

TOWN OF BEECH MOUNTAIN SUPPLEMENTAL WATER SOURCE PROJECT

*TOWN HALL MEETING
FEBRUARY 25, 2020 UPDATE*





**CURRENT AND ONLY WATER SOURCE:
BUCKEYE LAKE (MAN-MADE RESERVOIR ON
BUCKEYE CREEK)**

BUCKEYE LAKE WATER LEVEL- NORMAL POOL



Normal Level

WHY DOES BEECH MOUNTAIN NEED ANOTHER DRINKING WATER SOURCE? DROUGHT

In 2010, a drought caused the water level in Buckeye Lake to drop perilously close to empty (to the level of the lowest intake pipe).



BUCKEYE LAKE WATER LEVEL- JULY 30, 2010 AT STAGE II WATER RESTRICTIONS



- **THIS PHOTO ILLUSTRATES THE 2ND OF 3 WATER INTAKES. AT ITS LOWEST, THE WATER LEVEL WAS ONLY 8"- 10" ABOVE THE 3RD (AND FINAL) INTAKE.**

BUCKEYE LAKE WATER LEVEL- AUGUST 2010
STAGE III WATER RESTRICTIONS
(DAY AFTER RAINFALL THAT BEGAN THE END OF
DROUGHT)



WHY DOES BEECH MOUNTAIN NEED ANOTHER DRINKING WATER SOURCE?

A MINIMUM FLOW MUST ALWAYS BE RELEASED BELOW THE DAM

0.61 to 1.64 million gallons per day (MGD) are to be released from the reservoir (a requirement of the dam construction permit). The minimum release must equal the flow coming into the reservoir when at Stage 3 (more than 6.5' below spillway). These are the new conditions issued November 27, 2019. (Previous requirement was 1.0 to 1.8 MGD).



WHY DOES BEECH MOUNTAIN NEED ANOTHER DRINKING WATER SOURCE? REDUNDANCY

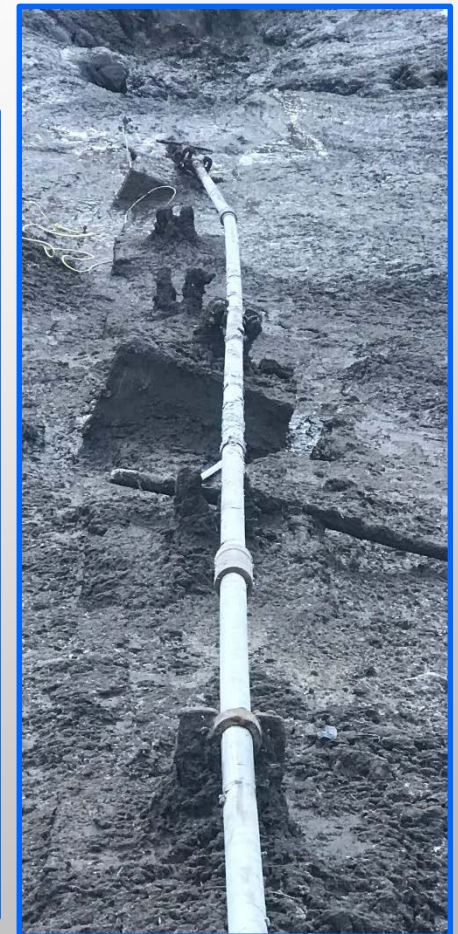
Although not mandatory, an emergency or supplemental source of water is a best practice for any water system. It provides water when the primary source is:

1. Depleted due to drought
2. Contaminated due to chemical spills, upstream erosion, wastewater spills, etc.
3. Unusable due to failure of equipment at the primary source (such as clogged screens, pump breakdowns, etc.)



WHY DOES BEECH MOUNTAIN NEED ANOTHER DRINKING WATER SOURCE? REDUNDANCY

Unusable due to failure of equipment at the primary source. Example: This occurred November 2018 when the drain valve failed.



WHY DOES BEECH MOUNTAIN NEED ANOTHER DRINKING WATER SOURCE? SUPPORT SOME GROWTH

Current annual withdrawal of water from the reservoir averages 0.391 MGD (2018). Supply needed in 20 years, assuming modest growth of 2% per year, would be about 0.5 MGD.

In addition to the risk of insufficient water supply for existing users, the State could deny permits for expansions to the water system (since current and future water demand exceeds the yield of Buckeye Lake during times of drought).

The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The text is centered in the middle of the slide.

**WHAT CAN THE
TOWN DO TO
ADDRESS THIS
SITUATION?**

POSSIBLE SOLUTIONS TO THE PROBLEM

- A. REDUCE WATER USE
- B. EXPAND BUCKEYE LAKE (RAISE DAM AND/OR EXCAVATE UPSTREAM OF THE DAM)
- C. DEVELOP GROUNDWATER SOURCES (WELLS)
- D. DRAW FROM ANOTHER SURFACE WATER

Note: other alternatives, such as purchasing water from another water system are not feasible, and therefore ruled out.

REDUCE WATER USE

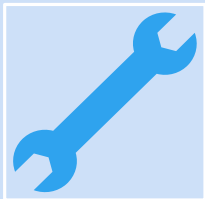


Based on the 2019 water audit, real water loss (leakage) is 57% of total water withdrawn from Buckeye Lake. Leaks in the water system are being addressed by gradually replacing all galvanized steel pipe and faulty service lines, but this will take many years since there are over 60 miles of these lines. Furthermore, the mountainous terrain causes high pressures which increase leakage rates. AWWA estimates unavoidable real losses for systems like Beech Mountain's to be 0.120 MGD.

REDUCE WATER USE



Conservation is encouraged through voluntary and mandatory water use restrictions, implemented according to the Town's Water Shortage Response Plan. Increased water rates also tend to encourage conservation.



- * New Water Plant uses less process water
- * Recent \$1.6 million Spruce Hollow Transmission main project replaced about 2.5 miles of old mains
- * About 3.3 miles of old water mains and 142 service connections are to be replaced in a current \$1.74 million project
- * Goal is to also replace 150 service lines per year

EXPAND BUCKEYE LAKE

	Theoretical Reservoir Yields During Drought		
Minimum Release Scenario	Current Reservoir	Raise Dam 10'	Raise Dam 10' & Excavate Finger
Previous (0.97 to 1.8 MGD)	0.0 MGD	0.0 MGD	0.10 MGD
DWR & USACE Final (varies with stage)	0.24 MGD	0.27 MGD	0.36 MGD

NOTE: Yields shown are theoretical, based on assumption that Buckeye Lake watershed characteristics mimic the Watauga River watershed. Actual yields may be much lower than shown.

Benefits:

1. Reduced risk of running out of water
2. Reclassification of watersheds would not be required
3. Same O&M costs except perhaps for maintenance of higher dam

EXPAND BUCKEYE LAKE

- DISADVANTAGES:
 - HIGH COST
 - EXTENSIVE PERMITTING DUE TO HIGH HAZARD DAM AND STREAM IMPACTS
 - STILL PROVIDES ONLY ONE WATER SOURCE WITH NO ADDED PROTECTION IF PRIMARY SOURCE DEPLETED, CONTAMINATED, OR INTAKE FACILITIES FAIL
 - INTERFERENCE WITH WATER TREATMENT DURING CONSTRUCTION
 - EVEN BEST CASE SCENARIO OF 0.36 MGD YIELD DOES NOT MEET WATER SUPPLY NEED
 - RISK OF MINIMUM RELEASE DEPLETING STORAGE (I.E., ACTUAL YIELD MAY BE LOWER THAN ESTIMATED)

DEVELOP GROUNDWATER SOURCES (WELLS)



One well has been developed at the head of Buckeye Lake. It will not serve as a separate source but can be used to pump some groundwater into the lake during a drought.



More wells could be developed. The yield of wells in mountain geology is very uncertain, both initially and long term.



The Town plans to drill some wells. Finding suitable sites has been challenging due to topography, setbacks, and scarcity of available property.

DEVELOP GROUNDWATER SOURCES (WELLS)

Benefits:

- Lower Cost (if not too many wells are needed)
- Relatively uncomplicated compared to other alternatives
- Each well stands alone and can be used when other sources are not available

Disadvantages:

- Much uncertainty with immediate and long term yields
- Each well must be on land under the control of the Town and free of contamination potential. Power and access roads must be extended to each well.
- Treatment at each well may be different depending on levels of metals, pH, and other water quality characteristics

DRAW FROM ANOTHER SURFACE WATER

- The nearest rivers with significantly more capacity than Buckeye Creek are Elk River and Watauga River. Elk River is further from the water plant and has less capacity than the Watauga River.
- If the Watauga River were used as a source, a relatively small amount would be withdrawn:
 - Per USGS, the river has an average flow of about 158 MGD and a 7Q10 (the lowest stream flow for seven consecutive days that would be expected to occur once in ten years) of 17 MGD.
 - Currently, Beech Mountain would only need an average of 0.4 MGD during a drought (about 0.5 MGD in 2040). Future demands are difficult to predict, but even at 3.0 MGD, the withdrawal would only be 18% of the 7Q10.
 - A withdrawal of 0.5 MGD would be 0.3% of the river's average flow.

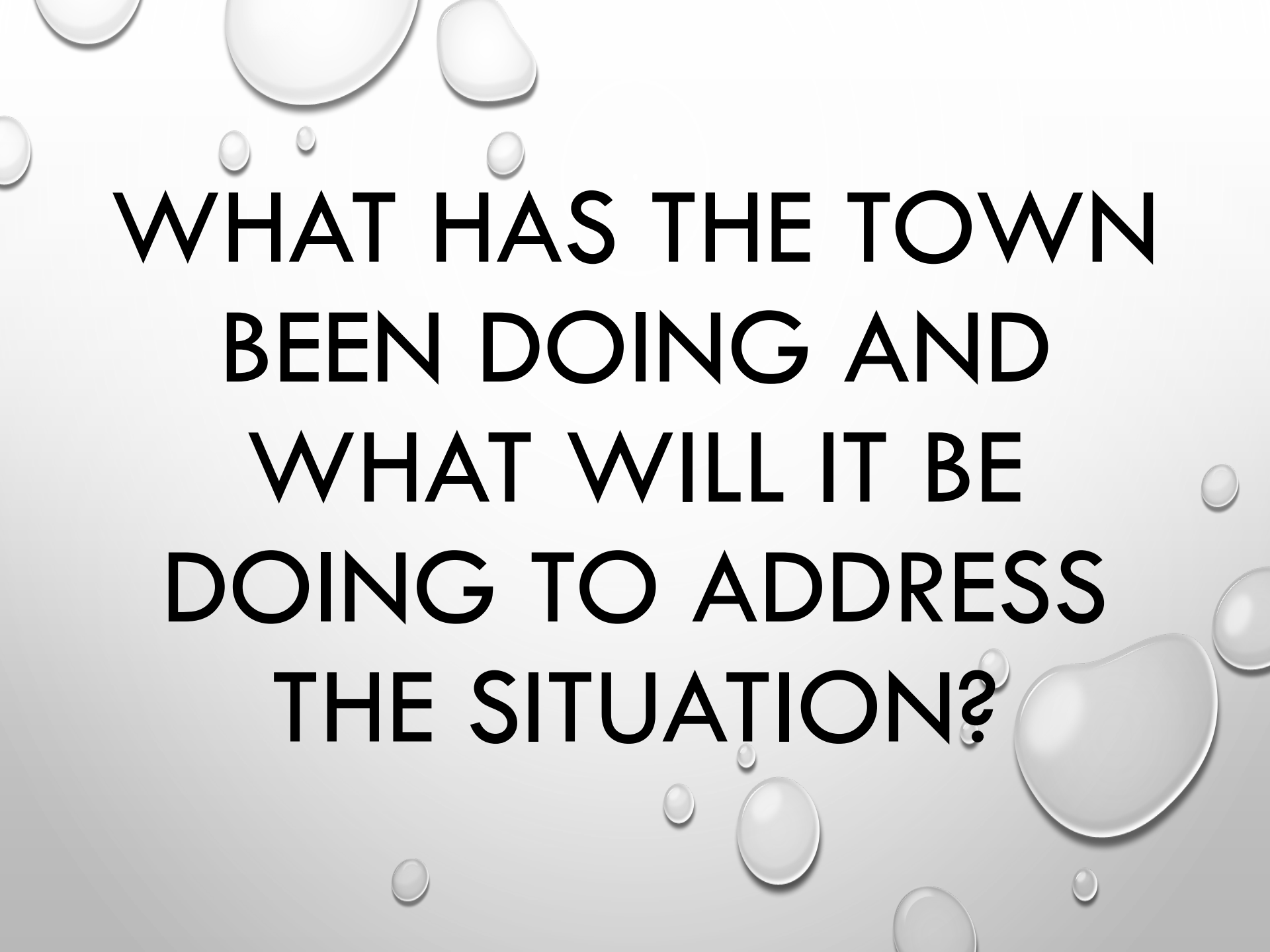
DRAW FROM ANOTHER SURFACE WATER

Benefits:

- Ample supply
- High quality water
- Separate from current source
- Little interference with existing plant during construction

Disadvantages:

- High capital cost
- Significant O&M cost, but will vary with need (i.e., dry years will require more pumping)
- Reclassification of Watauga River watershed required
- Extensive permitting

The background of the slide is a light gray gradient, decorated with numerous realistic water droplets of various sizes. The droplets are rendered with soft shadows and highlights, giving them a three-dimensional appearance. They are scattered across the frame, with some larger droplets near the top and bottom edges, and smaller ones in between.

**WHAT HAS THE TOWN
BEEN DOING AND
WHAT WILL IT BE
DOING TO ADDRESS
THE SITUATION?**

STEPS TAKEN AND UNDERWAY

1. Working with the Division of Water Resources (DWR) to define the problem and identify solutions. DWR assisted by gathering information and issuing a report.
2. Various Meetings with DWR, TVA, USACE and others to determine steps and requirements toward permitting a Watauga River intake.
3. Taking steps toward the reclassification of the Watauga River (to allow it to become a drinking water source):
 - Watauga County commissioners would be asked to pass a resolution that land use restrictions will be enforced according to State rules for a WS-IV watershed.
4. Wells are being drilled.
5. Continue replacing older parts of distribution system:
 - About 3.3 miles of old water mains and 142 service connections are to be replaced in a current \$1.74 million project (bid opening is this week)
 - Replace 150 service lines per year (subject to FY21 budget approval)

STEPS TAKEN AND UNDERWAY – ADDRESSING AGING INFRASTRUCTURE

1. The water distribution system consists of 66 miles (348,480 feet) of water mains, many storage tanks, and 8 pumping stations. The system also has 2,200 service connections averaging 30 feet in length (66,000 feet). Most of these connections have galvanized steel pipe with swing joints. Pipeline replacements and repair are imperative for the continued viability of the Town infrastructure.
2. In 2018 the Town replaced 700 feet of water main and 10 service connections on Slopes Road.
3. In 2018 the Town replaced 17,000 feet of water main between the Spruce Hollow and Parkway tanks, along with many service connections.
4. In 2020, the Tamarack/Charter Hills Area will have 17,000 feet of new water main replaced, along with 142 service connections. Bids are to be opened this week. The project also includes 11,000 feet of sewer main replacements and 150 sewer tap replacements.
5. The Utility Department will also be requesting the start of a service line replacement plan, to span the next 10 years, with the expectation of replacing 150 service connections annually (average of 4,500 feet per year). This effort would directly address water losses through the service lines, not waiting for the main lines to be replaced. The service lines are believed to be a major contributor of water loss.
6. Beech Mountain also has a comprehensive plan that identifies further main line replacement projects for inclusion in future budgets.

MINIMUM RELEASE EVALUATION

- The amount of water released downstream from Buckeye Lake must meet certain minimums even during a drought. This is a State and Federal requirement. The previous minimums were not achievable during droughts such as the Town experienced in 2010. Therefore, the Town requested a modification to the dam permit issued by US Army Corps of Engineers. The new minimums approved are still significant (up to 1.64 MGD) but are more achievable.
- The new minimum release protocol is a major factor in calculating the supplemental water needed. The current theoretical yield of 0.24 MGD is based on this protocol (actual yield may be much lower).

WATERSHED RECLASSIFICATION

- Properties within the proposed WS-IV protected area that are already within the HQW area would not have more restrictive land-use rules.
- Properties within the proposed WS-IV protected area and not already within the HQW area would have new land-use restrictions.
- The net effect would be an increase in water quality protection since the WS-IV protected area would be larger than the current HQW area.

WATERSHED RECLASSIFICATION – NONPOINT SOURCE AND STORMWATER POLLUTION CONTROL

New Development Type	WS-IV Protected Area Maximum Allowable Project Density or Minimum Lot Size
Single-family detached residential (Low Density)	2 dwelling units per acre or 20,000 square foot lot excluding roadway right-of-way or 24% built-upon; or 3 dwelling units per acre or 36% built-upon area without curb and gutter street system; 30' vegetated setbacks from perennial streams
Non-residential and all other residential (Low Density)	24% built-upon area; or 36% built-upon area without curb and gutter street system; 30' vegetated setbacks from perennial streams
High Density Development	24 to 70% built-upon area; stormwater control measures and 100' vegetated setbacks from perennial streams

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MAPS

POTENTIAL WATAUGA RIVER INTAKE

POTENTIAL WATER LINE ROUTE (APPX. 7.5 MILES)

Guy Ford Rd.
PROPOSED INTAKE SITE

BOOSTER PS SITE

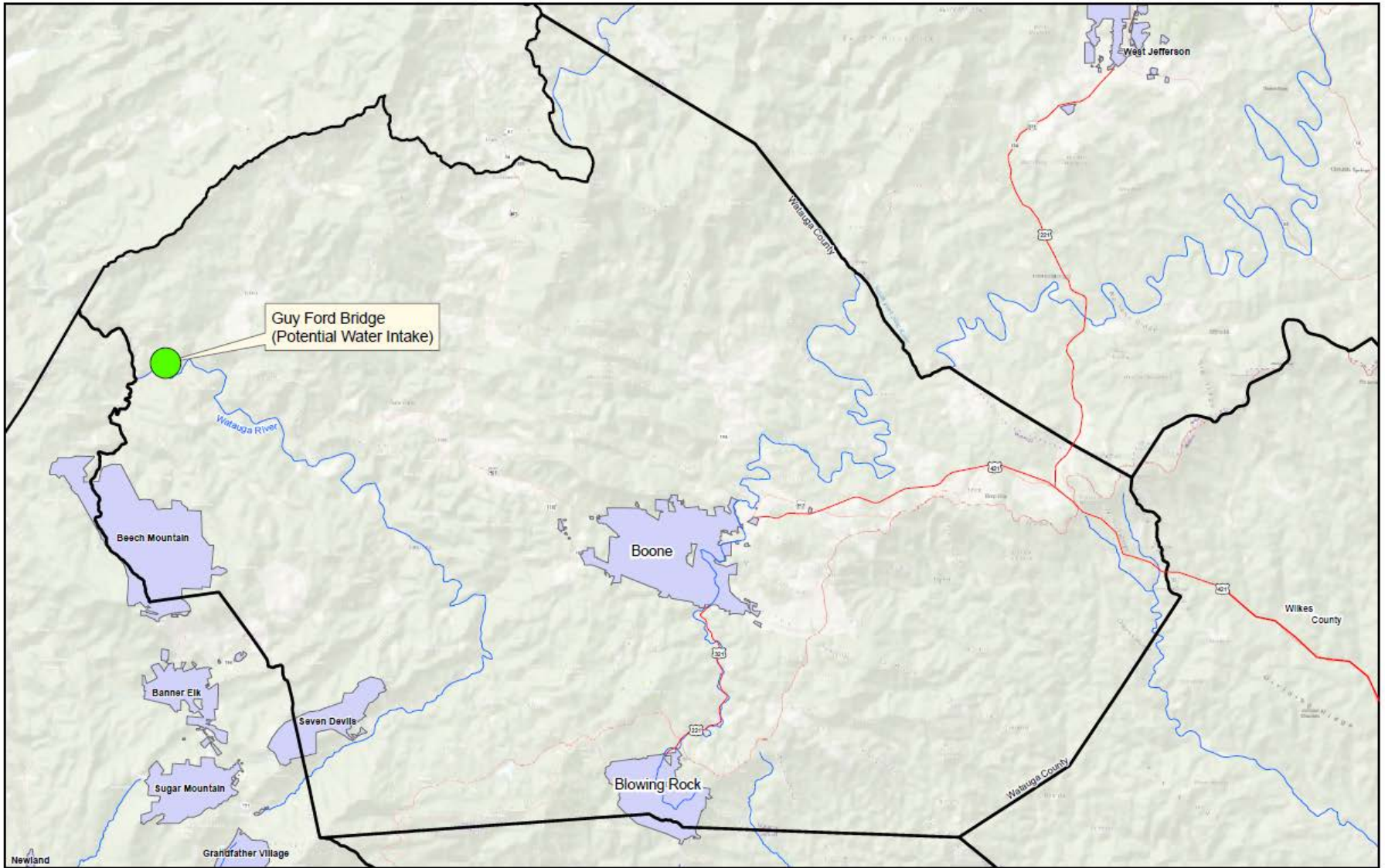
BUCKEYE WATER TREATMENT PLANT

TOWN OF BEECH MOUNTAIN



0 0.25 0.5 1 Miles





NOTES:
 1. WATERSHEDS DELINEATED BY NCDENR.
 2. RIVER DISTANCE MEASURED FROM ORTHOMAGERY FROM 2010 NC STATEWIDE IMAGERY ACQUISITION.

REVISION NO. 1 10/16/13

LEGEND

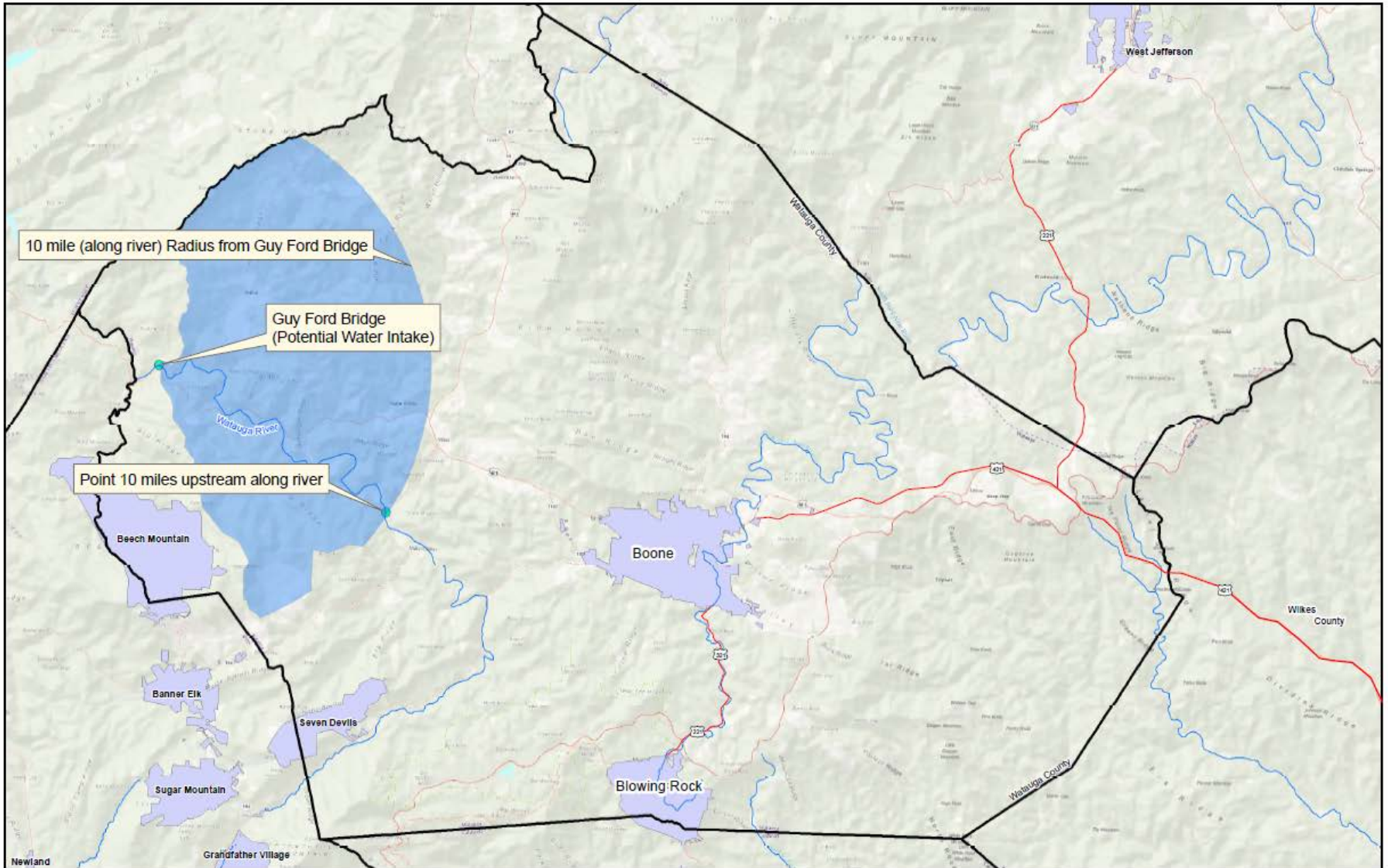
- Protected Watershed Area
- Rivers
- Potential Intake Point/ Point 10 miles upriver
- Municipal Boundaries

MAP DATA

3 1.5 0 3 Miles

1 in = 1 miles

PROPOSED WATERSHED RE-CLASSIFICATION
 FOR TOWN OF BEECH MOUNTAIN
 WATAUGA RIVER INTAKE PROJECT



NOTES:
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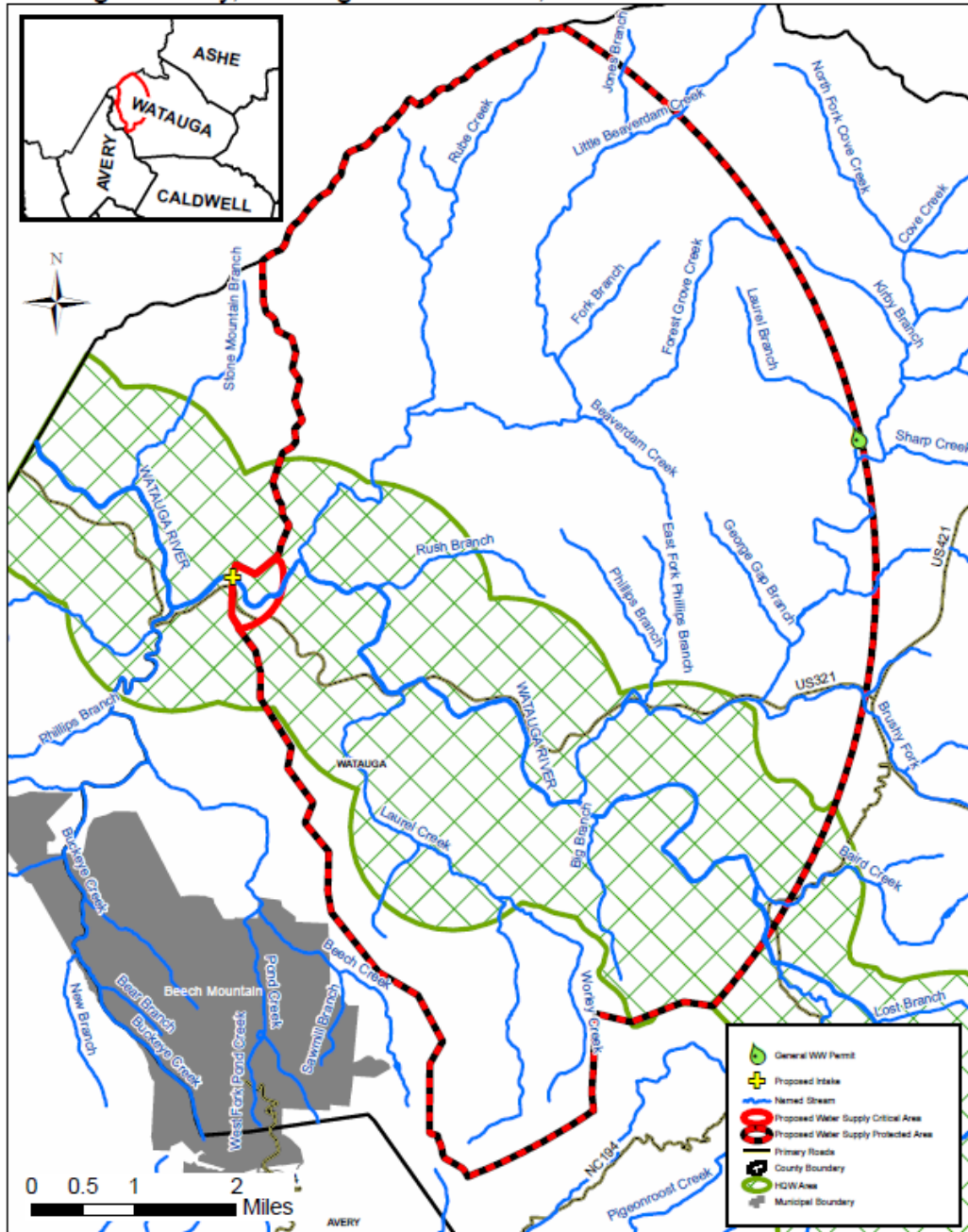
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MAP DATA

PROPOSED WATERSHED RE-CLASSIFICATION
 FOR TOWN OF BEECH MOUNTAIN
 WATAUGA RIVER INTAKE PROJECT

Watauga River Proposed WS-IV Watershed

Watauga County, Watauga River Basin, North Carolina



CONCLUSION



The Town of Beech Mountain will need one or more sources of water to supplement the existing Buckeye Creek and reservoir. Reduction of water demand and leakage is to continue, but this alone will not fully address the need.



It is recommended to continue with a three-pronged approach to address this need:

1. Develop one or more groundwater wells. If the yields are sufficient, the wells can provide a short-term supply.
2. Continue replacing older water mains and service lines.
3. Continue budgeting, planning, designing, and permitting for an intake on the Watauga River as the best long-term solution.