:

SYSTEM COMPONENT	QUANTITY
Water Mains	33.5 miles
12" Pipe	5,700'
10" Pipe	11,600'
8" Pipe	90,400'
6" Pipe	50,600'
4" Pipe	18,000'
Hydrants	262
Storage Tank No. 1	1,000,000 gal.
Storage Tank No. 2	500,000 gal.
Residential Services	1,491
Commercial Services	87

SOURCE WATER ASSESSMENT

In 2004 the New Jersey Department of Environmental Protection (NJDEP) completed and issued the Source Water Assessment Report and Summary for the Borough of Mountain Lakes water system. The purpose of the Source Water Assessment Program is to provide for the protection and benefit of public water systems and to increase public awareness and involvement in protecting the sources of public drinking water. The key items of the SWA are:

- Determine the assessment area of each source of public drinking water.
- Inventory the potential contamination sources within the source water assessment area.
- Determine the public water system source's susceptibility to regulated contaminants.
- Incorporate public education and participation.

It is important to note, if a drinking water source's susceptibility is high, it does not necessarily mean the drinking water is contaminated. The rating reflects the potential for contamination of source water, not the existence of contamination.

A copy of the SWA Summary from NJDEP is provided in Appendix A.

WATER QUALITY

Under the Federal and New Jersey Safe Drinking Water Regulations, all public water systems must routinely monitor for a number of contaminant categories including pathogens, nutrients, volatile organic compounds, synthetic organic compounds, pesticides, inorganics, radionuclides, and disinfection byproducts. Mountain Lakes performs all such testing and files reports of the results with NJDEP. Mountain Lakes complies with all drinking water standards.

Appendix B includes a copy of the 2015 Consumer Confidence Report which summarizes Mountain Lakes water quality information. Appendix C is a copy of the water quality standards set by EPA and NJDEP.

FIRM CAPACITY

Firm capacity is the theoretical measure of a water system's ability to reliably satisfy the peak usage demands, and is determined in accordance with NJDEP regulations. The firm capacity of a water system is calculated by summing the daily capacity of each well or other supply source, and then subtracting the single largest source. DEP requires that the largest source not be counted to insure that adequate water is available to all users in the event the source becomes unusable.

As shown below, Mountain Lakes water system has a firm capacity of 1,076,000 gallons per day. If peak daily demand exceeds firm capacity, the system is deemed to be deficient, and no additional service connections are allowed.

Well Inventory	Well Pump	Capacity	Firm Capacity
Well 5	800 gpm	1.152 MGD	0.0 MGD
Well 4	276 gpm	0.397 MGD	0.397 MGD
Well 3	211 gpm	0.304 MGD	0.304 MGD
Well 2	260 gpm	0.374 MGD	0.374 MGD
Water Supply Firm Capacity:	------	2.228 MGD	1.076 MGD

WATER SUPPLY LIMITS SET BY NJDEP

This is the volume of water that may be legally withdrawn from a groundwater or surface supply in accordance with limits set by the NJDEP Bureau of Water Allocation. Mountain Lakes allocation is 30 million gallons per month, and 285 million gallons per year.

	Allocation	Contract	Total
Monthly Limit	30.000 MGM	0 MGM	30.000 MGM
Yearly Limit	285.000 MGY	0 MGY	285.000 MGY

PEAK DEMANDS

	Current Peak	Date	Committed Peak	Total Peak
Daily Demand	0.903 MGD	07/2012	0.076 MGD	0.979 MGD
Monthly Demand	28.008 MGM	07/2012	1.178 MGM	29.186 MGM
Yearly Demand	217.562 MGY	2012	9.247 MGY	226.809 MGY

CURRENT AVAILABLE CAPACITY

0.097 MGD	0.814 MGM	58.191 MGY

WATER USAGE HISTORY

See tabulation in Appendix D which summarizes water usage in Mountain Lakes from 2006 through 2016.

CONSERVATION

The Borough ordinances include water conservation measures at Chapter 237-10. The key provisions include:

Water restrictions - During the months of June, July, August, and September of each year, all Borough water customers are required to observe the following water use restrictions: outdoor use for lawn, tree and shrub watering shall be restricted to alternate days

Declaration of water emergency - Whenever the Borough Manager is satisfied and finds that a water emergency exists in the Borough of Mountain Lakes, the Borough Manager may promulgate and publish a declaration that a water emergency exists in the Borough. Such declaration may impose the complete ban and prohibition of outside water usage.

Water Rate Incentive – Water rates increase with the amount of water that each customer consumes.

The Borough is required by NJDEP to file bi-annual Water Conservation and Drought Water Supply Emergency Management Plan Reports. The reports include summaries of usage, lost water investigations and programs employed to minimize unaccounted for water.

A copy of the 2015 report is provided in Appendix E.

RECOMMENDATIONS

- Enforcement / Regulatory
  - Enforcement of Ordinances
  - Changing from an odd-even schedule to a twice weekly schedule
  - Usage Charge structure change
  - Existing meter upgrades for meters older than ?? 20 years ??
  - Mandatory two-meter system on residential sprinkler systems
  - Remote reading Meters w/ Central Station Monitoring
  - Leak Detection Survey
  - Meter on fire hydrant at Borough Hall for Boonton Fire Department

- Conservation
  - Rain Sensors on sprinkler systems
  - Drip Irrigation vs. Spray
  - Rain Barrels
  - Cisterns
  - Rain Gardens and native plants
  - Grey water systems
  - Turn off irrigation to established deep root trees

- Education
  - Staying informed on new Best Practices, products and approaches
  - Education Programs for the residents and the Borough
  - Constant and consistent reinforcement
  - Partner with the high school to provide a scholarship for constructive and/or water saving messaging/campaigns

RECOMMENDATIONS (description, pros, cons, impact, costs, actions)

Enforcement / Regulatory

Enforcement of Ordinances

The Borough has a Code Enforcement Official since January of 2016 in Joe Mullaney.

Changing from an odd-even schedule to a twice weekly schedule

There is discussion that odd-even watering is inefficient as the water does not penetrate deep enough for the root system to grow longer and deeper roots. Thus when the plants are subjected to high heat, there is a tendency for them to become stressed and possibly die. A policy allowing for less frequent watering but for longer times, would encourage the root systems to grow and be less dependent on available water closer to the surface.
This need to be researched.

Usage Charge structure change

The current water billing models are based solely on usage with gradually increasing rates. Consideration should be given to alternative rate structures. Some examples include a steeper increase in the cost past a certain monthly usage or set a historic usage rate for each home and change the excess rate based on historic use.

Existing meter upgrades for meters older than ?? 20 years ??

Older meters can become problematic and produce inaccurate readings. As the Borough is attempting to reconcile the difference between pumped vs billed water, ensuring that the home based meters are working properly will provide a benefit.

Mandatory two-meter system on residential sprinkler systems

Having a separate meter on residential sprinkler/irrigation systems allows for more accurate tracking of actual water use and subsequently a more precise billing model and conservation approach. Currently the borough only has 442 out of over 1,400 households on a separate meter. One approach would be to make these separate meters mandatory, taking into account any difficulties in retrofitting older piping systems. Certainly for starters it could be a building code requirement for new construction as well as for plumbing renovations

Remote reading Meters w/ Central Station Monitoring

Currently a DPW employee must physically read each meter. Meters are read once per quarter, thus there is no data indicating specifically when water is being used.
Remote Reading Meters would (1st) eliminate the need for the quarterly physical reading and (2nd) would allow for immediate reading of usage. As an example,

lawn watering during non-usage times, days and dates could be determined immediately.
It is estimated that to implement such a system would cost $900,000. Assuming 1,400 household (not including commercial and Municipal), the cost per household would be $643. Spread over 4 years (not including interest charges) the increase in water charges would be $160 or $40 per billing period.

Leak Detection Survey

The Borough has contracted with a Leak Detection service that utilizes Active Listening Devices and travel every road in the Municipality and plans to contract for this service on a bi-annual basis

Meter on fire hydrant at Borough Hall for Boonton Fire Department

There is a long standing agreement with the Municipality that, as partial support, Boonton Fire Department can refill their pumpers occasionally at the hydrant. However, at this time there is no way to track the amount of water used. The Borough Manager is researching how to formalize this agreement without incurring burdensome reporting

Conservation

Rain Sensors on sprinkler systems

Resident need to ensure that (1) these are installed on sprinkler systems, (2) that they are working properly and (3) under education, the Borough needs to stay up to date on advances in sensor technology and update the residents with new information.

Drip Irrigation vs. Spray

Drip irrigation can save water in areas where the plant placement is relatively static. Examples include established trees, shrub and perennial beds

Rain Barrels

Rain barrels collect rain water from the downspouts that can be used later to water the garden. To achieve the stated efficiencies, rain barrels must be used, or emptied, between rain events.

Cisterns

Think very large in ground rain barrels. These will have added expense to install but can hold a much larger quantity of water. https://en.wikipedia.org/wiki/Cistern

Rain Gardens and native plants

A rain garden is a low area that absorbs and filters rain water runoff that comes from roofs, sidewalks, and driveways. Rain runs off the hard surfaces, collects in the shallow depression, and slowly soaks into the soil. They are usually planted with colorful native plants and grasses.

Native plants have numerous beneifts including requiring less water. For more information, go to http://plantnative.org/how_benefits.htm

Grey water systems

Greywater is defined as the wastewater produced from baths and showers, clothes washers, and lavatories. The wastewater generated by toilets, kitchen sinks, and dishwashers is called blackwater.

Grey water systems for residential use work by diverting water from washing machines, bathtubs and showers into areas such as gardens and flower beds. In the process, the water passes through a multi-stage filtration system which screens out debris such as dirt and lint. The process creates a highly effective irrigation system by using water that would ordinarily go to waste. Source - http://www.waterwisegroup.com/greywater-systems-residential.html

Turn off irrigation to established deep root trees

Apparently established trees develop deeper root systems, allowing the irrigation to them to be turned off unless there is extreme drought / heat.

Education (to be developed)

- Staying informed on new Best Practices, products and approaches
- Education Programs for the residents and the Borough
- Constant and consistent reinforcement
- Partner with the high school to provide a scholarship for constructive and/or water saving messaging/campaigns

APPENDICIES

A – Source Water Assessment Summary

B – 2015 Consumer Confidence Report

C – EPS and NJDEP Water Quality Standards

D – Water Usage Summary

E – 2015 Water Conservation Report

F – "Mountain Lakes Water Supply – Despite Meeting NJDEP Regulations the Borough Has a Water Deficit" by Lynn Uhrig – March 15, 2014

G – "Environmental Commission Statement to the Borough Council on March 10, 2014"

H – New Jersey Highlands Regional Master Plan; "Highlands Water Resources Technical Report Volume 1: Watersheds and Water Quality" - http://www.highlands.state.nj.us/njhighlands/master/tr_water_res_vol_1.pdf

I - Desalination Reference sources (for general information only)

https://en.wikipedia.org/wiki/Desalination

http://water.usgs.gov/edu/drinkseawater.html

http://www.water.ca.gov/desalination/

http://www.mercurynews.com/science/ci_25859513/nations-largest-ocean-desalination-plant-goes-up-near

http://www.livescience.com/4510-desalination-work.html

APPENDIX A – Source Water Assessment Summary

Borough of Mountain Lakes Water Department

Source Water Assessment Summary

A State Review of Potential Contamination Sources Near Your Drinking Water

The Department of Environmental Protection (DEP) has conducted an assessment of the water sources that supply each public water system in the state, including yours. The goal of this assessment was to measure each system's susceptibility to contamination, not actual (if any) contamination measured in a water supply system.

The assessment of your water system, the *Borough of Mountain Lakes Water Department*, involved:

- Identifying the area (known as the source water assessment area) that supplies water to your public drinking water system;
- Inventorying any significant potential sources of contamination in the area; and
- Analyzing how susceptible the drinking water source is to the potential sources of contamination.

DEP evaluated the susceptibility of all public water systems to eight categories of contaminants. These contaminant categories are explained, along with a summary of the results for your water system, on page 3. Page 4 contains a map of your water system's source water assessment area.

A public water system's susceptibility rating (L for low, M for medium or H for high) is a combination of two factors. H, M, and L ratings are based on the potential for a contaminant to be at or above 50% of the Drinking Water Standard or MCL (H), between 10 and 50% of the standard (M) and less than 10% of the standard (L).

- How "sensitive" the water supply is to contamination. For example, a shallow well or surface water source, like a reservoir, would be more exposed to contamination from the surface or above ground than a very deep well.
- How frequently a contaminant is used or exists near the source. This is known as "intensity of use." For example, the types of activities (such as industry or agriculture) surrounding the source.

The susceptibility rating does not tell you if the water source is actually contaminated. The Consumer Confidence Report annually issued by your water utility contains important information on the results of your drinking water quality tests, as required by the federal Safe Drinking Water Act.

Where does drinking water come from?

There are two basic sources of drinking water: ground water and surface water.

Ground water is water found beneath the Earth's surface. Ground water comes from rain and snow seeping into rock and soil. Ground water is stored in underground areas called aquifers. Aquifers supply wells and springs. Wells in New Jersey range from about 15 feet to 2,000 feet deep.

Surface water is the water naturally open to the atmosphere, such as rivers, lakes, streams and reservoirs. Precipitation that does not infiltrate the ground or evaporate into the sky runs off into surface water bodies.

Ground water can seep into a stream, river or other surface water body, recharging surface water bodies. Likewise, under some circumstances, surface water can seep into an adjacent aquifer.

A water system obtains its water from 1) wells drilled into the ground that pump out ground water; 2) devices called surface water intakes placed on a river, stream, reservoir; or 3) both.

What factors may affect the quality of your drinking water source?

A variety of conditions and activities may affect the quality of drinking water source. These include geology (rock and soil types); depth of a well or location of a surface water intake; how the land surrounding the source is used (for industry, agriculture or development); the use of pesticides and fertilizers; and the presence of contaminated sites, leaking underground storage tanks, and landfills.

What steps are being taken now to ensure my drinking water quality?

The DEP has numerous programs in place to maintain and protect the quality of our State's water resources. For example, the Safe Drinking Water Program is designed to ensure that water delivered for human consumption meets DEP's stringent health-based drinking water standards. Additionally, DEP has permitting, waste management, and clean up programs in place to avoid and control potential contamination. Key DEP drinking water protection initiatives will be phased-in over time in Source Water Assessment areas to advance existing program protections.

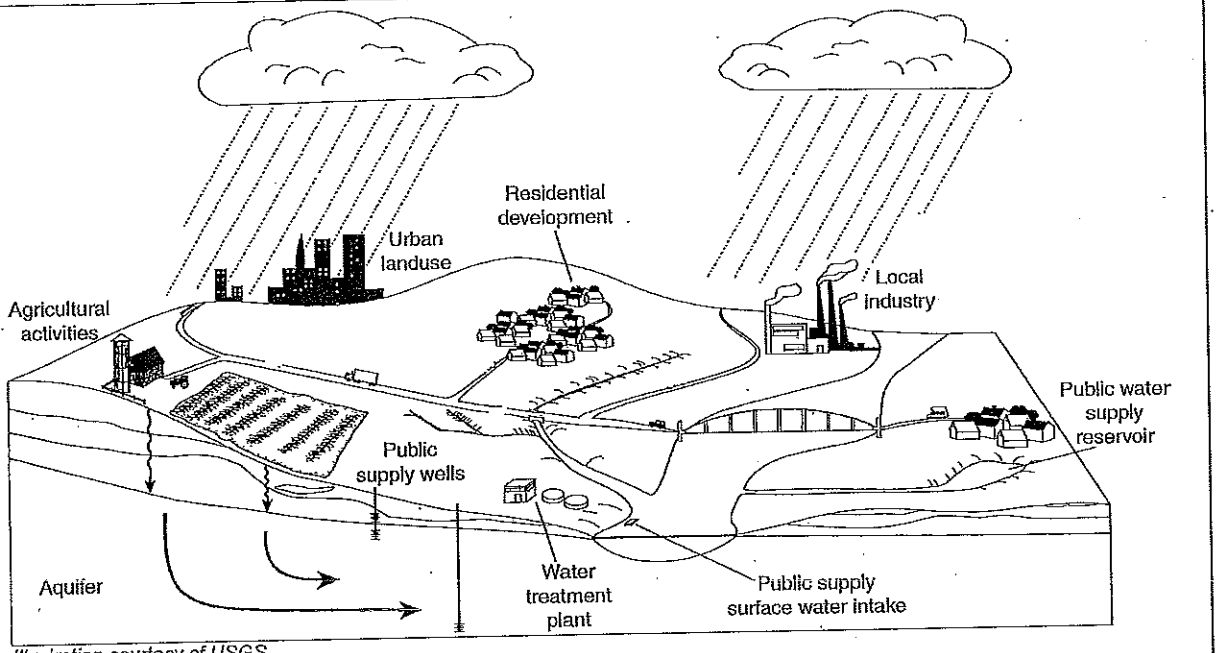


Illustration courtesy of USGS

Among the factors that may affect the quality of drinking water are the type of rock and soil and how the land is used. While some rain and snow evaporates into the sky, most of it runs off into nearby rivers and streams or seeps into the ground. Drinking water comes from underground aquifers or surface water bodies.

What can you and others do to help?

Federal law requires each state to establish and implement a Source Water Assessment Program. While government at the state and local levels can do their part, there are actions that you and your neighbors in homes and businesses can take now to help protect our precious and shared natural resource.

Here's just a few ways you and others can help ensure clean and plentiful water for New Jersey -- now and in the future. Join us today for a clean water future.

In your home or business:

- Dispose of waste properly. Some materials such as motor oil, paint, flea collars, and household cleaners have the potential to contaminate source water. Contact your local Department of Public Works for proper household hazardous waste disposal.
- Limit your use of fertilizer, pesticides, and herbicides.

Here are some actions that municipal and county officials/local and county planners can take and you can help encourage and support.

- Manage and work with owners of existing potential contaminant sources to minimize potential contamination.
- Establish regulations prohibiting or restricting certain activities or land uses within the source water assessment area. Take appropriate enforcement action when necessary.
- Update municipal master plans to ensure greater protection.
- Purchase lands or create conservation easements within the source water assessment area.

Borough of Mountain Lakes Water Department- PWSID # 1425001

Borough of Mountain Lakes Water Department is a public community water system consisting of 3 well(s), 0 wells under the influence of surface water, 0 surface water intake(s), 2 purchased ground water source(s), and 1 purchased surface water source(s).

This system's source water comes from the following aquifer(s) and/or surface water body(s) (if applicable): igneous and metamorphic rocks,glacial sand and gravel

This system purchases water from the following water system(s) (if applicable): BOONTON TWP WD,DENVILLE WD,PAR TROY HILLS WD

Susceptibility Ratings for Borough of Mountain Lakes Water Department Sources

The table below illustrates the susceptibility ratings for the seven contaminant categories (and radon) for each source in the system. The table provides the number of wells and intakes that rated high (H), medium (M), or low (L) for each contaminant category. For susceptibility ratings of purchased water, refer to the specific water system's source water assessment report.

The seven contaminant categories are defined at the bottom of this page. DEP considered all surface water highly susceptible to pathogens, therefore all intakes received a high rating for the pathogen category. For the purpose of Source Water Assessment Program, radionuclides are more of a concern for ground water than surface water. As a result, surface water intakes' susceptibility to radionuclides was not determined and they all received a low rating.

If a system is rated highly susceptible for a contaminant category, it does not mean a customer is or will be consuming contaminated drinking water. The rating reflects the potential for contamination of source water, not the existence of contamination. Public water systems are required to monitor for regulated contaminants and to install treatment if any contaminants are detected at frequencies and concentrations above allowable levels. As a result of the assessments, DEP may customize (change existing) monitoring schedules based on the susceptibility ratings.

	Pathogens			Nutrients			Pesticides			Volatile Organic Compounds			Inorganics			Radio-nuclides			Radon			Disinfection Byproduct Precursors		
Sources	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L	H	M	L
Wells - 3		1	2	1	2			1	2	2		1		1	2		3		1	2			3	
GUDI - 0																								
Surface water intakes - 0																								

- **Pathogens:** Disease-causing organisms such as bacteria and viruses. Common sources are animal and human fecal wastes.
- **Nutrients:** Compounds, minerals and elements that aid growth, that are both naturally occurring and man-made. Examples include nitrogen and phosphorus.
- **Volatile Organic Compounds:** Man-made chemicals used as solvents, degreasers, and gasoline components. Examples include benzene, methyl tertiary butyl ether (MTBE), and vinyl chloride.
- **Pesticides**: Man-made chemicals used to control pests, weeds and fungus. Common sources include land application and manufacturing centers of pesticides. Examples include herbicides such as atrazine, and insecticides such as chlordane.
- **Inorganics:** Mineral-based compounds that are both naturally occurring and man-made. Examples include arsenic, asbestos, copper, lead, and nitrate.
- **Radionuclides:** Radioactive substances that are both naturally occurring and man-made. Examples include radium and uranium.
- **Radon:** Colorless, odorless, cancer-causing gas that occurs naturally in the environment. For more information go to http://www.nj.gov/dep/rpp/radon/index.htm or call (800) 648-0394.
- **Disinfection Byproduct Precursors:** A common source is naturally occurring organic matter in surface water. Disinfection byproducts are formed when the disinfectants (usually chlorine) used to kill pathogens react with dissolved organic material (for example leaves) present in surface water.

APPENDIX B - 2015 Consumer Confidence Report

CONSUMER CONFIDENCE REPORT

Mountain Lakes Water Department – PWSID# NJ1425001

Reporting Period - January 1, 2015 to December 31, 2015

The Mountain Lakes Water Department is located at the DPW Building on Pocono Road. Billing and administrative offices are located in the Borough Hall at 400 Boulevard. Questions concerning this report should be directed to the Borough Manager at (973) 334-3131. The Borough Council holds regular public meetings every second and fourth Monday of the month at 8:00 P.M. at the Borough Hall. Included in this report are details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and State standards. As always, we are committed to providing you with the highest quality drinking water and service. Please do not hesitate to contact us at any time.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immune-compromised persons such as persons with cancer undergoing chemo-therapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lesson the risk of infection by *Cryptosporidium* and other microbial contaminates are available from the Safe Drinking Water Hotline 1-(800) 426-4791.

Water for the Mountain Lakes system is derived from four (4) production wells, 2 of which are located near the Rockaway River in Denville Township. The primary well (No. 5) is located on Route 46 in Mountain Lakes, and it supplies approximately 80% of the total water used by the homes and businesses in Mountain Lakes.

Source Water Assessments: The New Jersey Department of Environmental Protection (NJDEP) has completed and issued the Source Water Assessment Report and Summary for the Borough of Mountain Lakes water system, which is available for review at www.state.nj.us/dep/swap or by contacting NJDEP's Bureau of Safe Drinking Water at (609) 292-5550. Mountain Lakes monitors its water sources for regulated contaminants in accordance with NJDEP requirements.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline 1-(800) 426-4791.

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water before we treat it include:

Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wild life.

Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture and residential uses.

Radioactive contaminants, which are naturally occurring.

Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas station, urban stormwater runoff, and septic systems.

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. We treat our water according to EPA's regulations. Food and Drug Administrations (FDA) establish limits of contaminants in bottled water, which must provide the same protection for public health.

WATER QUALITY DATA

The table below lists all the drinking water contaminants that we detected during the 2015 calendar year. The presence of these contaminants in the water does not necessarily indicate that the water poses a health risk. Unless otherwise noted, the data presented in this table is from testing performed between January 1, 2015 and December 31, 2015. The State of New Jersey requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Therefore, some of the data, though representative of the water quality, is more than one year old.

Terms & abbreviations used below:

Maximum Contaminant Level (MCL): the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG): the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLG's allow for a margin of safety.

Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Goal (MRDLG): the level of a drinking water disinfectant, below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination

Recommended Upper Limit (RUL): recommended maximum concentration of secondary contaminants. These reflect aesthetic qualities such as odor, taste or appearance. RUL's are recommendations, not mandates.

Primary Contaminants: substances that are health-related. Water suppliers must meet all primary drinking water standards.

Secondary Contaminants: substances that do not have an impact on health. Secondary contaminants affect aesthetic qualities such as odor, taste or appearance. Secondary standards are recommendations, not mandates.

Action Level (AL): the concentration of a contaminant which, when exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT): a required process intended to reduce the level of a contaminant.

n/a: not applicable; **nd**: not detectable at testing limit; **ppb** parts per billion or micrograms per liter; **ppm**: parts per million or milligrams per liter; **pCi/l**: picocuries per liter (a measure of radiation).

Contaminants (units)	MCL	MCLG	Mountain Lakes Water	Range of Detections	Sample Date	Violation Y or N	Typical Source of Contaminant
Microbiological Contaminants							
Total Coliform Bacteria	1	0	0	0	2015	N	Naturally present in the environment
Fecal coliform and E. coli	0	0	0	0	2015	N	Human and animal fecal waste
Secondary Contaminants							
M.B.A.S. (ppb)	500	500	0	nd	08-22-14	N	Synthetic detergents
Aluminum (ppb)	200	200	0	nd	08-22-14	N	Naturally occuring element
Chloride (ppm)	250	250	56.5	10 - 108	08-22-14	N	Erosion from natural deposits; Discharge of human and animal wastes; Discharge from industry
Color (Color Units)	10	10	10	10	08-22-14	N	Physical characteristic
Corrosivity	+/- 1.0	+/- 1.0	-0.9	-1.84 to .37	08-22-14	N	Physical characteristic
Hardness (ppm)	250	250	155	71 - 241	08-22-14	N	Naturally ocurring minerals
Iron (ppb)	300	300	0	nd	02-20-15	N	Naturally occuring element
Manganese (ppb)	50	50	0	nd	02-20-15	N	Naturally occuring element
Odor (Threshold Number)	3	3	0	nd	08-22-14	N	Physical characteristic
pH (Standard Units)	6.5 - 8.5	6.5 - 8.5	7.13	6.7 - 8.02	08-22-14	N	Physical characteristic
Silver (ppb)	100	100	0	nd	08-22-14	N	Naturally occuring element
Sulfate (ppm)	250	250	18.8	10 - 31	08-22-14	N	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines
Total Dissolved Solids (ppm)	500	500	224	70 - 395	08-22-14	N	Erosion of natural mineral deposits
Zinc (ppm)	5	5	0	nd	08-22-14	N	Naturally occuring element

WATER QUALITY DATA

Contaminants (units)	MCL	MCLG	Mountain Lakes Water	Range of Detections	Sample Date	Violation Y or N	Typical Source of Contaminant
Lead and Copper							
Lead (ppb)	AL=15	15	9	0 to 10	07-17-13	N	Corrosion of household plumbing systems; Erosion of natural deposits
Copper (ppm)	AL=1.3	1.3	0.63	0.0 to .71	07-17-13	N	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives
Inorganic Contaminants							
Antimony (ppb)	6	6	0	nd	08-22-14	N	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
Arsenic (ppb)	5	n/a	0.5	0 - 1	02-20-15	N	Erosion from natural deposits; Runoff from orchards; Runoff from glass and electronics productions wastes
Barium (ppm)	2	2	0.01	.005-.020	08-22-14	N	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Beryllium (ppb)	4	4	0	nd	08-22-14	N	Discharge of metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries
Cadmium (ppb)	5	5	0	nd	08-22-14	N	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints
Chromium (ppb)	100	100	1	1	08-22-14	N	Discharge from steel and pulp mills; Erosion of natural deposits
Cyanide (ppb)	200	200	0	nd	08-22-14	N	Discharge from steel /metal factories; Discharge from plastic and fertilizer factories
Fluoride (ppm)	4	4	0.07	0 - .07	08-22-14	N	Erosion from natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Mercury (ppb)	2	2	0	nd	08-22-14	N	Discharge from steel /metal factories; Discharge from plastic and fertilizer factories
Nickle (ppb)	100	100	0	nd	08-22-14	N	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Nitrate (ppm)	10	10	1.67	1.45 - 2.04	11-25-15	N	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Selenium (ppb)	50	50	0	nd	08-22-14	N	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines
Thallium (ppb)	2	0.5	0	nd	08-22-14	N	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories
Sodium (ppm)	50	50	16.2	6.6 - 31.5	08-22-14	N	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines

WATER QUALITY DATA

Contaminants (units)	MCL	MCLG	Mountain Lakes Water	Range of Detections	Sample Date	Violation, Y or N	Typical Source of Contaminant
Regulated Disinfectants							
TTHMs [Total trihalomethanes] (ppb)	80	n/a	4.4	0 - 8.8	08-24-15	N	By-product of drinking water chlorination
HAA5 [Five Haloacetic Acids] (ppb)	60	n/a	0.8	0 - 1.6	08-24-15	N	By-product of drinking water chlorination
Chlorine (ppm) 2015	Levels Detected - Average & Highest				MRLD		MRDLG
	0.64		0.89		4.0 ppm		4.0 ppm
Radioactive Contaminants							
Total Alpha (pCi/l)	15	0	0	0	2015	N	Erosion of natural deposits
Radium 226/228 (pCi/l)	5	0	0.77	0 - 1.58	2015	N	Erosion of natural deposits
Uranium (ppb)	30	0	0.85	0 - 1.26	2015	N	Erosion of natural deposits

Water Standards Information

Regarding chemical contaminants and health related standards. Mountain Lakes is proud of the fact that our water complies with all drinking water standards for chemical contaminants as set by the State of New Jersey and the U.S. EPA.

Regarding New Standards for Arsenic. Mountain Lake's water meets EPA's standard for arsenic of 5 parts per billion.

Special Considerations Regarding Children, Pregnant Women, Nursing Mothers, and Others

Children may receive a slightly higher amount of a contaminant present in the water than do adults, on a body weight basis, because they may drink a greater amount of water per pound of body weight than do adults. For this reason, reproductive or developmental effects are used for calculating a drinking water standard if these effects occur at lower levels than other health effects of concern. If there is insufficient toxicity information for a chemical (for example, lack of data on reproduction or developmental effects), an extra uncertainty factor may be incorporated into the calculation of the drinking water standard, thus making the standard more stringent, to account for additional uncertainties regarding these effects. In the cases of lead and nitrate, effects on infants and children are the health endpoints upon which the standards are based.

Nitrate: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for a infant, you should ask advise from your health care provider.

Lead: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Mountain Lakes is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water is available from the Safe Drinking Water Hotline or at https://www.epa.gov/your-drinking-water/basic-information-about-lead-drinking-water.

APPENDIX C - EPA and NJDEP Water Quality Standards

Federal and NJ State Primary and Secondary Drinking Water Standards as of February 2005

Volatile Organic Compounds

Contaminants	Maximum Contaminant Levels [MCL] [µg/l or ppb]
Benzene	1*
Carbon Tetrachloride	2*
1,2-Dichlorobenzene	600
1,3-Dichlorobenzene	600*
1,4-Dichlorobenzene	75
1,1-Dichloroethane	50*
1,2-Dichloroethane	2*
1,1-Dichloroethylene	2*
cis-1,2-Dichloroethylene	70
trans-1,2-Dichloroethylene	100
1,2-Dichloropropane	5
Ethylbenzene	700
Methyl tertiary Butyl Ether	70*
Methylene Chloride	3*
Monochlorobenzene	50*
Naphthalene	300*
Styrene	100
1,1,2,2-Tetrachloroethane	1*
Tetrachloroethylene	1*
Toluene	1,000
1,2,4-Trichlorobenzene	9*
1,1,1-Trichloroethane	30*
1,1,2-Trichloroethane	3*
Trichloroethylene	1*
Vinyl Chloride	2
Xylenes [total]	1,000*

* N.J. MCL [A-280]

Key: One milligram per liter [mg/l] = one part per million = one cent in $10,000 or one second in 12 days.
One microgram per liter [µg/l] = one part per billion = one cent in $10,000,000 or one second in 32 years.

Trihalomethanes 80 µg/l [ppb] running annual average
Total of Dichlorobromomethane, Chlorodibromomethane, Bromoform and Chloroform.

Haloacetic Acids 60 µg/l ppb running annual average
Total of Monochloroacetic, Dichloroacetic, Trichloroacetic, Bromoacetic and Dibromoacetic acids.

Bromate (plants using ozone) 10 µg/l (ppb) running annual average

Chlorite (plants using chlorine dioxide) 1,000 µg/l (ppb) daily/follow-up monitoring

Radionuclides Combined radium 226/228 mcl is 5 picocuries/l (pCi/l); gross alpha particle radioactivity (including radium 226 but excluding radon and uranium) MCL is 15 pCi/l; beta/photon emitters MCL is 4 mrem/yr; uranium MCL is 30 µg/l.

Turbidity No more than 5% of the samples may exceed 0.3 NTU, nor any sample exceed 1 NTU.

Coliform bacteria standards are based on the presence or absence of coliforms in a sample. The number of samples collected by a public water system is determined by the size of the population served. A system collecting at least 40 samples/month can have coliform in no more than 5% of the samples. A system collecting fewer than 40 samples/month can have no more than one coliform positive. Any number exceeding these amounts triggers an MCL exceedence.

Inorganics

Contaminants	Maximum Contaminant Levels [MCL] [µg/l or ppb]
Antimony	6
Arsenic	5 * #
Asbestos	7 X 10^6 fibers/l > 10µm
Barium	2,000
Beryllium	4
Cadmium	5
Chromium	100
Copper	1,300**[AL]
Cyanide	200
Fluoride	4,000
Lead	15**[AL]
Mercury	2
Nickel	+
Nitrate[as nitrogen]	10,000
Nitrite	1,000
[combined nitrate/nitrite	10,000]
Selenium	50
Thallium	2

**An [AL] action level is not an MCL. It is a trigger point at which remedial action is to take place.

+No MCL - Monitoring Required

Effective January 23, 2006

* N.J. MCL [A-280]

Synthetic Organic Compounds

Contaminants	Maximum Contaminant Levels [MCL] [µg/l or ppb]
Alachlor	2
Aldicarb	+
Aldicarb Sulfone	+
Aldicarb Sulfoxide	+
Atrazine	3
Benzo[a]pyrene	0.2
Carbofuran	40
Chlordane	0.5*
Dalapon	200
Dibromochloropropane [DBCP]	0.2
Di[2-ethylhexyl]adipate	400
Di[2-ethylhexyl]phthalate	6
Dinoseb	7
Diquat	20
Endothall	100
Endrin	2
Ethylene dibromide [EDB]	0.05
Glyphosate	700
Heptachlor	0.4
Heptachlor Epoxide	0.2
Hexachlorobenzene	1
Hexachlorocyclopentadiene	50
Lindane	0.2
Methoxychlor	40
Oxamyl	200
PCBs	0.5
Pentachlorophenol	1
Picloram	500
Simazine	4
Toxaphene	3
2,3,7,8-TCDD [Dioxin]	3 X 10^{-8}
2,4-D	70
2,4,5-TP [Silvex]	50

* N.J. MCL [A-280]

+No MCL - Monitoring Required

For a detailed explanation of the Safe Drinking Water Program, refer to the Federal Safe Drinking Water Act regulations [40 CFR Parts 141, 142, 143] and the New Jersey Safe Drinking Water regulations [N.J.A.C. 7:10-1 et seq.].

Secondary Standards

[primarily aesthetic]

Physical Characteristics	Recommended Upper Limit or Optimum Range
Color	10 color units (standard cobalt scale)
pH	6.5 to 8.5 (optimum range)
Odor	3 Threshold odor number
Taste	No objectionable taste

Chemical Characteristics	Recommended Upper Limit [mg/l or ppm]
ABS/L.A.S.	0.5
Aluminum	0.2
Chloride	250
Fluoride	2
Hardness (as CaCO3)	250
Iron	0.3
Manganese	0.05
Silver	0.1
Sodium	50
Sulfate	250
Total dissolved solids	500
Zinc	5

New Jersey Department of Environmental Protection

Division of Water Supply

Bureau of Safe Drinking Water

P.O. Box 426
Trenton, New Jersey 08625-0426

Tel. # 609-292-5550
Fax. # 609-292-1654

2/05

APPENDIX D – Water Usage Summary

BOROUGH OF MOUNTAIN LAKES WATER DEPT.

WATER SYSTEM MONTHLY TOTAL USAGE

AND AVERAGE DAILY DEMAND FROM 2006 TO 2016

"WATERSUM"
File: ml_water.xl
Report Date
17-Apr-16

	MONTHLY TOTALS IN GALLONS										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
JAN	17,544,200	17,824,500	15,104,700	15,081,700	11,917,000	11,123,400	16,220,400	15,361,800	13,818,000	13,516,600	12,708,400
FEB	15,224,400	16,350,300	14,123,200	13,102,700	10,047,400	10,632,200	16,569,600	13,083,600	10,496,000	12,112,200	11,822,000
MAR	17,088,900	18,712,000	15,528,600	13,852,500	11,916,300	12,089,000	16,577,300	15,653,800	12,362,200	12,836,500	12,823,800
APR	18,797,100	18,210,700	16,079,700	14,476,000	12,425,700	12,878,500	18,914,800	16,174,800	12,479,000	12,681,400	
MAY	26,076,500	26,222,300	19,496,500	17,857,300	14,088,700	16,734,700	19,366,000	20,865,100	15,299,100	21,549,100	
JUN	23,955,900	28,245,800	22,939,200	14,506,500	17,297,600	21,120,600	21,455,700	21,447,898	18,635,000	18,069,700	
JUL	25,566,400	26,455,800	26,656,400	17,356,900	22,227,100	26,562,500	28,008,300	24,855,262	21,097,200	22,051,300	
AUG	30,978,300	24,051,700	25,138,400	15,749,600	20,438,400	21,327,400	21,405,100	20,756,800	22,577,900	25,901,700	
SEP	21,524,300	24,218,400	21,522,700	15,520,900	17,171,700	17,121,700	18,379,200	19,492,700	21,082,900	22,910,600	
OCT	20,272,000	20,087,000	17,592,100	13,174,000	11,984,300	16,801,900	14,288,500	16,403,200	14,782,300	15,634,000	
NOV	17,878,400	15,540,200	13,901,400	11,158,600	10,708,500	14,505,800	12,424,000	12,447,136	11,313,600	11,912,800	
DEC	18,036,200	15,543,400	14,704,600	11,772,000	11,009,500	16,353,800	13,972,600	12,847,000	11,299,300	12,290,400	
AVG.	21,078,550	20,955,175	18,565,625	14,467,392	14,269,350	16,437,625	18,131,792	17,449,091	15,436,875	16,788,858	12,451,400
MAX.	30,978,300	28,245,800	26,656,400	17,857,300	22,227,100	26,562,500	28,008,300	24,855,262	22,577,900	25,901,700	12,823,800
MIN.	15,224,400	15,540,200	13,901,400	11,158,600	10,047,400	10,632,200	12,424,000	12,447,136	10,496,000	11,912,800	11,822,000
YR. TOTAL	252,942,600	251,462,100	222,787,500	173,608,700	171,232,200	197,251,500	217,581,500	209,389,096	185,242,500	201,466,300	37,354,200

APPENDIX E – 2015 Water Conservation Report

NOTE: The following industry definitions apply to Sect I, A, 3:

Raw water is the water as it is pumped from the ground, prior to any treatment processes.
Finished water is the water after all treatment processes have been completed. In Mountain Lakes' case, air stripping and chlorination are the only treatment methods employed.
Delivered water is the water sent out into the distribution system for delivery to customers.

WCP-WS
Revised 12/2014

WATER CONSERVATION AND DROUGHT OR WATER SUPPLY EMERGENCY MANAGEMENT PLAN REPORT FOR PUBLIC WATER SUPPLY SYSTEMS

PERMITTEE: Borough of Mountain Lakes PROGRAM INTEREST NO.: 5238

CONTACT NAME: Mark Prusina DATE: 10/20/2015

ADDRESS: 55 Pocono Road, Mountain Lakes, NJ 07046

EMAIL ADDRESS: mprusina@mlschools.org

TELPHONE NO.: 973-334-1577

Submit to: Mail Code 401-04Q
Bureau of Water Allocation & Well Permitting
P.O. Box 420
Trenton, New Jersey 08625-0420

See your Water Allocation Permit for your submittal schedule

NOTE: You must read and complete all sections of the worksheet. Your Water Allocation Permit requires water conservation and water management activities that you may not usually consider in this context but no section may be omitted.

Please discard your file copies of the previous worksheets and/or delete or update computerized forms. Your report must be submitted on an exact replica of this worksheet, either a photocopy or a computerized version, with the original kept on file for future reference. An incomplete worksheet will be returned to you. If there is not enough space provided for your information, additional pages should be used.

I. WATER CONSERVATION COMPONENTS

A. WATER SYSTEM

1. Allocation: 30 mgm 1,000 gpm, 285 mgy

2. Sources of water:
   number of wells 4
   number of surface intakes 0
   bulk purchase 0 mgd, 0 mgm 0 mgy

3. Metering:

	(circle one)	
raw water source	(Yes)	No
finished water	(Yes)	No
delivered water	(Yes)	No

4. Date of last source meter calibration: April 2015

5. System Capacity:

treatment	2.23	mgd
delivery	2.23	mgd
storage	1.50	mg

6. Customer Base:

	# of Connections	# of Meters	% of overall use
Residential	1416	1416	94%
Commercial	75	75	5%
Industrial	0	0	0%
Municipal	10	10	1%
Total	1501	1501	100%

7. Interconnections:

existing/size	3	8" to 12"
under construction	0	n/a
planned (5 year)	1	8"

Interconnection Use (circle one) Bulk (Emergency) Other (describe)

Agreements for use: (circle one) Yes (give details) (No)

8. Map or diagram of the system (submit only once unless there are changes).

*Map on file

B. ANALYSIS OF WATER USE

1. Demand: Report demand from the most recent year for which you have complete data as the "Base Year". Note the years the data refers to where indicated.

USAGE	PEAK MONTH (mgm)	ANNUAL (mgy)
Base Year 2014	22.6	185.2
Previous Year 2013	24.9	209.4
Peak Year of last 5 2012	28.0	217.6
Peak Year of last 10 2005	32.3	267.8

PROJECTED USAGE	PEAK MONTH (mgm)	ANNUAL (mgy)
Next Year 2015	26.0	215.0
5 Year 2019	27.5	225.0

2. Customers:
Estimated population 4,400 (2010 year)
Names of municipalities served Mountain Lakes

3. Per Capita Use

To produce standardized data, please use the following calculations, using data from the years identified under B.1 - Demand.

$$\textit{Average Use} = \frac{\textit{(Total annual usage* in gallons x \% Residential Use)} \div 365}{\textit{Number of People Served}}$$

$$\textit{Minimum Use} = \frac{\textit{(Minumum month usage in gallons x \% Residential Use)} \div 31^*}{\textit{Number of People Served}}$$

$$\textit{Maximum Use} = \frac{\textit{(Maximum month usage in gallons x \% Residential Use)} \div 31^*}{\textit{Number of People Served}}$$

**Usage = Total Diversion + Total Purchased - Bulk Sales*
**Divide by 28, 30 or 31 depending on number of days in minimum/maximum month*

	Current Year 2014	Last Year 2013
Average	109	123
Minimum	80	86
Maximum	156	172

Calculation based (circle one) total pumpage or (residential use only)

4. Management of Peaks (describe approach)
Alternate day watering program was implemented in 2007.
New rate schedule with higher rates for sprinkling.

5. Projections of Growth:

	Service Connections
new in past year	5
expected this year	5
projected 5 year	15

C. UNACCOUNTED-FOR WATER

1. Leak Detection & Repair Program

a. frequency of surveys (performed on a regular schedule, as conditions require, etc.)
As required.

b. miles of mains surveyed per year varies
valves tested varies
hydrants tested varies

c. methods employed Vendor contracted using sonic & seismologic technolog

d. equipment used Consultant supplied

e. equipment owned/rented/borrowed/consultant employed
Consultant supplied

2. Leak Repair Activities (for last calendar year)

a. Leaks detected

	Number	Size	Repaired
Mains	8	2" to 10"	Y
Valves	1	6"	Y
Hydrants	2	6"	Y

b. estimate of water saved Unkown

c. manpower/equipment available to make repairs Water Dept. crew

3. Long-range plans to reduce unaccounted-for-water (for example, over the next three years) Meter replacement program and continued leak detection.

4. Service Meter Repair/Replacement Procedures

a. regular schedule or as needed basis As needed
b. average age of meters in use 20 years
c. approximate number of direct read 0
d. approximate number of remote read 100%

5. Calculate Unaccounted-for Water (UFW) for past *two years*
(DO NOT INCLUDE ANY ESTIMATED WATER USE)

$$100 - \left(\frac{\textit{gallons of water billed}}{\textit{gallons of water entering distribution system}} \times 100 \right) = \text{UFW\%}$$

$$100 - \left(\frac{157{,}000{,}000}{185{,}200{,}000} \times 100 \right) = \underline{15\%} \quad \underline{(2014)}$$

$$100 - \left(\frac{168{,}900{,}000}{209{,}400{,}000} \times 100 \right) = \underline{19\%} \quad \underline{(2013)}$$

6. Estimate water supply used for fire fighting and unmetered municipal buildings.
3 mgy

7. Water Loss Audit (optional) /Water Loss Control

"Water loss control represents the efforts of water utilities to provide accountability in their operation by reliably auditing their water supplies and implementing controls to minimize system losses."

The following is a link to the American Water Works Associations' free water audit software: http://www.awwa.org/resources-tools/water-knowledge/water-loss-control.aspx

Software outputs meaningful indicators: _____

gpd / connection _____

gpd / mile mains _____

ILI (infrastructure leakage index) _____

Questions? Contact **AWWA's Water Loss Control Committee** directly.

D. WATER RATES

1. Attach a copy of your rate schedule or a summary of schedule.
2. Note any planned or proposed changes in rates.
3. Meter reading and billing schedule Visit http://ecode360.com/8631294 Scroll to Sect. 111-C.(4)

E. PUBLIC EDUCATION/AWARENESS

List efforts undertaken to date and those planned

1. Assess public awareness of local and regional water supply problems.
Local newsletters, CCR, website postings, and public sign postings.

2. Describe and/or include samples of information distributed to water users.
General advisories and website.

3. Describe activities undertaken in the past 3 years to meet with environmental committees and watershed associations to explore the concept of water conservation education.
None

4. Describe the assistance given to schools and civic organizations to promote the best use of local water resources.
Local newsletters, CCR and public sign postings.

II. DROUGHT OR WATER SUPPLY EMERGENCY MANAGEMENT COMPONENTS

A. Management of Localized Water Supply Problems

1. Storage, backup supplies, equipm interconnections on standby status:
The Mountain Lakes water system has adequate storage and available interconnections to handle localized supply problems.

Note: The following section refers to local restrictions, which may be voluntary or mandatory, as decided by local officials when necessary, to manage local shortages only. The restrictions that apply when a drought emergency is declared by the Governor are not to be included here.

2. List ordinances that have been adopted to promote water conservation and provisions for their enforcement: Visit http://ecode360.com/8632714
Scroll to Sect. 237-10

3. Indicate which of the above ordinances are implemented during the following local conditions:
   a. Drought warning All
   b. Drought emergency All
   c. Precipitation deficits All
   d. Reservoir storage deficits All

4. Distribution of water conservation devices/retrofit program/rebate program:

   None

5. Regulations requiring reuse or recycling of water:

   None

B. Voluntary Transfers Via Interconnections

1. Describe conditions under which voluntary transfers of water into your system are made via existing interconnections: Emergency request only.

2. Describe existing interconnections and agreements for their use during temporary emergencies and during localized drought emergencies:

   Mountain Lakes presently has emergency interconnections with Boonton, Denville & Parsippany. Use of these interconnections is by mutual consent at the time of need.

   No formal agreements are in place.

3. Give schedule for exercising interconnections: No formal schedule

C. Purveyors with Water Supply Reservoirs with Capacity over 2.0 Billion Gallons ONLY;

1. Attached a rule curve that can be used to establish storage level thresholds for your reservoir or note that there is one on file with the Bureau of Water Allocation & Well Permitting.

2. Explain the management steps to be taken as drought conditions progress approaching drought warning or drought emergency levels of the rule curve.

APPENDIX F – "Mountain Lakes Water Supply – Despite Meeting NJDEP Regulations the Borough Has a Water Deficit"

by Lynn Uhrig – March 15, 2014

Mountain Lakes Water Supply –
Despite Meeting NJDEP Regulations the Borough Has a Water Deficit

March 15, 2014
By Lynn Uhrig

There are two ways of looking at the question of the impacts of increasing withdrawals from the Mountain Lakes water system. Items 1 to 3 explain the differences.

1. **Sustainability**: Let's start with the basic assumption that our goal is to keep our aquifer at historic water levels by not withdrawing more water than the system can safely sustain over time. In other words we will not add to a water deficit over the long term.

2. **Water Deficit**: Before we increase the demand for water, we need to determine whether current water withdrawals exceed the natural replenishment of the aquifer. We may decide to look into this further, but it appears that the experts are telling us that indeed we do have a water deficit. The Environmental Commission reported on March 10, 2014 that calculations by the New Jersey Highlands Council for the Regional Master Plan determined that our watershed has a significant water deficit.

The abstract of the Regional Master Plan states the following: "A central goal of the Regional Master Plan is to determine the amount and type of human development and activity that the ecosystem of the Highlands Region can sustain while still maintaining the overall ecological values thereof, with special reference to surface and ground water quality and supply. Based on an analysis of available methods and available data, the Low Flow Margin method was selected as the best scientific approach available at this time for estimating capacity of ground water supplies across the entire Highlands Region, to maintain both ecological flow needs and estimate sustainable levels of human consumption."

Thus, as stated above, a central goal of the Regional Master Plan was to come up with data on the capacity of ground water supplies in the Highlands. Their 2007 *Water Resources Technical Report* on net water availability found a water deficit in our watershed and in many others. See map attached.

3. **NJDEP Water Regulations**: Your next question might be to ask how has it come about that we have a water deficit when the borough has been meeting the water diversion limits and firm capacity* regulations of NJDEP.

The answer to this inconsistency lies in the fact that the NJDEP regulations are based on a different set of criteria than are discussed above in items 1 and 2. NJDEP looks at past water use in the Borough and the adequacy of our wells' pumping equipment. NJDEP is saying to us, if the water is there, these are the regulations for how much you can pump out. NJDEP is not addressing the important question of how much can safely be withdrawn from the system over time.

We need to understand the limitations of the NJDEP water regulations. Just because we adhere to them, doesn't mean we will have enough water. The regulations do not look at the sustainability of the aquifer.

This explains how we have arrived at the present situation with conflicting viewpoints. The administration advises that the borough meets the NJDEP regulations and could continue to meet the regulations even if a large hotel increases water withdrawals. The Economic Development Committee believes that they are moving in the right direction by recommending changes in zoning for more intensive land use. On the other hand, the Environmental Commission is concerned about risks to the water supply. The EC has given the Borough Council crucial information about the water deficit. A new large hotel may strain our aquifer. We could cause water shortages that would impair existing users or future residents.

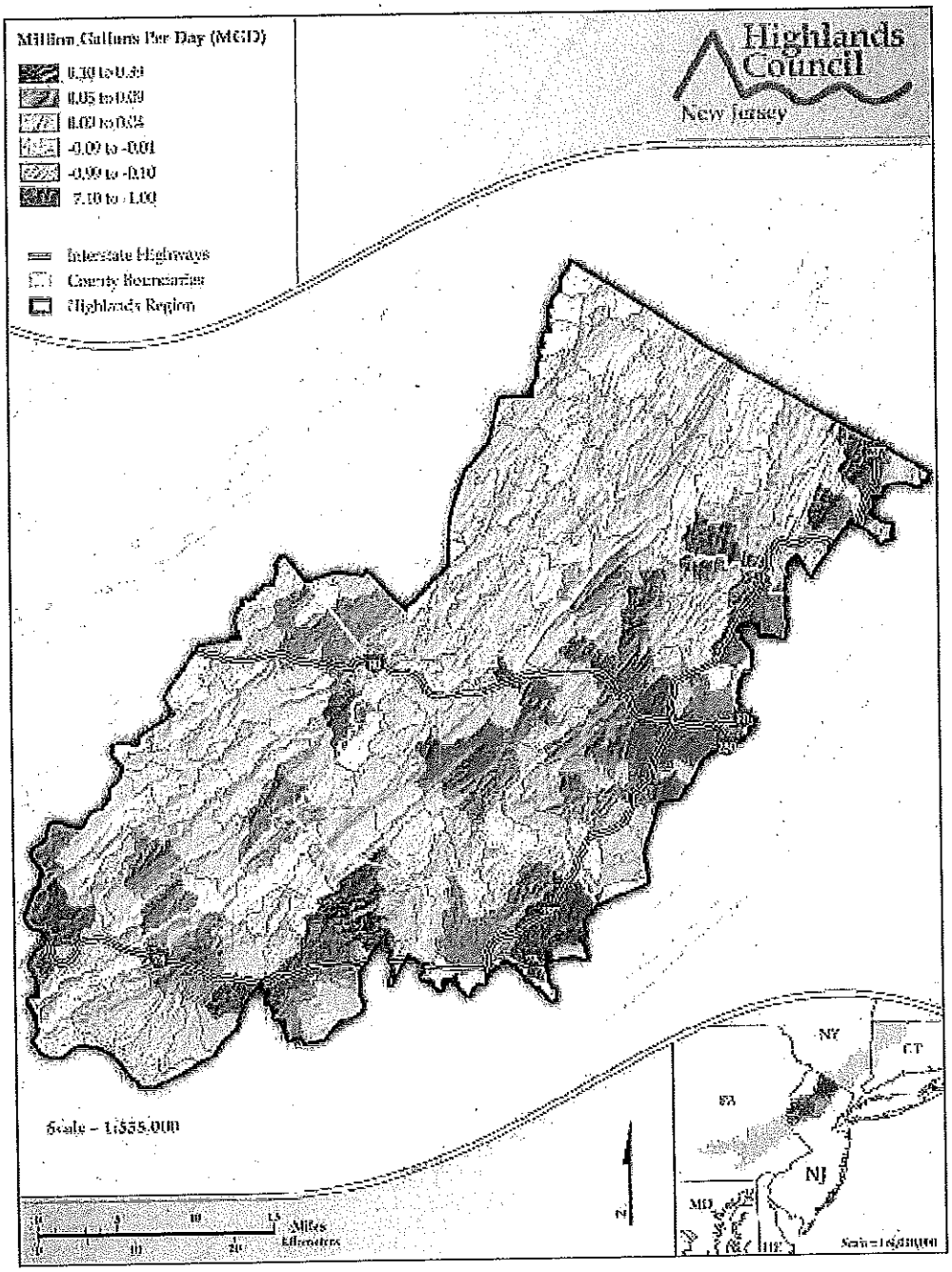
4. **Firm Capacity Test:** The Environmental Commission and Jerry Uhrig, former chair of the commission, have concerns about the output of Laurel Hill well No. 2. The EC suggests a practical way to test whether we indeed have sufficient backup if our main well No. 5 on Route 46 is out of service. As stated in their recent report to the Borough Council, during summer months of peak water use, we should shut down well No. 5 for a period of time and see if we have enough water. This will give us assurances that we actually have "firm capacity." If the test results indicate a water shortfall, then we can make plans to provide additional backup for well No.5.

5. **Water Conservation Plan:** The EC recommends that we develop a conservation plan for a time of drought. In addition to this we should decide if we want to devise a campaign for residents to use less water, especially during the peak summer months. The only way to make up for increased withdrawals by existing users or from new development is to repair leaks, purchase water or reduce demand by conservation.

Note *: "'Firm Capacity' means adequate pumping equipment ..... to meet peak daily demand ..... when the largest pumping station ..... is out of service." NJDEP, Firm Capacity and Water Allocation Analysis.
C:\Documents and Settings\mkingkin.000\Local Settings\Temp\Firm Cap-WA Analysis Outline.doc

Attachment: New Jersey Highlands Council - Map of Net Water Availability

FIGURE 3.15: Net Water Availability by HUC14



APPENDIX E – G – "Environmental Commission Statement to the Borough Council on March 10, 2014"

Environmental Commission Statement to the Borough Council on March 10, 2014

The Environmental Commission has concerns about the possible risk to the water supply with the proposed 130 room development of a hotel at the Villa on Route 46 and the Boulevard. We currently reside in HUC-14 – the highest water deficit area as defined by the Highlands Regional Master Plan. The Plan's calculations show a regional deficit of up to 7.1 million gallons per day (see attachment 1).

Secondly, although this project might meet on paper the Firm Capacity requirements as delineated by the NJDEP, we believe that our requirement calculation may be based upon untested assumptions about non-core well capacity. A 2009 LWV study indicated that our 'Firm Capacity' calculation relies upon the assumption that Well No. 2, located on Laurel Hill, can produce sufficient water to act as a viable back up to well #5. The League study suggests, however, that historically, this bedrock well has produced only 'one –tenth' of the firm capacity number used in the calculation.

If ML had sufficient firm capacity it would seem that we could use water from Borough wells during times when well #5 is shut down. In the summer of 2012, however, the Borough chose to purchase water from Parsippany rather than source internally.

If Mountain Lakes decides to allow water intensive development like a hotel, the EC would recommend two courses of action. First: we should test the assumptions within the firm capacity calculation and shut down well #5 to see if sufficient capacity exists to fill the tanks. Secondly, we should develop a borough-wide water conservation plan that could be deployed during a time of drought.

In closing, great care must be taken to ensure the water supply. We would like to see Mountain Lakes living up to our obligations within the Highlands Regional Master Plan to work to decrease water deficits – not contribute to them. We would also like to see an economically healthy business corridor with adequate water to fund a variety of new businesses. We look forward to being an active partner in working with the Council to achieve sustainable growth.

FIGURE 3.19: Net Water Availability by HUC14