# DRAFT REPORT

## COST- JUSTIFIED WATER SYSTEM DEVELOPMENT FEES REPORT

## TOWN OF BEECH MOUNTAIN

## AVERY AND WATAUGA COUNTIES, NC

James Bourey, Director of Consulting Services
Dale R. Schepers, Senior Consultant

*1240 19TH Street Lane NW*
*Hickory, North Carolina 28601*
Firm License No.: C-0459

**AUGUST 2019**
**PROJECT NO. 19.02513**

# TABLE OF CONTENTS



## TABLES



## Appendix

# EXECUTIVE SUMMARY and PURPOSE STATEMENT

**Executive Summary:**

The North Carolina General Assembly passed House Bill 436 (HB 436) in July 2017, amending Chapter 162A of the General Statutes by adding "Article 8, System Development Fees." This amendment was enacted as "An Act to Provide for Uniform Authority to Implement System Development Fees for Public Water and Sewer Systems in North Carolina and to Clarify the Applicable Statute of Limitations" which requires compliance with designated calculation methodology.

In response to the HB 436, the Town of Beech Mountain has retained McGill Associates (McGill) to complete a system development fee analysis. The Town of Beech Mountain's development fee is dependent on a combination of existing system capacity and planned capital improvements to expand capacity. The development fee, in accordance with HB 436 rules for an Equivalent Residential Unit (ERU) for water and sewer, was calculated to be $10,521. ERU is defined as the water and sewer capacities required to serve the most typical user type, which is a three-bedroom single-family dwelling.

The fee for other types of development can be calculated by applying the calculated cost of capacity per gallon of flow per day to the water demands for various uses as defined by NC Administrative Code 15A NCAC 18C .0409 and 15A NCAC 02T .0114 using the following table:

**Table 0.0.1 – System Development Fee Calculation: Cost per Gallon per Day ($/GPD)**

| Beech Mountain System Development Fees: Cost per Gallon per Day Calculation | | | | |
|---|---|---|---|---|
| Item | Cost-Justified System Development Fee Calculation | | | Cost of Capacity $ / GPD |
| 1 | Water System | | | $ 16.90 |
| 2 | Sewer System | | | $ 10.45 |

**Purpose Statement:**

This report documents the results of the approach, methodology and calculations for establishing system development fees in accordance with North Carolina General Statue 162A, Article 8 "System Development Fees". Through HB 436, the General Assembly of North Carolina established a uniform approach and associated methodology required for local governmental units to calculate and implement System Development Fees (SDF) for public water and sewer systems. The SDF must be determined by a qualified engineer or financial professional using industry standard practices. A copy of HB 436 is included in the Appendix.

The existing fees that were collected on October 1st, 2017 for the purpose of offsetting capital costs of facilities that serve new development (typically defined as impact fees, capital recovery fees, capacity charges, etc.) are required to be conformed to HB 436 no later than July 1, 2018 in order to become valid. Fees that remain non-conforming after July 1, 2018 are considered unlawful and revenues collected are at risk to be refunded along with the possibility of associated legal penalties.

The Town of Beech Mountain retained McGill to review and make recommendations for revisions as necessary to conform water and sewer system SDFs with HB 436. The approach, methodology and calculations are based on American Water Works Association (AWWA) Manual of Water Supply Practices – M1, Principles of Water Rates, Fees, and Charges, Seventh Edition.

McGill is qualified in engineering disciplines and financial analysis and has the expertise and experience to determine system development fees. The firm has a long history of working with cities, towns, counties and special districts to provide professional advice on the setting of fees, the development of water and sewer master plans, capital improvement programs and the development of asset management plans.

Beech Mountain has made significant investments in its water and sewer system capital assets that provide capacity that is, and will be, available for new development. The town also desires to use System Development Fees to recover a portion of the costs associated with providing capacity.

The overall result of this effort will be establishing the maximum cost-justified System Development Fees allowable under HB 436. Beech Mountain may elect to implement fees of lesser value; however, any adjustment must be calculated on a cost per unit volume basis.

This report does not constitute a recommendation of any SDF amount. The Town Council has full authority to charge any amount, up to the maximum, provided it is applied to the relative demands of new development proportionally.

## 1.0 APPROACH

System Development Fees are defined as a charge imposed on each new customer or development that generally offsets the incremental cost of replacing existing and/or constructing new capital assets to provide capacity that will continue to meet the demands placed on the system by each new customer or development. Since water system capacity must, without exception, exceed customer demands, the major infrastructure components providing this capacity, such as water treatment plants, reservoirs, wells, pump stations, etc., must be planned and constructed well in advance and in large enough increments to keep pace with anticipated demand on the available system capacity.

AWWA methodology cites legal consideration for determining SDF. A Rational Nexus, or reasonable relationship, must be established between the fee charged and the cost associated with providing capacity to new customers. The Rational Nexus Test consists of three elements: 1) a review of available planning documents to verify general alignment between capacity demands driven by projected development patterns and planned capital improvements that will be needed to provide the required capacity; 2) a determination of the proportionate share of costs to be borne by new development through appropriate methodology and calculation and 3) establishing a reasonable apportionment of the cost to new development in relation to the benefits the new development will reasonably receive through appropriate methodology and calculations.

The first element of the Rational Nexus Test was determined to be favorable based on a review of the Town's 2013 Comprehensive Plan, existing water system available capacity, and capital improvements plan. The Comprehensive Plan anticipates a total population (permanent and seasonal) of 7,188 by 2030. By extending these projections through a 20-year planning period, the same annual rate of growth translates into a combined total population of 7,354 by 2040. Corresponding projections for water and sewer system demand and available capacities are presented as follows:

**Table 1.0.2 – Beech Mountain System Capacity Availability Projection (MGD)**

| | Beech Mountain System Capacity Availability Projection (MGD) | | | |
|---|---|---|---|---|
| Item | Existing Water and Sewer System Infrastructure | Year 2019 | Year 2030 | Year 2040 |
| W1 | Water Capacity | 1.000 | 1.000 | 1.000 |
| W2 | Water Demand | 0.419 | 0.539 | 0.676 |
| | Available Water Capacity | 0.581 | 0.461 | 0.324 |
| S1 | Sewer Capacity | 0.530 | 0.530 | 0.530 |
| S2 | Sewer Demand | 0.197 | 0.253 | 0.317 |
| | Available Sewer Capacity | 0.333 | 0.277 | 0.213 |

This table demonstrates that existing water and sewer systems are capable of providing sufficient capacity to address future demands; however, North Carolina Division of Water Resources has determined that the current source of water supply is unable to meet the 20-year safe yield capacity requirement. In response, the Town has programmed construction of a new surface water intake to add sufficient capacity in Fiscal Year 25 (FY25) of the Capital Improvements Plan (CIP).

Available capacity in the sewer system is dependent on the Grassy Gap Wastewater Treatment Plant which has exceeded its useful life and must therefore be replaced in order to preserve existing capacity. This project is programmed in FY26 and the portion of this project that is eligible for the system development fee is included in the calculation.

Planned capacity-related capital projects are in general alignment with projected capacity needs which demonstrates a rational nexus between the Comprehensive Plan's projection of development-driven demands and planned water and sewer capacity-related capital projects that will address these demand projections.

The remaining elements of the Rational Nexus Test are 2) determining proportionate share of costs to be borne by new development and 3) establishing a reasonable cost to new development in relation to the benefits received by the new development. These elements will be determined through appropriate methodology and calculations in the following sections.

## 2.0 METHODOLOGY

Three methods for calculating SDF meet the definition of HB 436 and will satisfy the Rational Nexus Test:

### Buy-In Method

The Buy-In Method is used where existing system capacity is available to provide service to new development. New customers essentially "buy" their proportionate share of system capacity from the current customer base ("system owners") at the current cost or value of the existing facilities. HB 436 requires appropriate adjustments to be made to the replacement cost such as "debt credits, grants, and other generally accepted valuation adjustments."

### Incremental Cost Method

The Incremental Cost (or Marginal Cost) Method is used to assign new development the incremental cost of capital assets required for preserving and/or providing additional system capacity. This method should include supporting details that identify construction costs, scheduling, financing, funding source(s), etc., tied to a capital improvements plan (CIP), utilities master plan, and/or other approved planning document(s) that cover a planning horizon of 10 to 20 years. HB 436 requires a revenue credit to be applied "against the projected aggregate cost of water or sewer capital improvements."

### Combined Method

The Combined Approach is a combination of the Buy-In and Incremental Cost Methods. It is used where existing assets provide some system capacity to accommodate new development and applicable capital plan(s) also identify significant capital investment proposed to add infrastructure required to address future growth and capacity needs.

## 3.0 CALCULATION of SYSTEM DEVELOPMENT FEES

The *Combined Method* is the appropriate approach to calculating Beech Mountain's system development fees. Existing system capacity is available to provide service to new customers. Future capacity-related projects in the Capital Improvements Plan require incremental cost calculations. Therefore, calculating SDF will require the combined method.

### 3.1 Existing System Capacity Availability

Water and sewer system design capacities are determined using average day demands and incorporate appropriate peaking factors and wet weather flows that will adequately address maximum flow conditions that occur during high water use and inflow/infiltration conditions. The water and sewer systems have current available capacities as follows:

**Table 3.1.1– Beech Mountain Water and Sewer Systems Available Capacity**

| Beech Mountain Water and Sewer System Available Capacity (MGD) | | | | |
|---|---|---|---|---|
| Item | System Capacity - Million Gallons Per Day (MGD) | Design Capacity | Average Day | Available Capacity |
| 1 | Water System | 1.000 | 0.348 | 0.652 |
| 2 | Sewer System | 0.530 | 0.197 | 0.333 |

### 3.2 Buy-In Calculation

**After demonstrating that capacity is available, the value per gallon is calculated to determine the cost per gallon that will be applied to reimburse existing customers for constructing and maintaining available capacity in advance.**

The preferred AWWA valuation approach is "replacement cost new less depreciation" (RCNLD). This approach is based on the premise that System Development Fees reflect the value of providing any given amount of new capacity at the cost of constructing the assets at the time the new customer is connected. This fairly compensates existing customers for carrying the costs of constructing and maintaining capacity built into the system in advance of when the new customers connect.

Replacement cost in the RCNLD calculation used the RS Means Historical Cost Index. RS Means has been publishing a construction cost index for over 70 years, collecting data from all facets of the industry to accurately track costs directly related to building and construction. This allows the present value (replacement cost new) of capital construction projects to be calculated on data provided by a very reliable, long-time industry leader. Depreciation assigned

by the Town's fixed asset inventory uses the straight-line method, typically based on 10 to 50-year assignments of useful life for major capital assets, to represent a general decline in value over time.

Replacement Cost New (RCN) is therefore determined by applying the RS Means index to the original cost then deducting the accumulated depreciation to reach RCNLD.

Assets included in the buy-in valuation are those that provide the available capacity of the system, are "owned" by the ratepayers, and therefore provide a benefit to all customers. Typically, these assets are water supply, treatment, pump stations, storage, transmission and distribution mains, wastewater treatment, lift stations and collection systems. Assets contributed by or paid for by developers are deducted from the calculation since these costs were not "paid" by the existing customers. Non-capacity related assets such as vehicles, computers and software are also excluded from the calculation.

**Table 3.2.1– Water System Cost per GPD of Existing Utility Assets Providing Available Capacity**

| | Beech Mountain Water System Development Fee Buy-In Valuation | | | |
|---|---|---|---|---|
| Item | System Asset Description | RCNLD | Excluded | Amount Eligible |
| | Water System Assets | | | |
| W1 | Land | $ 351,300 | $ - | $ 351,300 |
| W2 | Water System Infrastructure | $ 16,145,792 | $ 379,241 | $ 15,766,551 |
| W3 | Vehicles and Equipment | $ 96,430 | $ 96,430 | $ - |
| | Subtotal - Water System Assets | $ 16,593,522 | $ 475,671 | $ 16,117,851 |
| | | | | |
| | Less Revenue Credit: Outstanding Debt Principal | | | $ (4,559,368) |
| | Equals: Net Water System Value | | | $ 11,558,483 |
| | Divide by: Water System Capacity (MGD) | | | 1.00 |
| | Equals: Unit Valuation of Water System ($/MGD) | | | $ 11,558,483 |
| | Divide by: 1,000,000 gallons ($/GPD) | | | $ 11.56 |

**Table 3.2.2– Sewer System Cost per GPD of Existing Utility Assets Providing Available Capacity**

| | Beech Mountain Sewer System Development Fee Buy-In Valuation | | | |
|---|---|---|---|---|
| Item | System Asset Description | RCNLD | Excluded | Amount Eligible |
| | Sewer System Assets | | | |
| W1 | Land | $ 220,900 | $ - | $ 220,900 |
| W2 | Sewer System Infrastructure | $ 6,299,160 | $ - | $ 6,299,160 |
| W3 | Vehicles and Equipment | $ 96,430 | $ 96,430 | $ - |
| | Subtotal - Sewer Collection System Assets | $ 6,616,490 | $ 96,430 | $ 6,520,060 |
| | | | | |
| | Less Revenue Credit: Outstanding Debt Principal | | | $ (1,192,613) |
| | Equals: Net Sewer System Value | | | $ 5,327,446 |
| | Divide by: Sewer System Capacity (MGD) | | | 0.530 |
| | Equals: Unit Valuation of Sewer System ($/MGD) | | | $ 10,051,785 |
| | Divide by: 1,000,000 gallons ($/GPD) | | | $ 10.05 |

## 3.3 Incremental Cost Calculation

**Value of future capacity to be available to new customers through capital construction projects considered in the Town's Capital Improvements Plan (CIP) or similar master planning document.**

Assigning value to future capacity-related assets requires a determination of cost in present-day dollars and a clearly defined capacity that the assets will provide. Engineers typically assign project costs and capacity needs developed through a conceptual design process and adjust costs to the scheduled year of construction in the CIP. Present-day value can therefore be obtained using the same assumptions for inflation and then applied to the incremental cost calculation.

## Table 3.4.1 - Cost per GPD for Incremental (Future) Capacity Related Assets

| | Beech Mountain Water System Development Fee Incremental Valuation | | | |
|---|---|---|---|---|
| CIP Item | System Asset Description | Cost | Capacity Related % | SDF Component Valuation |
| | Water System Assets: New Construction | | | |
| WI 1 | Watauga River Intake | $ 19,104,837 | 100% | $ 19,104,837 |
| | | | | |
| | | | | |
| Valuation Adjustments and Calculation of Cost-Justified Fee | | | | |
| | Less Revenue Credit: 25% project cost per HB436 | | | $ (4,776,209) |
| | Less Revenue Credit: Contributions from other sources | | | $ (3,650,000) |
| | Equals: Adjusted Valuation | | | $ 10,678,628 |
| | Divided by: Capacity (MGD) | | | 2.00 |
| | Equals: Unit Valuation of Capacity ($/MGD) | | | $ 5,339,314 |
| | Divided by: 1,000,000 gallons ($/GPD) | | | $ 5.34 |

## Table 3.4.2 - Cost per GPD for Incremental (Future) Capacity Related Assets

| | Beech Mountain Sewer System Development Fee Incremental Valuation | | | |
|---|---|---|---|---|
| CIP Item | System Asset Description | Cost | Remaining Asset Value | SDF Component Valuation |
| | Sewer System Assets: Replacement Construction | | | |
| SI 1 | Grassy Gap WWTP Replacement | $ 1,212,840 | $ - | $ 1,212,840 |
| | | | | |
| | | | | |
| Valuation Adjustments and Calculation of Cost-Justified Fee | | | | |
| | Less Revenue Credit: 25% project cost per HB436 | | | $ (303,210) |
| | Equals: Adjusted Valuation | | | $ 909,630 |
| | Divided by: Capacity (MGD) | | | 0.080 |
| | Equals: Unit Valuation of Capacity ($/MGD) | | | $ 11,370,375 |
| | Multiply: Available Capacity | | | 0.035 |
| | Equals: Unit Valuation of Available Capacity ($/MGD) | | | $ 397,963 |
| | Divided by: 1,000,000 gallons ($/GPD) | | | $ 0.40 |

## 3.5 Valuation Adjustments

**The above system valuations include applicable credit adjustments for revenues anticipated from user charges, donated infrastructure, grants and funding from other (non-rate payer) sources.**

HB 436 requires revenue credits to be applied to existing debt that was issued to construct water and sewer system assets that provide capacity for potential customers and are repaid by

retail water rates and charges. To ensure that repayment for this debt is not collected twice from new customers; once through the SDF and again through retail rates and charges, the remaining outstanding debt principal amount is required to be applied as a credit against the projected aggregate cost of the capital improvements in the SDF calculation. Contributed capital provided by new development in excess of the development's proportionate share of connecting facilities, shall also be credited. Contributed capital is identified as part of fixed asset review and included in the summary of ineligible assets in the buy-in valuation calculation.

Revenue credits are also required to be applied to incremental (future) capacity-related assets. The present value of revenue generated by the approved rate structure over the course of the planning horizon (minimum 10 years, maximum 20 years) to repay future debt service is considered revenue credit and required to be excluded from the incremental valuation. The potential for existing rate structures to offset future capital needs was discussed with the Town. Staff concluded that water and sewer rates do not consider revenue generation specific to offsetting any incremental capacity costs and therefore revenue credits from this potential source are not applicable.

HB 436 assumes rate-generated revenues projected through the capital planning horizon will provide a minimum of 25% of the funding required to construct incremental assets. Therefore, a revenue credit of 25% is applied to the incremental valuation calculation.

### 3.6 Cost per Unit Volume

**Dollar valued that can be applied uniformly to all potential customer.**

This measure becomes the starting point for determining the maximum cost-justified water system development fee. Fees for different types of customers are based on this cost of capacity multiplied by the amount of capacity needed to serve each type or class of customer.

## 4.0 SERVICE UNIT CALCULATIONS: EQUIVALENT RESIDENTIAL UNITS

HB 436 requires SDF calculations to be applied to various categories of customer demands based on service units or ERU's. An ERU is defined as the water and sewer capacities required to serve the most typical user type which is a three-bedroom single-family dwelling. North Carolina Division of Water Resources (DWR) design standards for constructing water and sewer systems, NC Administrative Code 15A NCAC 18C .0409 and 15A NCAC 02T .0114 respectively, establish daily flow requirements based this type of service connection. An ERU can therefore be defined as 400 gallons per day for water and 360 gallons per day for sewer.

**Table 4.0.1– System Development Fees: Equivalent Residential Unit, Water and Sewer**

| | Beech Mountain System Development Fees: Equivalent Residential Unit Calculation | | | |
|---|---|---|---|---|
| Item | Cost-Justified System Development Fee Calculation | Capacity $ / GPD | Demand GPD | Cost per Unit Capacity |
| 1 | Water System | $ 16.90 | 400 | $ 6,760 |
| 2 | Sewer System | $ 10.45 | 360 | $ 3,761 |
| | Total ERU | | | $ 10,521 |

## 5.0 APPLICATION of SYSTEM DEVELOPMENT FEES and SERVICE UNIT EQUIVALENCY

NC Administrative Code 15A NCAC 18C .0409 and 15A NCAC 02T .0114, included in the Appendix, further define other service connection types and the associated water system demands sewer system flows on a per gallon per day basis. Therefore, these tables serve as an equivalency or conversion for use in determining applicable SDF for various categories of demand.

## 6.0 CONCLUSION

McGill has calculated costs for water system capacity on a per gallon per day basis for the Town of Beech Mountain. This calculation was performed using the Combined Method to account for the Town's combination of existing capacity, current improvements under construction and future capacity-related projects. This calculation resulted in a development fee ceiling of $10,521 for an ERU. An ERU is defined as the water and sewer capacities required to serve the most typical user type which is a three-bedroom single-family dwelling. The fee for other types of development can be calculated by applying the calculated cost of capacity per gallon of flow per day to the water demands for various uses as defined by NC Administrative Code 15A NCAC 18C .0409 and 15A NCAC 02T .0114.

Using NC Administrative Code 15A NCAC 18C .0409 and 15A NCAC 02T .0114 ensures that the same standard used to plan, design, construct and finance capital assets is applied as the same cost recovery basis to be applied to new development.

**Appendix**

House Bill 436
NC Administrative Code 15A NCAC 18C .0409
NC Administrative Code 15A NCAC 02T .0114
Revenue Credit: Outstanding Debt Principal
2013 Comprehensive Plan: Population Projection Section
2013 Comprehensive Plan: Water and Sewer Section
Beech Mountain Capital Improvements – Capacity Related Assets
RS Means Historical Cost Index

# APPENDIX

**GENERAL ASSEMBLY OF NORTH CAROLINA**
**SESSION 2017**

**SESSION LAW 2017-138**
**HOUSE BILL 436**

AN ACT TO PROVIDE FOR UNIFORM AUTHORITY TO IMPLEMENT SYSTEM DEVELOPMENT FEES FOR PUBLIC WATER AND SEWER SYSTEMS IN NORTH CAROLINA AND TO CLARIFY THE APPLICABLE STATUTE OF LIMITATIONS.

The General Assembly of North Carolina enacts:

**SECTION 1.** Chapter 162A of the General Statutes is amended by adding a new Article to read:

"Article 8.
"System Development Fees.

"**§ 162A-200. Short title.**

This Article shall be known and may be cited as the "Public Water and Sewer System Development Fee Act."

"**§ 162A-201. Definitions.**

The following definitions apply in this Article:

(1) Capital improvement. – A planned facility or expansion of capacity of an existing facility other than a capital rehabilitation project necessitated by and attributable to new development.

(2) Capital rehabilitation project. – Any repair, maintenance, modernization, upgrade, update, replacement, or correction of deficiencies of a facility, including any expansion or other undertaking to increase the preexisting level of service for existing development.

(3) Existing development. – Land subdivisions, structures, and land uses in existence at the start of the written analysis process required by G.S. 162A-205, no more than one year prior to the adoption of a system development fee.

(4) Facility. – A water supply, treatment, storage, or distribution facility, or a wastewater collection, treatment, or disposal facility, including for reuse or reclamation of water, owned or operated, or to be owned or operated, by a local governmental unit and land associated with such facility.

(5) Local governmental unit. – Any political subdivision of the State that owns or operates a facility, including those owned or operated pursuant to local act of the General Assembly or pursuant to Part 2 of Article 2 of Chapter 130A, Article 15 of Chapter 153A, Article 16 of Chapter 160A, or Articles 1, 4, 5, 5A, or 6 of Chapter 162A of the General Statutes.

(6) New development. – Any of the following occurring after the date a local government begins the written analysis process required by G.S. 162A-205, no more than one year prior to the adoption of a system development fee, which increases the capacity necessary to serve that development:

a. The subdivision of land.

b. The construction, reconstruction, redevelopment, conversion, structural alteration, relocation, or enlargement of any structure which increases the number of service units.

c. Any use or extension of the use of land which increases the number of service units.

(7) Service. – Water or sewer service, or water and sewer service, provided by a local governmental unit.

(8) Service unit. – A unit of measure, typically an equivalent residential unit, calculated in accordance with generally accepted engineering or planning standards.

(9) System development fee. – A charge or assessment for service imposed with respect to new development to fund costs of capital improvements necessitated by and attributable to such new development, to recoup costs of existing facilities which serve such new development, or a combination of those costs, as provided in this Article. The term includes amortized charges, lump-sum charges, and any other fee that functions as described by this definition regardless of terminology. The term does not include any of the following:

a. A charge or fee to pay the administrative, plan review, or inspection costs associated with permits required for development.

b. Tap or hookup charges for the purpose of reimbursing the local governmental unit for the actual cost of connecting the service unit to the system.

c. Availability charges.

d. Dedication of capital improvements on-site, adjacent, or ancillary to a development absent a written agreement providing for credit or reimbursement to the developer pursuant to G.S. 153A-280, 153A-451, 160A-320, 160A-499 or Part 3A of Article 18, Chapter 153A or Part 3D of Article 19, Chapter 160A of the General Statutes.

e. Reimbursement to the local governmental unit for its expenses in constructing or providing for water or sewer utility capital improvements adjacent or ancillary to the development if the owner or developer has agreed to be financially responsible for such expenses; however, such reimbursement shall be credited to any system development fee charged as set forth in G.S. 162A-207(c).

(10) System development fee analysis. – An analysis meeting the requirements of G.S. 162A-205.

**"§ 162A-202. Reserved.**

**"§ 162A-203. Authorization of system development fee.**

(a) A local governmental unit may adopt a system development fee for water or sewer service only in accordance with the conditions and limitations of this Article.

(b) A system development fee adopted by a local governmental unit under any lawful authority other than this Article and in effect on October 1, 2017, shall be conformed to the requirements of this Article not later than July 1, 2018.

**"§ 162A-204. Reserved.**

**"§ 162A-205. Supporting analysis.**

A system development fee shall be calculated based on a written analysis, which may constitute or be included in a capital improvements plan, that:

(1) Is prepared by a financial professional or a licensed professional engineer qualified by experience and training or education to employ generally accepted accounting, engineering, and planning methodologies to calculate system development fees for public water and sewer systems.

(2) Documents in reasonable detail the facts and data used in the analysis and their sufficiency and reliability.

(3) Employs generally accepted accounting, engineering, and planning methodologies, including the buy-in, incremental cost or marginal cost, and combined cost methods for each service, setting forth appropriate analysis as to the consideration and selection of a method appropriate to the circumstances and adapted as necessary to satisfy all requirements of this Article.

(4) Documents and demonstrates the reliable application of the methodologies to the facts and data, including all reasoning, analysis, and interim calculations underlying each identifiable component of the system development fee and the aggregate thereof.

(5) Identifies all assumptions and limiting conditions affecting the analysis and demonstrates that they do not materially undermine the reliability of conclusions reached.

(6) Calculates a final system development fee per service unit of new development and includes an equivalency or conversion table for use in determining the fees applicable for various categories of demand.

(7) Covers a planning horizon of not less than 10 years nor more than 20 years.

(8) Is adopted by resolution or ordinance of the local governmental unit in accordance with G.S. 162A-209.

**"§ 162A-206. Reserved.**

**"§ 162A-207. Minimum requirements.**

(a) Maximum. – A system development fee shall not exceed that calculated based on the system development fee analysis.

(b) Revenue Credit. – In applying the incremental cost or marginal cost, or the combined cost, method to calculate a system development fee with respect to water or sewer capital improvements, the system development fee analysis must include as part of that methodology a credit against the projected aggregate cost of water or sewer capital improvements. That credit shall be determined based upon generally accepted calculations and shall reflect a deduction of either the outstanding debt principal or the present value of projected water and sewer revenues received by the local governmental unit for the capital improvements necessitated by and attributable to such new development, anticipated over the course of the planning horizon. In no case shall the credit be less than twenty-five percent (25%) of the aggregate cost of capital improvements.

(c) Construction or Contributions Credit. – In calculating the system development fee with respect to new development, the local governmental unit shall credit the value of costs in excess of the development's proportionate share of connecting facilities required to be oversized for use of others outside of the development. No credit shall be applied, however, for water or sewer capital improvements on-site or to connect new development to water or sewer facilities.

**"§ 162A-208. Reserved.**

**"§ 162A-209. Adoption and periodic review.**

(a) For not less than 45 days prior to considering the adoption of a system development fee analysis, the local governmental unit shall post the analysis on its Web site and solicit and furnish a means to submit written comments, which shall be considered by the preparer of the analysis for possible modifications or revisions.

(b) After expiration of the period for posting, the governing body of the local governmental unit shall conduct a public hearing prior to considering adoption of the analysis with any modifications or revisions.

(c) The local governmental unit shall publish the system development fee in its annual budget or rate plan or ordinance. The local governmental unit shall update the system development fee analysis at least every five years.

**"§ 162A-210. Reserved.**

**"§ 162A-211. Use and administration of revenue.**

(a) Revenue from system development fees calculated using the incremental cost method or marginal cost method, exclusively or as part of the combined cost method, shall be expended only to pay:

(1) Costs of constructing capital improvements including, and limited to, any of the following:

a. Construction contract prices.

b. Surveying and engineering fees.

c. Land acquisition cost.

d. Principal and interest on bonds, notes, or other obligations issued by or on behalf of the local governmental unit to finance any costs for an item listed in sub-subdivisions a. through c. of this subdivision.

(2) Professional fees incurred by the local governmental unit for preparation of the system development fee analysis.

(3) If no capital improvements are planned for construction within five years or the foregoing costs are otherwise paid or provided for, then principal and interest on bonds, notes, or other obligations issued by or on behalf of a local governmental unit to finance the construction or acquisition of existing capital improvements.

(b) Revenue from system development fees calculated using the buy-in method may be expended for previously completed capital improvements for which capacity exists and for capital rehabilitation projects. The basis for the buy-in calculation for previously completed capital improvements shall be determined by using a generally accepted method of valuing the actual or replacement costs of the capital improvement for which the buy-in fee is being collected less depreciation, debt credits, grants, and other generally accepted valuation adjustments.

(c) A local governmental unit may pledge a system development fee as security for the payment of debt service on a bond, note, or other obligation subject to compliance with the foregoing limitations.

(d) System development fee revenues shall be accounted for by means of a capital reserve fund established pursuant to Part 2 of Article 3 of Chapter 159 of the General Statutes and limited as to expenditure of funds in accordance with this section.

**"§ 162A-212. Reserved.**

**"§ 162A-213. Time for collection of system development fees.**

For new development involving the subdivision of land, the system development fee shall be collected by a local governmental unit either at the time of plat recordation or when water or sewer service for the subdivision or other development is committed by the local governmental unit. For all other new development, the local governmental unit shall collect the system development fee at the time of application for connection of the individual unit of development to the service or facilities.

**"§ 162A-214. Reserved.**

**"§ 162A-215. Narrow construction.**

Notwithstanding G.S. 153A-4 and G.S. 160A-4, in any judicial action interpreting this Article, all powers conferred by this Article shall be narrowly construed to ensure that system development fees do not unduly burden new development."

**SECTION 2.** G.S. 130A-64 reads as rewritten:

"**§ 130A-64. Service charges and rates.**

(a) A sanitary district board shall apply service charges and rates based upon the exact benefits derived. These service charges and rates shall be sufficient to provide funds for the maintenance, adequate depreciation and operation of the work of the district. If reasonable, the service charges and rates may include an amount sufficient to pay the principal and interest maturing on the outstanding bonds and, to the extent not otherwise provided for, bond anticipation notes of the district. Any surplus from operating revenues shall be set aside as a separate fund to be applied to the payment of interest on or to the retirement of bonds or bond anticipation notes. The sanitary district board may modify and adjust these service charges and rates.

(b) The district board may require system development fees only in accordance with Article 8 of Chapter 162A of the General Statutes."

**SECTION 3.** G.S. 153A-277 reads as rewritten:

"**§ 153A-277. Authority to fix and enforce rates.**

(a) A county may establish and revise from time to time schedules of rents, rates, fees, charges, and penalties for the use of or the services furnished or to be furnished by a public enterprise. Schedules of rents, rates, fees, charges, and penalties may vary for the same class of service in different areas of the county and may vary according to classes of service, and different schedules may be adopted for services provided outside of the county. A county may include a fee relating to subsurface discharge wastewater management systems and services on the property tax bill for the real property where the system for which the fee is imposed is located.

...

(a2) A county may require system development fees only in accordance with Article 8 of Chapter 162A of the General Statutes.

...."

**SECTION 4.(a)** G.S. 160A-314 reads as rewritten:

"**§ 160A-314. Authority to fix and enforce rates.**

(a) A city may establish and revise from time to time schedules of rents, rates, fees, charges, and penalties for the use of or the services furnished or to be furnished by any public enterprise. Schedules of rents, rates, fees, charges, and penalties may vary according to classes of service, and different schedules may be adopted for services provided outside the corporate limits of the city.

...

(e) A city may require system development fees only in accordance with Article 8 of Chapter 162A of the General Statutes."

**SECTION 4.(b)** G.S. 160A-317 is amended by adding a new subsection to read:

"(a4) System Development Fees. – A city may require system development fees only in accordance with Article 8 of Chapter 162A of the General Statutes."

**SECTION 5.(a)** G.S. 162A-6(a) is amended by adding a new subdivision to read:

"(9a) To impose and require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 5.(b)** G.S. 162A-9 is amended by adding a new subsection to read:

"(a5) An authority may require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 6.(a)** G.S. 162A-36(a) is amended by adding a new subdivision to read:

"(8a) To impose and require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 6.(b)** G.S. 162A-49 reads as rewritten:

**"§ 162A-49. Rates and charges for services.**

(a) The district board may fix, and may revise from time to time, rents, rates, fees and other charges for the use of land for the services furnished or to be furnished by any water system or sewerage system or both. Such rents, rates, fees and charges shall not be subject to supervision or regulation by any bureau, board, commission, or other agency of the State or of any political subdivision. Any such rents, rates, fees and charges pledged to the payment of revenue bonds of the district shall be fixed and revised so that the revenues of the water system or sewerage system or both, together with any other available funds, shall be sufficient at all times to pay the cost of maintaining, repairing and operating the water system or the sewerage system or both, the revenues of which are pledged to the payment of such revenue bonds, including reserves for such purposes, and to pay the interest on and the principal of such revenue bonds as the same shall become due and payable and to provide reserves therefor. If any such rents, rates, fees and charges are pledged to the payment of any general obligation bonds issued under this Article, such rents, rates, fees and charges shall be fixed and revised so as to comply with the requirements of such pledge. The district board may provide methods for collection of such rents, rates, fees and charges and measures for enforcement of collection thereof, including penalties and the denial or discontinuance of service.

(b) The district board may require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 7.(a)** G.S. 162A-69 is amended by adding a new subdivision to read:

"(8a) To impose and require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 7.(b)** G.S. 162A-72 reads as rewritten:

**"§ 162A-72. Rates and charges for services.**

(a) The district board may fix, and may revise from time to time, rents, rates, fees and other charges for the use of and for the services furnished or to be furnished by any sewerage system. Such rents, rates, fees and charges shall not be subject to supervision or regulation by any bureau, board, commission, or other agency of the State or of any political subdivision. Any such rents, rates, fees and charges pledged to the payment of revenue bonds of the district shall be fixed and revised so that the revenues of the sewerage system, together with any other available funds, shall be sufficient at all times to pay the cost of maintaining, repairing and operating the sewerage system the revenues of which are pledged to the payment of such revenue bonds, including reserves for such purposes, and to pay the interest on and the principal of such revenue bonds as the same shall become due and payable and to provide reserves therefor. If any such rents, rates, fees and charges are pledged to the payment of any general obligation bonds issued under this Article, such rents, rates, fees and charges shall be fixed and revised so as to comply with the requirements of such pledge. The district board may provide methods for collection of such rents, rates, fees and charges and measures for enforcement of collection thereof, including penalties and the denial or discontinuance of service.

(b) The district board may require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 8.** G.S. 162A-85.13 is amended by adding a new subsection to read:

"(a1) The district board may require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 9.** G.S. 162A-88 reads as rewritten:

**"§ 162A-88. District is a municipal corporation.**

(a) The inhabitants of a county water and sewer district created pursuant to this Article are a body corporate and politic by the name specified by the board of commissioners. Under that name they are vested with all the property and rights of property belonging to the corporation; have perpetual succession; may sue and be sued; may contract and be contracted with; may acquire and hold any property, real and personal, devised, sold, or in any manner conveyed, dedicated to, or otherwise acquired by them, and from time to time may hold, invest, sell, or dispose of the same; may have a common seal and alter and renew it at will; may establish, revise and collect rates, fees or other charges and penalties for the use of or the services furnished or to be furnished by any sanitary sewer system, water system or sanitary sewer and water system of the district; and may exercise those powers conferred on them by this Article.

(b) The district board may require system development fees only in accordance with Article 8 of this Chapter."

**SECTION 10.(a)** G.S. 1-52(15) reads as rewritten:

"(15) For the recovery of taxes paid as provided in ~~G.S. 105-381.~~G.S. 105-381 or for the recovery of an unlawful fee, charge, or exaction collected by a county, municipality, or other unit of local government for water or sewer service or water and sewer service."

**SECTION 10.(b)** This section is to clarify and not alter G.S. 1-52.

**SECTION 11.** Sections 1 through 9 of this act become effective October 1, 2017, and apply to system development fees imposed on or after that date. Section 10 of this act, being a clarifying amendment, has retroactive effect and applies to claims accrued or pending prior to and after the date that section becomes law. Nothing in this act provides retroactive authority for any system development fee, or any similar fee for water or sewer services to be furnished, collected by a local governmental unit prior to October 1, 2017. The remainder of this act is effective when it becomes law and applies to claims accrued or pending prior to and after that date.

In the General Assembly read three times and ratified this the 29th day of June, 2017.

s/ Daniel J. Forest
President of the Senate

s/ Tim Moore
Speaker of the House of Representatives

s/ Roy Cooper
Governor

Approved 4:13 p.m. this 20th day of July, 2017

**15A NCAC 18C .0409 SERVICE CONNECTIONS**

(a) Local Water Supply Plan. Units of local government which are operating under a local water supply plan in accordance with G.S. 143-355(l) shall not be limited in the number of service connections.

(b) No local water supply plan. A public water system which does not have a local water supply plan as stated in Paragraph (a) shall limit its number of service connections as follows:

(1) A public water system shall meet the daily flow requirements specified in Table 1:

Table 1: Daily Flow Requirements

| Type of Service Connection | Daily Flow for Design |
|---|---|
| Residential | 400 gallon/connection |
| Mobile Home Parks | 250 gallon/connection |
| Campgrounds and Travel Trailer Parks | 100 gallon/space |
| Marina | 10 gallon/boat slip |
| Marina with bathhouse | 30 gallon/boat slip |
| Rest Homes and Nursing Homes | |
| with laundry | 120 gallon/bed |
| without laundry | 60 gallon/bed |
| Schools | 15 gallon/student |
| Day Care Facilities | 15 gallon/student |
| Construction, work, or summer camps | 60 gallon/person |
| Business, office, factory (exclusive of industrial use) | |
| without showers | 25 gallon/person/shift |
| with showers | 35 gallon/person/shift |
| Hospitals | 300 gallon/bed |

or;

(2) A public water system serving different types of service connections shall meet the maximum daily demand calculated as follows:

(A) Where records of the previous year are available that reflect daily usage, the average of the two highest consecutive days of record of the water treated shall be the value used to determine if there is capacity to serve additional service connections (unusual events such as massive line breaks or line flushings shall not be considered).

(B) Where complete daily records of water treated are not available, the public water system shall multiply the daily average use based on the amount of water treated during the previous year of record by the appropriate factor to determine maximum daily demand, as follows:

(i) A system serving a population of 10,000 or less shall multiply the daily average use by 2.5; or

(ii) A system serving a population greater than 10,000 shall multiply the daily average use by 2.0.

*History Note: Authority G.S. 130A-315; 103A-317; P.L. 93-523;*
*Eff. July 1, 1994.*

**15A NCAC 02T .0114 WASTEWATER DESIGN FLOW RATES**

(a) This Rule shall be used to determine wastewater flow rates for all systems covered by this Subchapter unless alternate criteria are provided by a program specific rule and for flow used for the purposes of 15A NCAC 02H .0105. These are minimum design daily flow rates for normal use and occupancy situations. Higher flow rates may be required where usage and occupancy are atypical, including, those in Paragraph (e) of this Rule. Wastewater flow calculations must take hours of operation and anticipated maximum occupancies/usage into account when calculating peak flows for design.

(b) In determining the volume of sewage from dwelling units, the flow rate shall be 120 gallons per day per bedroom. The minimum volume of sewage from each dwelling unit shall be 240 gallons per day and each additional bedroom above two bedrooms shall increase the volume by 120 gallons per day. Each bedroom or any other room or addition that can reasonably be expected to function as a bedroom shall be considered a bedroom for design purposes. When the occupancy of a dwelling unit exceeds two persons per bedroom, the volume of sewage shall be determined by the maximum occupancy at a rate of 60 gallons per person per day.

(c) The following table shall be used to determine the minimum allowable design daily flow of wastewater facilities. Design flow rates for establishments not identified below shall be determined using available flow data, water-using fixtures, occupancy or operation patterns, and other measured data.

| Type of Establishments | Daily Flow For Design |
|---|---|
| Barber and beauty shops | |
| Barber Shops | 50 gal/chair |
| Beauty Shops | 125 gal/booth or bowl |
| Businesses, offices and factories | |
| General business and office facilities | 25 gal/employee/shift |
| Factories, excluding industrial waste | 25 gal/employee/shift |
| Factories or businesses with showers or food preparation | 35 gal/employee/shift |
| Warehouse | 100 gal/loading bay |
| Warehouse – self storage (not including caretaker residence) | 1 gal/unit |
| Churches | |
| Churches without kitchens, day care or camps | 3 gal/seat |
| Churches with kitchen | 5 gal/seat |
| Churches providing day care or camps | 25 gal/person (child & employee) |
| Fire, rescue and emergency response facilities | |
| Fire or rescue stations without on site staff | 25 gal/person |
| Fire or rescue stations with on-site staff | 50 gal/person/shift |
| Food and drink facilities | |
| Banquet, dining hall | 30 gal/seat |
| Bars, cocktail lounges | 20 gal/seat |
| Caterers | 50 gal/100 sq ft floor space |
| Restaurant, full Service | 40 gal/seat |
| Restaurant, single service articles | 20 gal/seat |
| Restaurant, drive-in | 50 gal/car space |
| Restaurant, carry out only | 50 gal/100 sq ft floor space |
| Institutions, dining halls | 5 gal/meal |
| Deli | 40 gal/100 sq ft floor space |
| Bakery | 10 gal/100 sq ft floor space |
| Meat department, butcher shop or fish market | 75 gal/100 sq ft floor space |
| Specialty food stand or kiosk | 50 gal/100 sq ft floor space |
| Hotels and Motels | |
| Hotels, motels and bed & breakfast facilities, without in-room cooking facilities | 120 gal/room |
| Hotels and motels, with in-room cooking facilities | 175 gal/room |
| Resort hotels | 200 gal/room |
| Cottages, cabins | 200 gal/unit |
| Self service laundry facilities | 500 gal/machine |
| Medical, dental, veterinary facilities | |
| Medical or dental offices | 250 gal/practitioner/shift |

| | |
|---|---|
| Veterinary offices (not including boarding) | 250 gal/practitioner/shift |
| Veterinary hospitals, kennels, animal boarding facilities | 20 gal/pen, cage, kennel or stall |
| Hospitals, medical | 300 gal/bed |
| Hospitals, mental | 150 gal/bed |
| Convalescent, nursing, rest homes without laundry facilities | 60 gal/bed |
| Convalescent, nursing, rest homes with laundry facilities | 120 gal/bed |
| Residential care facilities | 60 gal/person |
| Parks, recreation, camp grounds, R-V parks and other outdoor activity facilities | |
| Campgrounds with comfort station, without water or sewer hookups | 75 gal/campsite |
| Campgrounds with water and sewer hookups | 100 gal/campsite |
| Campground dump station facility | 50 gal/space |
| Construction, hunting or work camps with flush toilets | 60 gal/person |
| Construction, hunting or work camps with chemical or portable toilets | 40 gal/person |
| Parks with restroom facilities | 250 gal/plumbing fixture |
| Summer camps without food preparation or laundry facilities | 30 gal/person |
| Summer camps with food preparation and laundry facilities | 60 gal/person |
| Swimming pools, bathhouses and spas | 10 gal/person |
| Public access restrooms | 325 gal/plumbing fixture |
| Schools, preschools and day care | |
| Day care and preschool facilities | 25 gal/person (child & employee) |
| Schools with cafeteria, gym and showers | 15 gal/student |
| Schools with cafeteria | 12 gal/student |
| Schools without cafeteria, gym or showers | 10 gal/student |
| Boarding schools | 60 gal/person (student & employee) |
| Service stations, car wash facilities | |
| Service stations, gas stations | 250 gal/plumbing fixture |
| Car wash facilities (if recycling water see Rule .0235) | 1200 gal/bay |
| Sports centers | |
| Bowling center | 50 gal/lane |
| Fitness, exercise, karate or dance center | 50 gal/100 sq ft |
| Tennis, racquet ball | 50 gal/court |
| Gymnasium | 50 gal/100 sq ft |
| Golf course with only minimal food service | 250 gal/plumbing fixture |
| Country clubs | 60 gal/member or patron |
| Mini golf, putt-putt | 250 gal/plumbing fixture |
| Go-kart, motocross | 250 gal/plumbing fixture |
| Batting cages, driving ranges | 250 gal/plumbing fixture |
| Marinas without bathhouse | 10 gal/slip |
| Marinas with bathhouse | 30 gal/slip |
| Video game arcades, pool halls | 250 gal/plumbing fixture |
| Stadiums, auditoriums, theaters, community centers | 5 gal/seat |
| Stores, shopping centers, malls and flea markets | |
| Auto, boat, recreational vehicle dealerships/showrooms with restrooms | 125 gal/plumbing fixture |
| Convenience stores, with food preparation | 60 gal/100 sq ft |
| Convenience stores, without food preparation | 250 gal/plumbing fixture |
| Flea markets | 30 gal/stall |
| Shopping centers and malls with food service | 130 gal/1000 sq ft |
| Stores and shopping centers without food service | 100 gal/1000 sq ft |
| Transportation terminals – air, bus, train, ferry, port and dock | 5 gal/passenger |

(d) Design daily flow rates for proposed non-residential developments where the types of use and occupancy are not known shall be designed for a minimum of 880 gallons per acre or the applicant shall specify an anticipated flow based upon anticipated or potential uses.

(e) Conditions applicable to the use of the above design daily flow rates:

(1) For restaurants, convenience stores, service stations and public access restroom facilities, higher design daily flow rates shall be required based on higher expected usage where use is increased because of its proximity to highways, malls, beaches, or other similar high use areas.

(2) Residential property on barrier islands and similar communities located south or east of the Atlantic Intracoastal Waterway used as vacation rental as defined in G.S. 42A-4 shall use 120 gallons per day per habitable room. Habitable room shall mean a room or enclosed floor space used or intended to be used for living or sleeping, excluding kitchens and dining areas, bathrooms, shower rooms, water closet compartments, laundries, pantries, foyers, connecting corridors, closets, and storage spaces.

(f) An adjusted daily sewage flow design rate shall be granted for permitted but not yet tributary connections and future connections tributary to the system upon showing that a sewage system is adequate to meet actual daily wastewater flows from a facility included in Paragraph (b) or (c) of this Rule without causing flow violations at the receiving wastewater treatment plant or capacity related sanitary sewer overflows within the collection system as follows:

(1) Documented, representative data from that facility or a comparable facility shall be submitted by an authorized signing official in accordance with Rule .0106 of this Section to the Division as follows for all flow reduction request:

(A) Dates of flow meter calibrations during the time frame evaluated and indication if any adjustments were necessary.

(B) A breakdown of the type of connections (e.g. two bedroom units, three bedroom units) and number of customers for each month of submitted data as applicable. Identification of any non-residential connections including subdivision clubhouses/pools, restaurants, schools, churches and businesses. For each non-residential connection, information as identified in Paragraph (c) of this Rule (e.g. 200 seat church, 40 seat restaurant, 35 person pool bathhouse).

(C) Owner of the collection system.

(D) Age of the collection system.

(E) Analysis of inflow and infiltration within the collection system or receiving treatment plant, as applicable.

(F) Where a dedicated wastewater treatment plant serves the specific area and is representative of the residential wastewater usage, at least the 12 most recent consecutive monthly average wastewater flow readings and the daily total wastewater flow readings for the highest average wastewater flow month per customers as reported to the Division.

(G) Where daily data from a wastewater treatment plant cannot be utilized or is not representative of the project area: at least 12 months worth of monthly average wastewater flows from the receiving treatment plant shall be evaluated to determine the peak sewage month. Daily wastewater flows shall then be taken from a flow meter installed at the most downstream point of the collection area for the peak month selected that is representative of the project area. Justification for the selected placement of the flow meter shall also be provided.

(H) An estimated minimum design daily sewage flow rate shall be taken by calculating the numerical average of the top three daily readings for the highest average flow month. The calculations shall also account for seasonal variations, excessive inflow and infiltration, age and suspected meter reading/recording errors.

(2) The Division shall evaluate all data submitted but shall also consider other factors in granting, with or without adjustment, or denying a flow reduction request including: applicable weather conditions during the data period (i.e. rainy or drought), other historical monitoring data for the particular facility or other similar facilities available to the Division, the general accuracy of monitoring reports and flow meter readings, and facility usage (i.e., resort area).

(3) Flow increases shall be required if the calculations in Subparagraph (f)(1) of this Rule yield design flows higher than that specified in Paragraphs (b) or (c) of this Rule.

(4) The applicant/owner shall retain the letter of any approved adjusted daily design flow rate for the life of the facility and shall transfer such letter to any new system owner.

*History Note:* *Authority G.S. 143-215.1; 143-215.3(a)(1);*
*Eff. September 1, 2006.*

## TOWN OF BEECH MOUNTAIN
## DEBT SERVICE SCHEDULE AND REVENUE CREDIT TOTALS

**WATER AND SEWER FUND:**

| YEAR | 1,992,046 DENR 2.265% STATE REVOLVING LOAN 7/30/07 POND CREEK WW PLANT | | | 2011 950,000 BB&T 3.11% LEASE/PURCHASE RADIO READ WATER METER PROJECT | | | 988,110 BB&T 3.71% WATER LINE & GENERATORS LEASE/PURCHASE | | | 4,300,000 USDA 3.375% REVENUE BONDS WATER TREAT PLANT | | | 95,004 BB&T 2.19% May-17 Backhoe | | | TOTAL DEBT PAYMENTS WATER & SEWER |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PRINCIPAL | INTEREST | TOTAL | PRINC | INTEREST | TOTAL | PRINCIPAL | INTEREST | TOTAL | PRINCIPAL | INTEREST | TOTAL | PRINCIPAL | INTEREST | TOTAL | |
| 2018/2019 | 99,602 | 22,560 | 122,162 | 102,218 | 9,050 | 111,268 | 115,777 | 4,295 | 120,073 | 54,000 | 143,336 | 197,336 | 18,585 | 1,682 | 20,267 | **571,106** |
| 2019/2020 | 99,602 | 20,304 | 119,906 | 105,421 | 5,847 | 111,268 | | | | 56,000 | 141,514 | 197,514 | 18,992 | 1,275 | 20,267 | **448,955** |
| 2020/2021 | 99,602 | 18,048 | 117,650 | 108,725 | 2,543 | 111,268 | | | | 58,000 | 139,624 | 197,624 | 19,408 | 859 | 20,267 | **446,809** |
| 2021/2022 | 99,602 | 15,792 | 115,394 | | | | | | | 60,000 | 137,666 | 197,666 | 19,832 | 434 | 20,267 | **333,327** |
| 2022/2023 | 99,602 | 13,536 | 113,138 | | | | | | | 62,000 | 135,641 | 197,641 | | | | **310,780** |
| 2023/2024 | 99,602 | 11,280 | 110,882 | | | | | | | 64,000 | 133,549 | 197,549 | | | | **308,431** |
| 2024/2025 | 99,602 | 9,024 | 108,626 | | | | | | | 66,000 | 131,389 | 197,389 | | | | **306,015** |
| 2025/2026 | 99,602 | 6,768 | 106,370 | | | | | | | 68,000 | 129,161 | 197,161 | | | | **303,532** |
| 2026/2027 | 99,602 | 4,512 | 104,114 | | | | | | | 71,000 | 126,866 | 197,866 | | | | **301,981** |
| 2027/2028 | 99,602 | 2,256 | 101,858 | | | | | | | 73,000 | 124,470 | 197,470 | | | | **299,328** |
| 2028/2056 | | | | | | | | | | 3,615,000 | 1,518,632 | 5,133,632 | | | | **5,133,632** |
| TOTAL | 996,023 | 124,080 | 1,120,103 | 316,364 | 17,440 | 333,804 | 115,777 | 4,295 | 120,073 | 4,247,000 | 2,861,848 | 7,108,848 | 76,817 | 4,250 | 81,068 | **8,763,895** |
| | | | | | | | | | | | | | | Total Debt Interest | | **3,011,913** |
| | | | | | | | | | | | | | | Total Debt Principal | | **5,751,981** |

INTEREST DUE MAY 1 AND NOV 1
PRINC DUE MAY 1

PRINC & INTEREST DUE OCT 15 & APR 15

PRINCIPAL & INTEREST DUE
EACH OCTOBER 22.

| | | |
|---|---|---|
| **Revenue Credit Totals** | **Water System Outstanding Debt Principal** | **4,559,368** |
| | **Sewer System Outstanding Debt Principal** | **1,192,613** |

# 2013-2030

# Beech Mountain Comprehensive Plan

**A Comprehensive Plan for the Future Growth and Development of the Town of Beech Mountain, North Carolina**

2013-2030

# Town of Beech Mountain Comprehensive Plan

Beech Mountain, North Carolina

***Prepared for the citizens and stakeholders of Beech Mountain***

**Elected Officials:**

**Beech Mountain Town Council**

Rick Owen, Mayor
Paul Piquet, Vice Mayor
Cindy Keller
Alan Holcombe
Rick Miller

Randy Feierabend, Town Manager

**Prepared by:**

**Beech Mountain Planning Board**

Paul O'Connell
Andrew Porter
Brian Barnes
John Hoffman
Bill Watson
James True
Matt LaVigne

**Town of Beech Mountain Planning Staff**

James Scott, Town Planner

With assistance from: Rob Haigh, Planning Intern Brandon Davis, Planning Intern Kevin Lewis, Planning Intern

*Cover photo Credit: Kristian Jackson*

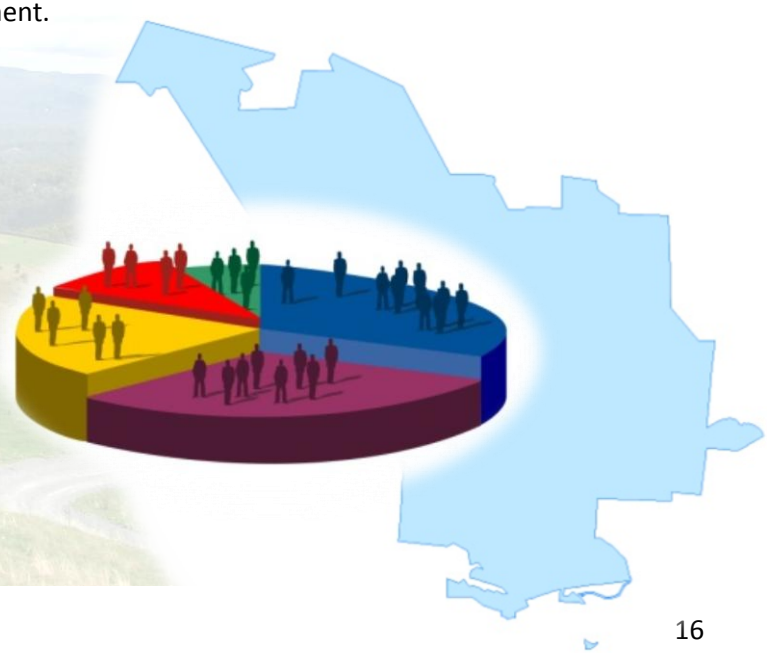
# Table of Contents

REFERENCES (Available at Beech Mountain Town Hall)

# Demogr aphics

To plan for the future of Beech Mountain, it is critical to know about the Town's population. First and foremost is the straightforward question of growth. How much growth will the Town see? How many people will we have to accommodate? But other questions about our population also carry great weight. What kinds of people make Beech Mountain their home or vacation destination? What kind of housing, recreation, and employment choices do they make? It is important to understand who our population is and how their characteristics will change over the coming decades. The answers to questions such as these will set the background for our Town's plans for the future.

More than just a mechanism to support planning for growth, demographics are also important to consider because ***many of the decisions that the Town makes, consciously or unconsciously, can make a drastic impact on the level of growth that the town will see in the future***. It is important to remember that other scenarios than those presented are possible. By planning to increase density the town could experience levels of growth even greater than in the build-out scenario. By concentrating that density in specific locations and modifying land use controls to allow for compact development, such density could theoretically be achieved without compromising open spaces and environmental characteristics. On the other hand, the Town could drastically limit growth by imposing more severe land usage restrictions and regulations as an alternative means to protecting the town's character and environment.



## Current Population Statistics

## (Baseline Figures)

The figures below provide a snapshot of basic and critical current population figures for Beech Mountain:

***345*** - Number of full time residents (2010 US Census)

*Approximately* ***4500*** -Estimated number of seasonal or second home residents (Beech Mtn. est. based on 2.24 persons per housing unit)

***2287*** -Number of Housing Units (2010 US Census)

- For seasonal , recreational, occasional use: ***2049***
- Full time occupied: ***154***

***5418*** - Number of Parcels of Land (2011 Avery and Watauga County Tax Data)

## Demographic Projections for Beech Mountain

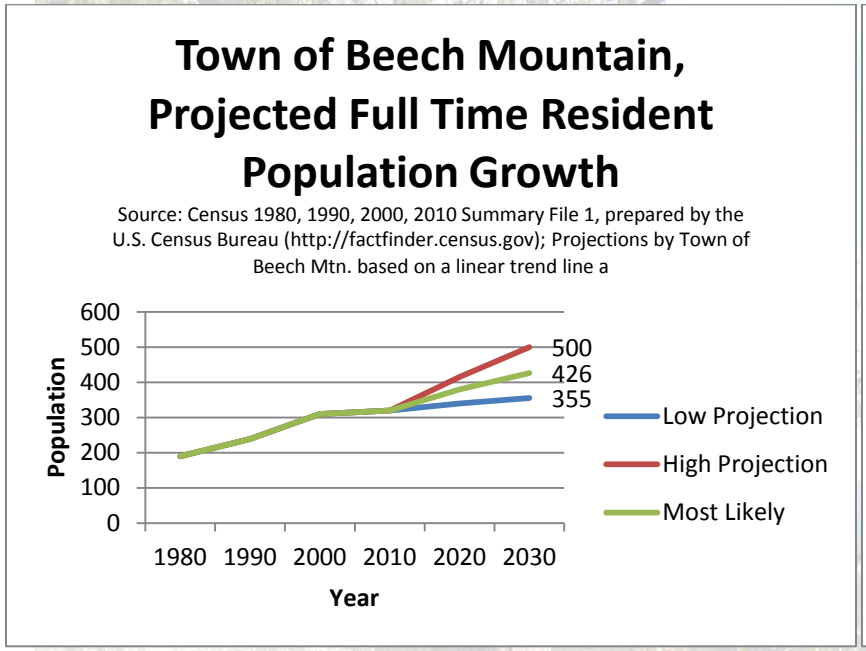
As a vacation resort community, Beech Mountain has relatively few full time residents. But full time residents only portray a fraction of the picture of Beech Mountain's true population. Beech Mountain's unique situation as a resort community demands that demographic trends for Beech Mountain be analyzed in different ways and that different factors be taken into account. Because Census figures focus on year-round residents, analyzing housing and building trends is one method of accounting for the fact that the majority of homes on Beech Mountain are second homes or vacation homes.

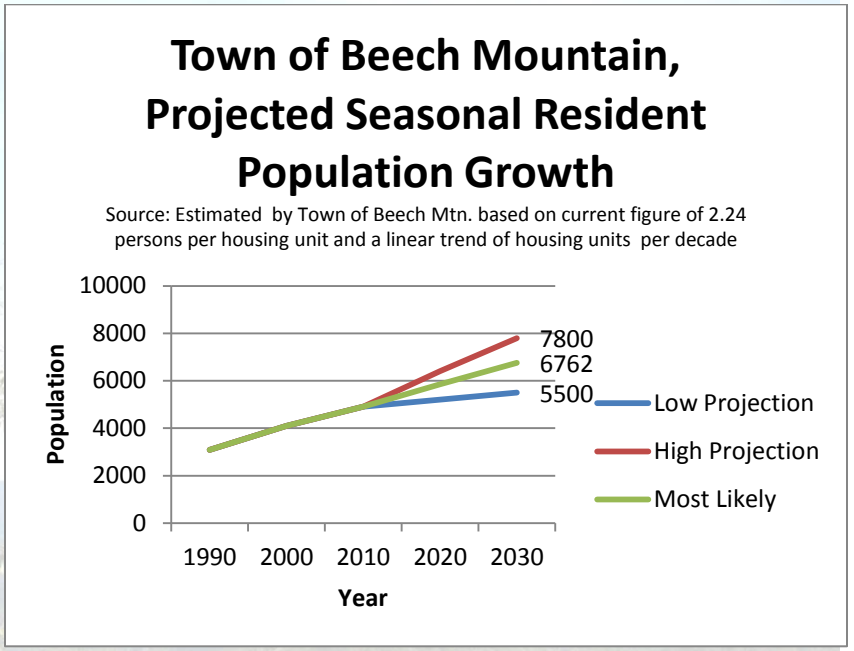
For purposes of forecasting growth, two factors are focused upon in this analysis:

- Population and its contributing factors
- Construction trends

## Projected Growth Scenario

This scenario forecasts as closely as possible the growth that Beech Mountain will encounter over the coming decades. It takes into account current growth rates and projects them into the future. The following charts illustrate that ***Beech Mountain will likely have approximately 425 full time and nearly 7000 part time residents by 2030***.




Many factors were considered in developing these estimates, and these considerations will likely determine whether the actual population change over this period errs towards high-growth or low-growth projection. Considerations support a conclusion that steady, robust growth will resume in Beech Mountain in the future include:

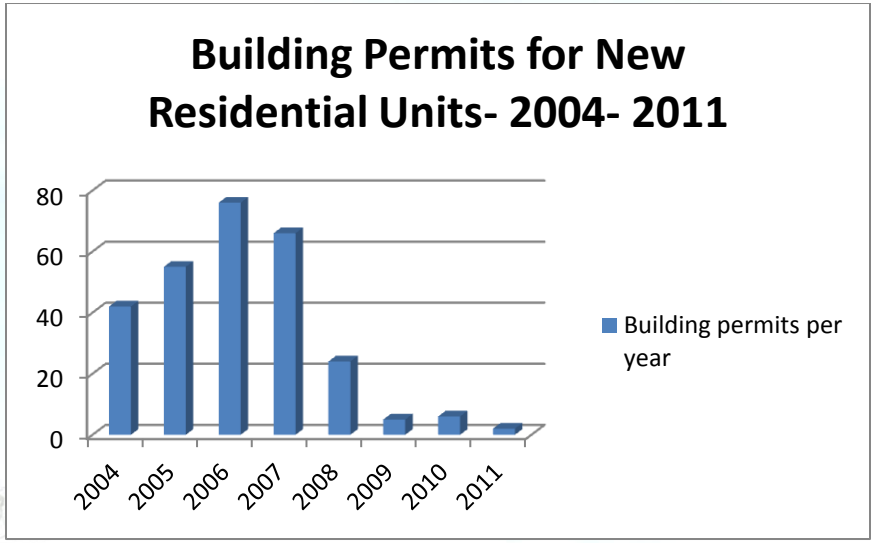
- Retirement age baby boomers (people born between 1946-1964). Much of the land and housing in Beech Mountain is owned by people who are planning to one day "retire to the mountains"
- Rise in number of independently wealthy individuals

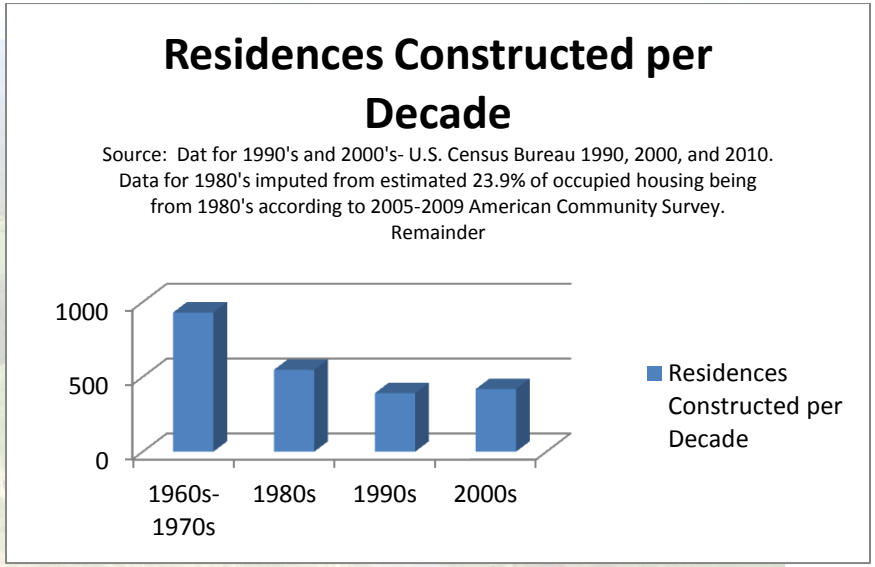
- Advent of internet and telecommuting allows individuals to live where they desire, rather than being tied to a work location
- Continued growth in nearby major cities (Charlotte, Piedmont Triad, Tri- Cities, Triangle) and in the State of North Carolina as a whole
- Land and Housing competitively priced for the High Country area of North Carolina

However, there are several factors and trends that will serve to limit Beech Mountain's population growth in the future, including:

- The baby boomer generation has already peaked. The average baby boomer has passed retirement age.
- The national and global economic slowdown that began in 2008 has severely curtailed growth in the near term.
- Aging of current population. The age structure of Beech Mountain's residents is very top-heavy, meaning there is a disproportionate number of individuals at the high end of the age spectrum, without a sufficient number of persons in younger age categories to replace them.

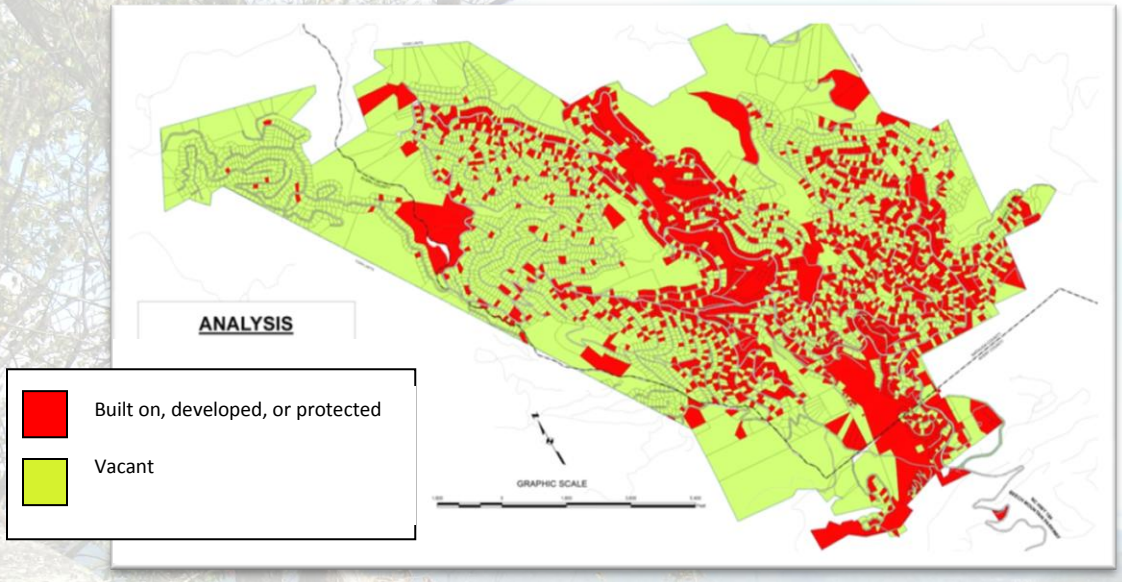
One of the largest factors to consider in this analysis is the long-term impact of the current economic recession. Although recent figures show a sharp decline in the construction of new homes, it is reasonable to predict that the overall growth trend will continue in the future. Even with the recent downturn in the economy and its related impacts on construction, the decade of 2000-2010 taken as a whole echoed the pattern of growth that the Town has experienced since its inception. The first chart below illustrates the sharp curtain in construction at the latter half of the 2000's, but the second chart documents the overall high and consistent level of development that has occurred here over the last 40 years.



# Build-Out Scenario

Another way to forecast demands that will be placed on infrastructure in Beech Mountain is to plan for complete build – out of existing buildable lots. Because the town originated as a planned development, Beech Mountain has the unique characteristic of having almost all of its land already subdivided and its growth is ultimately constrained by limited space and a limited number of buildable, subdivided lots.




Although the prospect of occupying all of Beech Mountain's buildable lots is distant, it is nevertheless feasible in a long-term plan. Once all lots have been built upon, population will increase more slowly, and will only occur with increases in density.

As of 2010, there were 5434 lots in the Town of Beech Mountain, 1754 of which are built upon, or roughly 32%. Assuming that 85% of the remaining 3680 lots are eventually buildable, and assuming single family residences will be the predominant land use, ***there is potential for at least 3128 new homes in the Town of Beech Mountain***, which is 137% of the current number.

**With 3128 new housing units in Beech Mountain, the population figures would be as follows:**

- **5415 total housing units**
- **Approximate seasonal population of 12,129** (calculated using current average of 2.24 persons per housing unit)
- **Approximate year round population of 815** (calculated using the current ratio of .15 year round residents per housing unit)

## WS: Background

## WS: Current Water System Infrastructure Map and Data

## WS.G: Water and Sewer Goals, Policies and Strategies

**Goal WS.G1:** Adequate Water and Sewer Capacity for our Town's Future

- **WS.G1.S1:** Look for alternate sources of raw water
- **WS.G1.P1:** Promote conservation
- **WS.G1.S2:** Replace undersized water lines
- **WS.G1.S3:** Expand capacity of water and sewer treatment facilities

**Goal WS.G2:** Superior Water Quality

- **WS.G1.P1:** Protect the Town's watersheds and watercourses
- **WS.G2.S1:** Where feasible, utilize BMP's to better manage stormwater
- **WS.G2.S2:** Update and modernize the Water Treatment Plant
- **WS.G2.S3:** Increase circulation in the water system
- **WS.G2.S4:** Systematically and incrementally replace water and sewer line infrastructure

**Goal WS.G3:** Efficiency in the Delivery of Services

- **WS.G3.P1:** Reduce amount of water unaccounted for
- **WS.G3.P2:** Reduce the amount of inflow and infiltration
- **WS.G3.P3:** Capitalize on GIS technology to understand our infrastructure
- **WS.G3.P4:** Utilize effective long-term budgeting tools to prepare for the costs of improvements to the utility systems

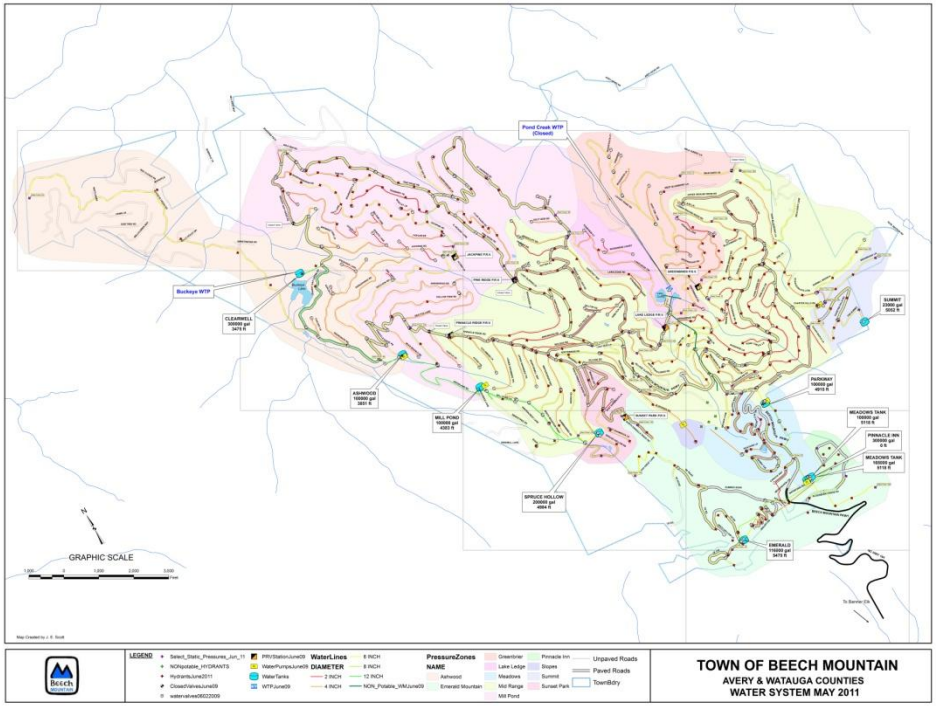
## WS: Discussion and Conclusion

# Background

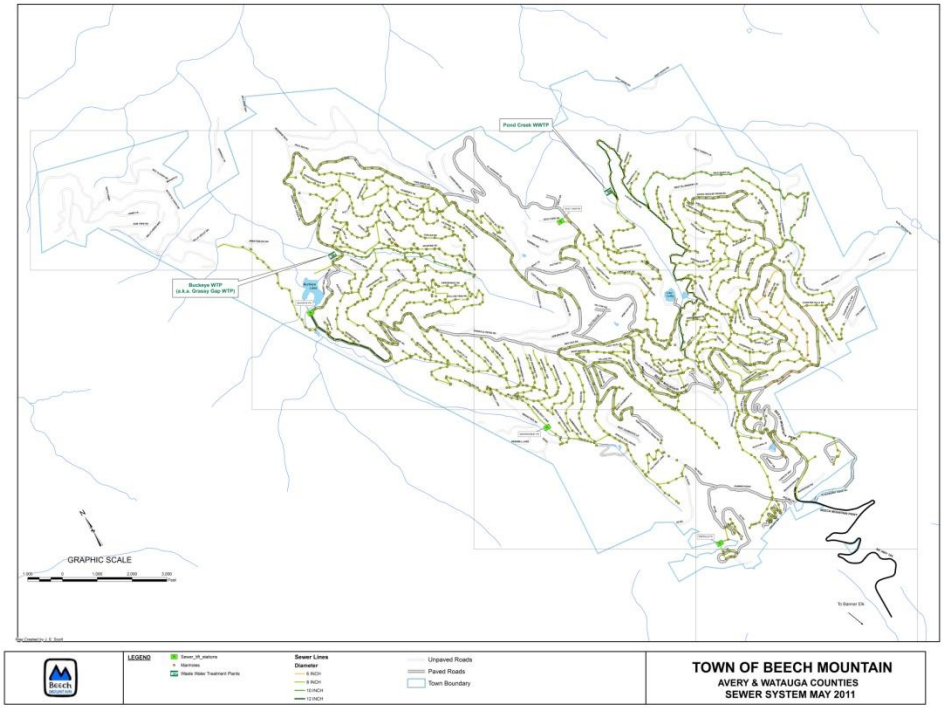
It has been said that water will be the oil of the next century. Like oil, the availability of clean, potable water is finite, and our growing population will stretch the available sources to their maximum capacity. However, unlike oil, water is an essential, indispensable element of human existence for which we cannot find a substitute. It is no exaggeration to say that without a functional water and sewer system, the Town of Beech Mountain would cease to exist. Our utilities systems, so easily taken for granted, are what have made the idea of a thriving town atop one of North Carolina's highest mountains a reality as opposed to an impossible dream.

The modernization and improvement of our water system is therefore clearly one of the Town's highest priorities for the future, and is a fundamental building block without which no other element of this plan has meaning. However, the engineering analysis and calculations required to recommend specific actions necessary and procedures to follow is beyond the scope of this plan. This work has been performed in the existing Beech Mountain Water and Sewer Study prepared by Rothrock Engineering in 2011. The purpose of this section of the plan, therefore, is not to supersede or supplant any of that analysis, but rather to incorporate that study's goals and findings into a more general document, comprehensible by the layperson. It is also to look at the water and sewer system and the specific projects recommended by the engineering study from a planning perspective— to look at the big picture rather than the details.

# Beech Mountain Water and Sewer Systems




Water System




Sewer System

*See Reference E for larger maps.*

## System Statistics

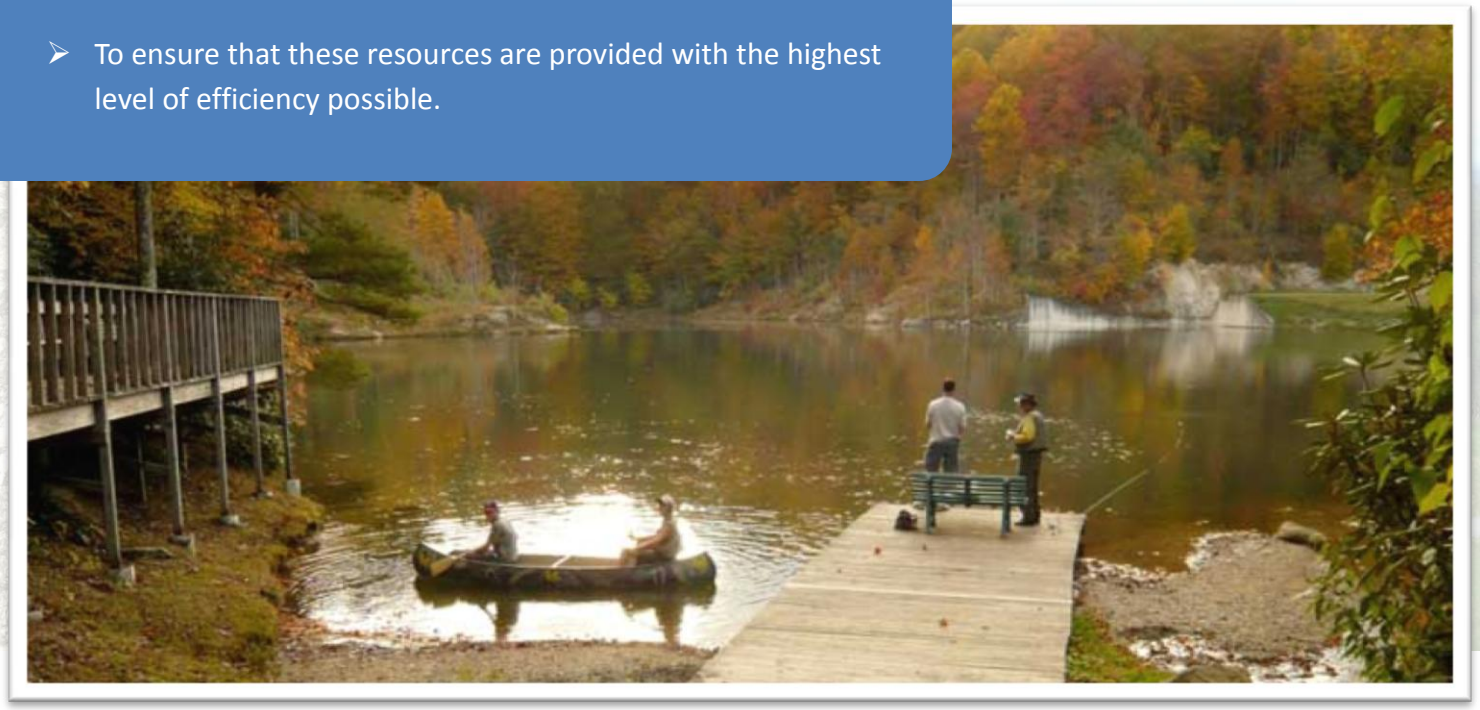
- *68.5 MILES OF WATER LINE/ 55.16 MILES OF SEWER LINE*
- *333 HYDRANTS*
- *9 WATER TANKS*
- *ESTIMATED 500+ VALVES*
- *APPROX. 1700 MANHOLES*
- *6 MAJOR WATER PUMP STATIONS/ 4 SEWER LIFT STATIONS*

# Water and Sewer: Goals, Objectives

## & Recommended Strategies and Policies

The Town's goals in the area of providing for these basic necessities are simple and straightforward:

- To provide Capacity for water and sewer that will be adequate for our Town's future,
- To ensure that the quality of these resources is high, and
- To ensure that these resources are provided with the highest level of efficiency possible.





## Goal WS1: Adequate Water and Sewer Capacity for our Town's Future

Buckeye Lake Reservoir has three levels of water intakes, at 6 ½ feet , 13 ½ feet, and 23 ½ feet below full pond. During a moderate drought in the Summer of 2010, water level at its lowest was a mere 18" above the bottom intake. This amounted to a water supply reserve of less than 20 days at the current rates of withdrawal. This experience made obvious the peril that a similar or worse drought could impose, especially when considered in light of potential increases in demand in coming years.

It is clear that action is needed to ensure that both our water and sewer systems have the capacity to meet the demands that future growth will place upon them.

### Strategy WS.G1.S1: Pursue supplemental sources of raw water

As the recent droughts illustrated, Buckeye Lake in itself is an insufficient water source for the town now, much less thirty years into the future. As recommended by the Rothrock water and sewer study, the Town needs to move forward with plans for securing a secondary raw water source for use in emergencies and to supplement Buckeye Lake.

## Policy WS.G1.P1: Promote conservation

Another way to ensure that our water and sewer capacities are adequate is to conserve and be more judicious in our use of resources.

- **Continue and strengthen our mandatory conservation measures during drought**
  - Better education regarding conservation practices, better dissemination of conservation requirements, and better enforcement of requirements are three ways to help the system be more effective.
- **Billing structure**
  - Ensure that the Town's billing structure remains organized in such a way that conservation is rewarded and overuse is penalized.
- **Other conservation methods**
  - The town could also take measures to encourage environmental conservation practices. We can promote and encourage the use of water conservation technology such as rain barrels, low flush volume toilets, and low volume shower heads. To encourage the use of these items during construction, the Town could leverage building permit fee reductions.

### Strategy WS.G1.S2: Replace undersized waterlines

The adequacy of water issue can also be approached from a fire fighting and public safety context. The town has several areas where the primary water lines are 2 inches in diameter. Modern practices no longer use 2 inch water pipe for utility applications because they generally do not provide ideal flow rates for fire fighting.

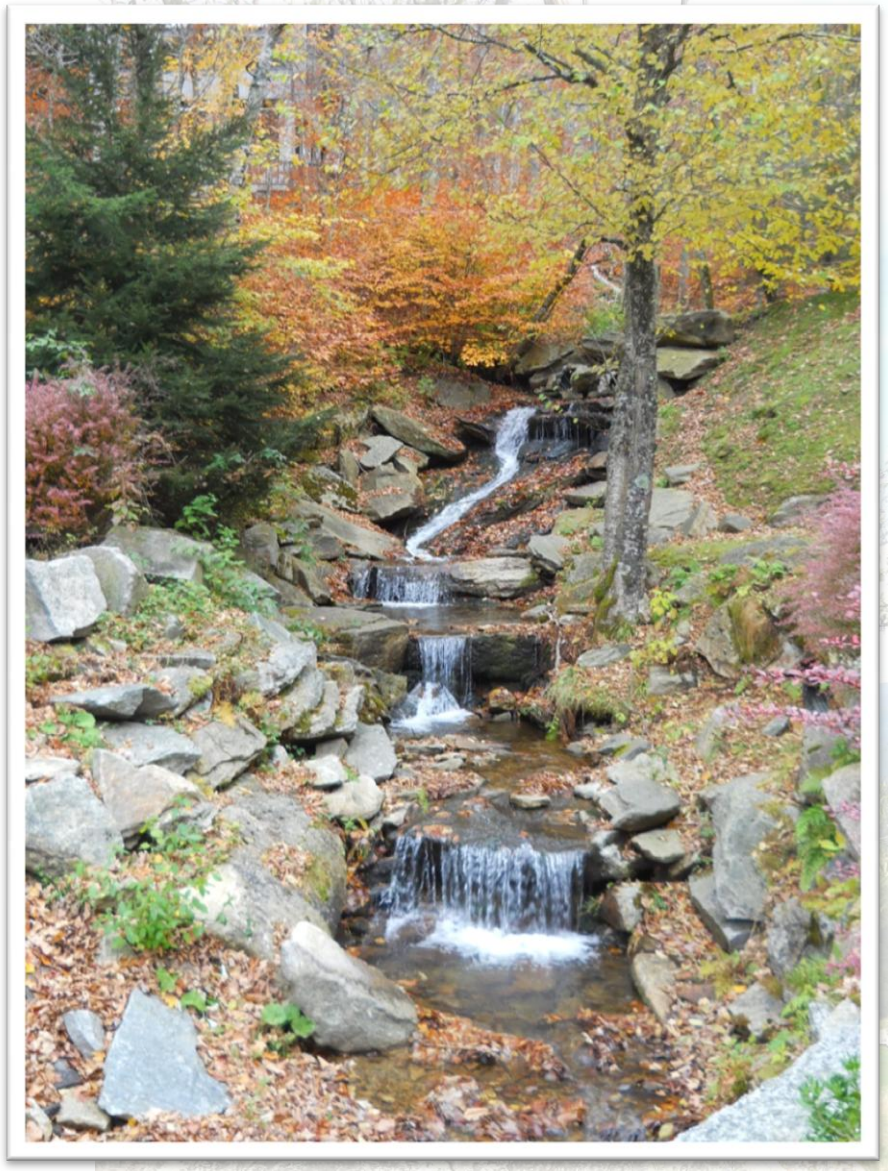
As the town pursues strategies of replacing its water lines these lines should receive weighted priority.

### Strategy WS.G1.S3: Expand Capacity of Water and Sewer Treatment Plants

Finally, expanding the capacity of our water and sewer treatment facilities will be a major step towards ensuring our services are adequate to meet needs.

A June 2009 study predicted that the water plant's demand would exceed capacity in 2012. While that has not yet occurred, it is still clear that additional capacity must be developed. The 2011 Rothrock study offered three alternatives for developing water plant capacity that included two methods for refitting the existing plant and building an entire new plant. Regardless of which alternative the Town chooses, it is clear that they must move ahead with plans and preparations to increase plant capacity in some manner.

Likewise, the Grassy Gap Waste Water Treatment Plant will exceed its useful life expectancy in 2024 and when replaced should be sized to meet future demand.



## Goal WS.G2: Superior Water Quality

It is the goal of the town to provide water that is as pristine as our mountain surroundings.

### Policy WS.G2.P1: Protect the Town's watersheds and watercourses

One of the best ways to improve the town's water quality is to protect and improve the quality of the water before it even enters the system. This method requires the least amount of construction and infrastructure costs and also benefits wildlife and the environment.

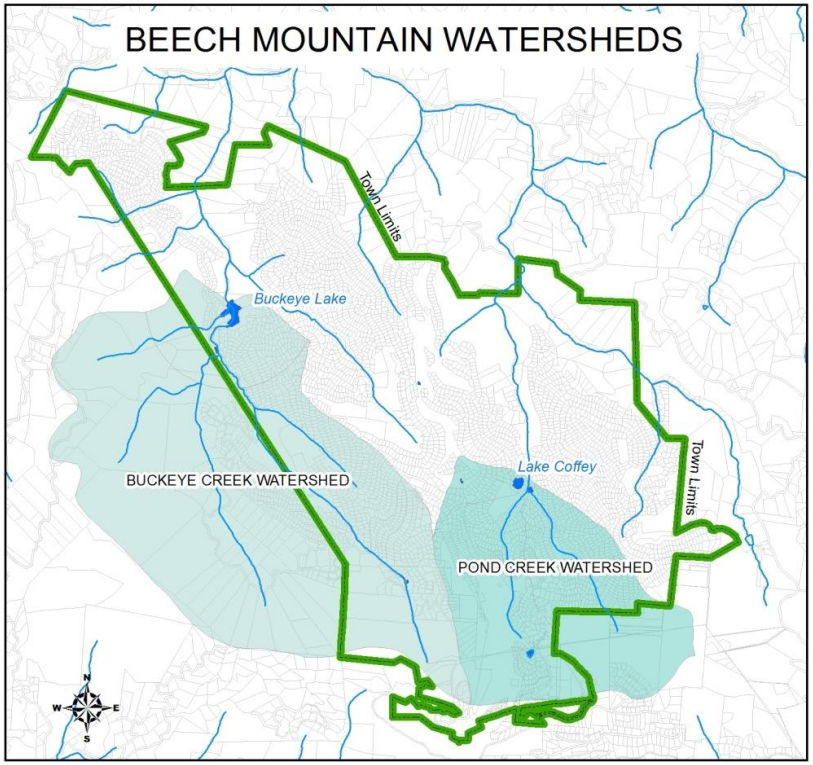
One method of protecting our streams and lakes is through enforcement of the town's watershed protection program as mandated by the North Carolina Department of Environment and Natural Resources. Under this program, there are various watershed classifications within the Town, and sets of rules apply to each based upon the proximity to the reservoir.

Within the Watershed Overlay Districts, land use is intended to remain undeveloped. Single Family uses are intended to be limited to one per acre (in the WS-II districts) and one per two acres (in the WS-II C district). All other uses are to be limited to a maximum of 6%- 12% built upon area.

Although at first glance this program seems highly restrictive, there is one large exception that makes it have relatively low impact within Beech Mountain's town limits. This exception is that platted lots existing at the time of the enactment of the watershed laws (1993) are exempt from the regulations if used for single family purposes. Almost all of the area within the Town of Beech Mountain that lies in a

watershed district was divided into platted lots prior to 1993 and is zoned for single family usage. However, a large percentage of the watersheds lie outside the town's jurisdiction, and these areas contain the largest amount developable land to which the Watershed Act's regulations would apply. Although these areas are not within the town's regulatory purview, the Town should be vigilant to ensure that standards are upheld in these outlying areas that directly affect the Town's water source.

Another benefit of the watershed rules to the town is that they also grant the town the more general power to prohibit any activities, situations, or structures that pose a threat to water quality, such as inadequate on-site sewage systems or improper disposal of garbage or junk.




The town also enforces state laws regarding setbacks and buffers from streams. Currently our ordinances specify that, "no new development activities may occur within 30' of a perennial watercourse indicated on the most recent versions of USGS 1:24,000 (7.5 minute) scale topographic maps or as determined by Town of Beech Mountain studies." There are actually few "perennial" watercourses within the town, because at our high elevation we are at the source waters for streams, and our watercourses tend to have flows that are often seasonal or intermittent. Beech Mountain should, as the ordinance stipulates, undertake our own studies to determine more accurately which streams actually do make a large influence on our water quality and need to be protected.

A final way of protecting our water sources is to identify areas of significant erosion or other pollution and to undertake streambank or shoreline stabilization and restoration. The town should conduct studies to determine if there are any areas here that would benefit from these processes.

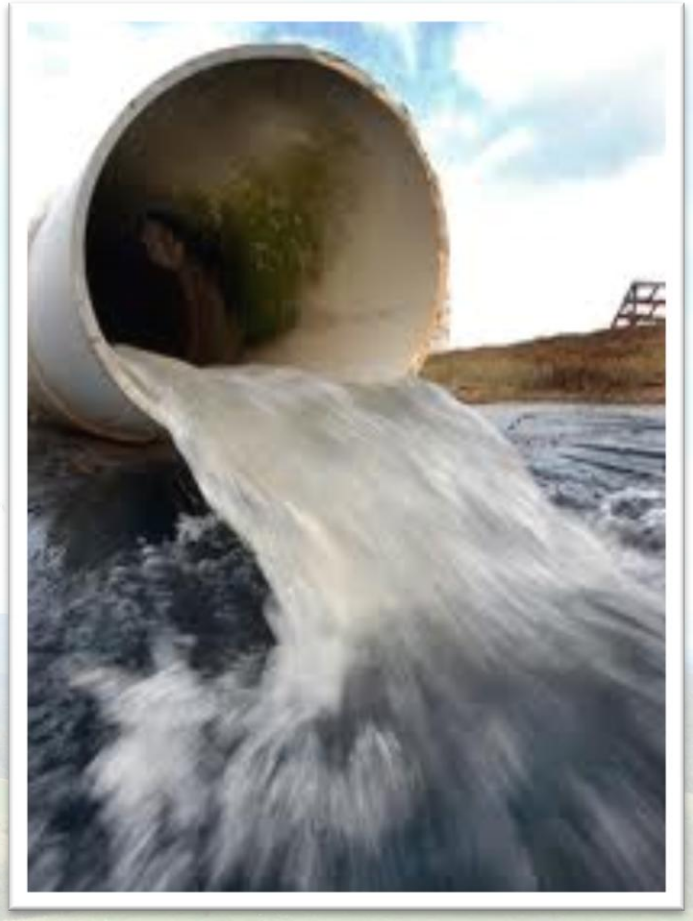
### Policy WS.G2.P2: Where feasible, the Town should utilize Best Management Practices (BMP's) to better manage Stormwater

One of the most significant sources of pollution in water sources comes directly from the stormwater that washes into them from our streets, parking lots, and other impervious surfaces.

In 2007 the town received a Clean Water Management Trust Fund grant to perform a stormwater inventory and basin study for the town. The study did not extend to the entire town but was confined to a specific identified target area with known stormwater issues.

Products of the study included a GIS database of stormwater data and recommendations to retrofit several sites with Best Management Practices. The study recognized that in improved stormwater management there was potential to significantly enhance the water quality of our streams.

It is recommended that future work expand the scope of this study to include more of the Town. It is also recommended that the town seek sources of funding to implement some of the study's other recommendations, including upsizing several conveyances and culverts, and possibly constructing a stormwater wetland.



### Strategy WS.G2.S1: Update and modernize the Water Treatment Plant

The Buckeye Water Treatment Plant is in need of replacement. In addition to the adequacy to handle projected demand as mentioned above, it also is facing problems with age and deterioration. It went on line in 1986—25 years ago. The expected useful life of "package" water treatment plants of this type is generally 20-25 years. The Rothrock study identified several areas of deterioration that were bordering on becoming emergency issues (later investigation proved that the problems were not as severe as they could have been). The age and deterioration issues with the plant make it difficult to treat water as well as possible. When the plant is replaced, the use of newer technology and better operating equipment will help in ensuring a high level of water quality.

### Strategy WS.G2.P2: Increase circulation of water in the system

Potentially the greatest obstacle to the quality of water that has already been treated and is in our system is stagnation. Beech Mountain faces special problems with stagnation because of the seasonal nature of our population and the expansive size and spread-out nature of our system. The Rothrock study investigated this issue and found the average water ages in our various water tanks in the chart to the right.

Several approaches have been proposed to solve this problem:

- The town is locating motorized devices into our water tanks to circulate the water within them. The first of these has already been installed and is an important step towards water quality.

- Look for opportunities to connect or reconfigure water lines to encourage circulation rather than stagnation. Water systems that "loop" and connect are better for circulation than water systems in a tree-like layout that have many dead ends. Beech Mountain's system does have many dead ends that could be addressed by adding sections of water line to make connections.

## Water Quality

### Problems With Water Age

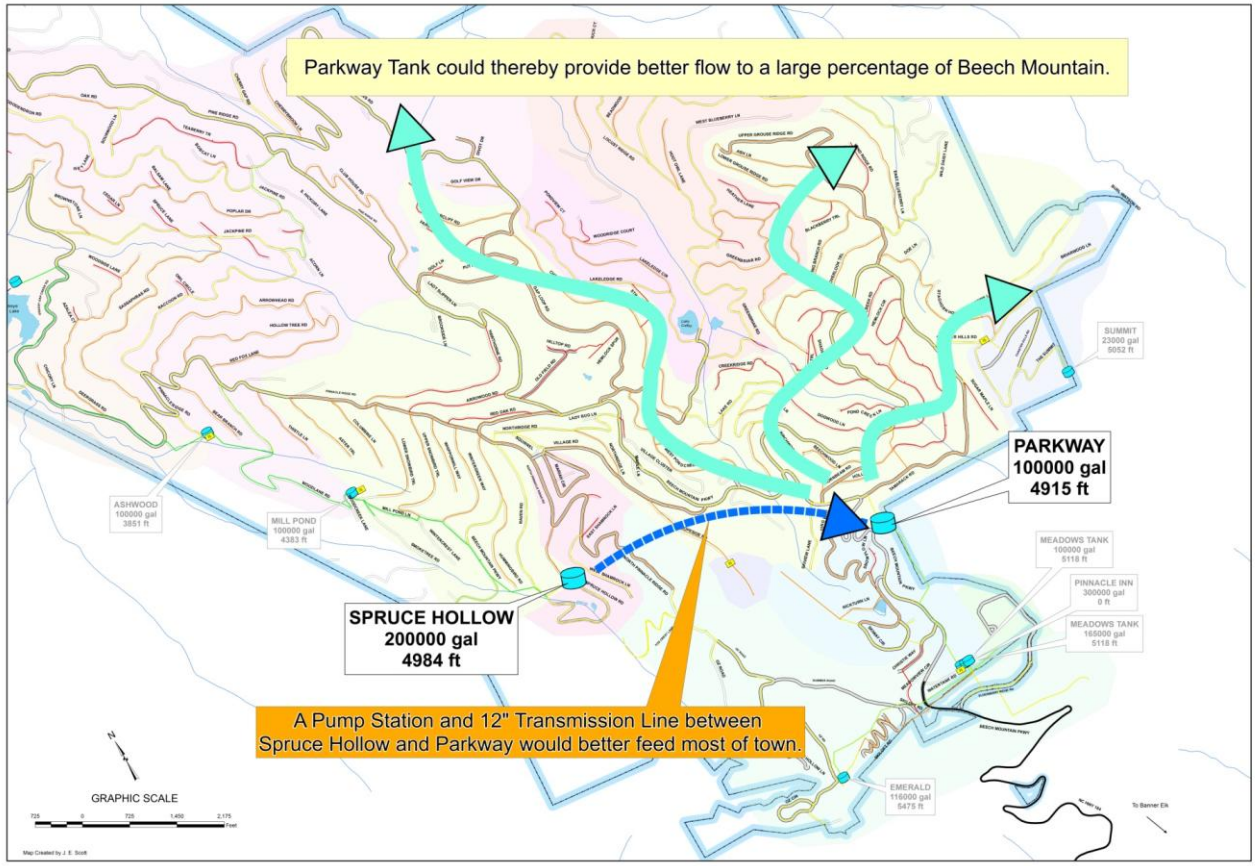
| Location | Days Water Is In Tank |
|---|---|
| Pinnacle Inn | 32.6 |
| The Summit | 17.8 |
| Emerald Mountain | 17.1 |
| The Meadows II | 7.9 |
| The Meadows I | 7.1 |
| Parkway | <2 |
| Spruce Hollow | <2 |
| Mill Pond | <2 |
| Ashwood | <2 |

- The Rothrock study identified the need for a large diameter connection and pump station between the Spruce Hollow and Parkway water tanks to allow better cross-flow between various pressure zones- thereby increasing circulation system-wide. (see diagram below).

- The Rothrock study also recommended replacement and upgrades at several of our older booster pump locations in order to better pump water through the system.

**Strategy WS.G2.S3: Systematically and incrementally work toward the replacement of the town's entire water line and sewer line infrastructure.**

It is difficult to get clean water out of a rusty, dirty old pipe. Our aging network of water and sewer lines bring problems with efficiency and quality as well as the issues with water leakage and flow rate mentioned above. It should be a long term goal of the town to work toward the eventual replacement of all of the water and sewer pipes in our system. This far reaching goal should be approached piece by piece, little by little, in a systematic fashion wherein the situations identified as worst are replaced first. The Rothrock study laid out the steps to take in this regard.




**Proposed Pump Station and 12" Transmission Line from Spruce Hollow to Parkway**

## Goal WS.G3: Efficiency in the Delivery of Services

The Town not only needs to provide utility services of adequate quantity and high quality, but it needs to do so in a manner that is economically efficient.

### Strategy WS.G3.P1: Reduce amount of Water Unaccounted For

The Rothrock Water and Sewer Study revealed a staggering amount of water unaccounted for in the Beech Mountain Utilities System. In 2010, the Town treated 119,663,000 gallons of water, but only billed for 39,631,000 gallons. That means roughly 67% of the water that was pumped into our system was unaccounted for. Fixing this problem may be one of the most important steps towards ensuring our water supply system is adequate for the future, but it is also one of the most difficult problems to fix.

The study found that the unaccounted-for water is mostly the result of *systematic* leaks that exist system wide. In other words, this is not a matter of simply locating and fixing a few major leaks, but rather it is the result of the accumulation of hundreds or even thousands of small leaks throughout the entire system. The water system is becoming quite aged- being originally constructed in the 1960s- and it is estimated that at least some leakage is present at nearly every tap and coupling.

It was also estimated that one of the largest sources of this problem was not actually water loss at all, but rather inaccurate or non-functioning water meters. The town has already taken a major step towards correcting this by undertaking a major project of replacing every meter in the town with new "radio read" meters in 2011. Early results have shown a significantly improved accountability for water use.

### Strategy WS.G3.P2: Reduce amount of Inflow and Infiltration

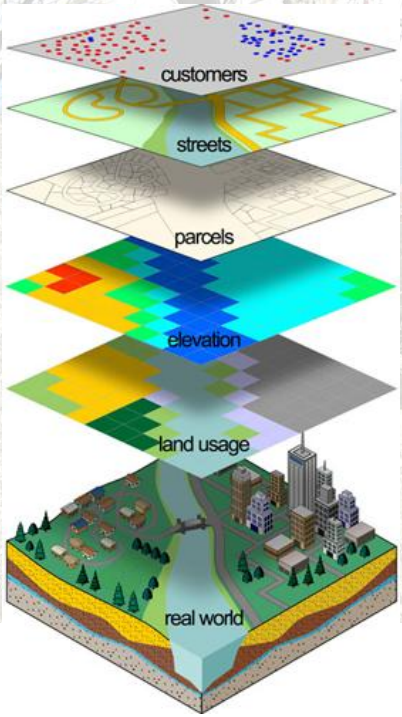
Mirroring the problem of unaccounted- for water, *inflow and infiltration* are major obstacles to our sewer system being able to handle and process the amount of sewage it receives. Inflow and infiltration is the problem of water seepage into the sewer system, increasing the volume of water that must be treated at the town's plants.

Many manholes inspected during the water and sewer study showed severe disrepair and age, while it was evident that many others were of substandard construction in the first place. Many manholes had gaping holes in their sidewalls or were lacking any semblance of a seal at the connection between the manhole and the pipe entrance.

The town needs to undertake plans to incrementally replace the sewer lines and manholes system-wide, beginning with those in the worst condition or in the areas with the most severe problems.

### Strategy WS.G3.P3: Capitalize upon GIS technology to understand our infrastructure

Geographic Information Systems (GIS) are a technology that allows for the mapping and analysis of Geographic Information. In a GIS, attributes about data can be stored in databases that accompany the spatially mapped feature. This allows GIS to be used as a functional and complete record keeping system for system infrastructure. But much more than just a computer map or a digital record keeping system, GIS also enables that data to be robustly analyzed by considering its spatial characteristics and other attributes. GIS can answer questions like "Where are the oldest sections of pipe?", "What structures are currently located within 50' of Buckeye Creek?" or "What manholes are located in the TR-280 Sewer Basin?". It also allows data of various themes to be layered upon each other to make more complicated analysis.




The benefits of GIS are tremendous. It enables easy access to information on the town's water and sewer assets, that in turn allow us to make better decisions regarding the maintenance and improvement of the system. It enables efficient delivery of utility services by helping the town determine where to focus its efforts.

Beech Mountain originally had a GIS system developed by a consultant engineering firm in 2001, but without a staff member who knew how to operate and update the GIS, and without anyone who was familiar with how to use its data, the system was not kept up to date. In 2011, the Town took a major step towards keeping its system accurate by purchasing a sub-meter Global Positioning System (GPS) to utilize for collecting data.

Going forward, Beech Mountain needs to ensure that it realizes the potential of its GIS. The town needs to ensure that qualified personnel are retained that understand how to use the technology and that can explain it to others. Furthermore, the data in the GIS needs to be better disseminated among various entities who need to know about our utilities systems, such as the staff of various departments and the towns governing decision makers.

### Policy WS.G3.P4: Utilize effective long-term budgeting tools to prepare for the costs of necessary improvements to the utility system

To undertake the major infrastructure improvements that our system needs will be expensive. The town will need to prepare and stick to multiple year financing tools such as Capital Improvement Plans to accurately forecast and prepare for future expenditures. The cost of improvements that are years ahead should be anticipated now, and money should be set aside incrementally to pay for them. That way the extensive capital costs can be realized, and the town can minimize the necessity to borrow money.

## Discussion and Conclusion

It will be no small matter to ensure that our water and sewer infrastructure is sufficient for our town's future, but the undertaking is essential to the success of the town. The town has received an excellent guideline to the improvement of its system in the water and sewer study conducted by Rothrock Engineering. The town should make every effort to follow the recommendations of the study, especially those deemed of critical importance. The work required is extensive, but the first major steps have already been taken.

## Beech Mountain Incremental Water and Sewer Capacity-Related CIP FY20 through FY29

| Item | | FY20 | FY21 | FY22 | FY23 | FY24 | FY25 | FY26 | FY27 | FY28 | FY29 | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Water | | | | | | | | | | | |
| WI 1 | Watauga River Intake | | | | | | $ 19,104,837 | | | | | $ 19,104,837 |
| | | | | | | | | | | | | $ - |
| | Total Water | $ - | $ - | $ - | $ - | $ - | $ 19,104,837 | $ - | $ - | $ - | | $ 19,104,837 |
| | Sewer | | | | | | | | | | | |
| SI 1 | Grassy Gap WWTP Replacement | | | | | | | $ 1,212,840 | | | | $ 1,212,840 |
| | Total Sewer | $ - | $ - | $ - | $ - | $ - | $ - | $ 1,212,840 | $ - | $ - | $ - | $ 1,212,840 |
| | **Total Water / Sewer Fund Capacity Related Assets** | **$ -** | **$ -** | **$ -** | **$ -** | **$ -** | **$ 19,104,837** | **$ 1,212,840** | **$ -** | **$ -** | **$ -** | **$ 20,317,677** |

Source: Water and Sewer Capital Improvements Plan, July 2019

# Historical Cost Indexes

The table below lists both the RSMeans® historical cost index based on Jan. 1, 1993 = 100 as well as the computed value of an index based on Jan. 1, 2019 costs. Since the Jan. 1, 2019 figure is estimated, space is left to write in the actual index figures as they become available through the quarterly *RSMeans Construction Cost Indexes*.

To compute the actual index based on Jan. 1, 2019 = 100, divide the historical cost index for a particular year by the actual Jan. 1, 2019 construction cost index. Space has been left to advance the index figures as the year progresses.

| Year | Historical Cost Index Jan. 1, 1993 = 100 | | Current Index Based on Jan. 1, 2019 = 100 | | Year | Historical Cost Index Jan. 1, 1993 = 100 | Current Index Based on Jan. 1, 2019 = 100 | | Year | Historical Cost Index Jan. 1, 1993 = 100 | Current Index Based on Jan. 1, 2019 = 100 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Est. | Actual | Est. | Actual | | Actual | Est. | Actual | | Actual | Est. | Actual |
| Oct 2019* | | | | | July 2004 | 143.7 | 63.2 | | July 1986 | 84.2 | 37.1 | |
| July 2019* | | | | | 2003 | 132.0 | 58.1 | | 1985 | 82.6 | 36.3 | |
| April 2019* | | | | | 2002 | 128.7 | 56.6 | | 1984 | 82.0 | 36.1 | |
| Jan 2019* | 227.3 | | 100.0 | 100.0 | 2001 | 125.1 | 55.0 | | 1983 | 80.2 | 35.3 | |
| July 2018 | | 222.9 | 98.1 | | 2000 | 120.9 | 53.2 | | 1982 | 76.1 | 33.5 | |
| 2017 | | 213.6 | 94.0 | | 1999 | 117.6 | 51.7 | | 1981 | 70.0 | 30.8 | |
| 2016 | | 207.3 | 91.2 | | 1998 | 115.1 | 50.6 | | 1980 | 62.9 | 27.7 | |
| 2015 | | 206.2 | 90.7 | | 1997 | 112.8 | 49.6 | | 1979 | 57.8 | 25.4 | |
| 2014 | | 204.9 | 90.1 | | 1996 | 110.2 | 48.5 | | 1978 | 53.5 | 23.5 | |
| 2013 | | 201.2 | 88.5 | | 1995 | 107.6 | 47.3 | | 1977 | 49.5 | 21.8 | |
| 2012 | | 194.6 | 85.6 | | 1994 | 104.4 | 45.9 | | 1976 | 46.9 | 20.6 | |
| 2011 | | 191.2 | 84.1 | | 1993 | 101.7 | 44.7 | | 1975 | 44.8 | 19.7 | |
| 2010 | | 183.5 | 80.7 | | 1992 | 99.4 | 43.7 | | 1974 | 41.4 | 18.2 | |
| 2009 | | 180.1 | 79.2 | | 1991 | 96.8 | 42.6 | | 1973 | 37.7 | 16.6 | |
| 2008 | | 180.4 | 79.4 | | 1990 | 94.3 | 41.5 | | 1972 | 34.8 | 15.3 | |
| 2007 | | 169.4 | 74.5 | | 1989 | 92.1 | 40.5 | | 1971 | 32.1 | 14.1 | |
| 2006 | | 162.0 | 71.3 | | 1988 | 89.9 | 39.5 | | 1970 | 28.7 | 12.6 | |
| 2005 | | 151.6 | 66.7 | | 1987 | 87.7 | 38.6 | | 1969 | 26.9 | 11.8 | |

## Adjustments to Costs

The "Historical Cost Index" can be used to convert national average building costs at a particular time to the approximate building costs for some other time.

**Time Adjustment Using the Historical Cost Indexes:**

$$\frac{\text{Index for Year A}}{\text{Index for Year B}} \times \text{Cost in Year B} = \text{Cost in Year A}$$

## Example:

Estimate and compare construction costs for different years in the same city.

To estimate the national average construction cost of a building in 1970, knowing that it cost $900,000 in 2019:

INDEX in 1970 = 28.7

INDEX in 2019 = 227.3

$$\frac{\text{INDEX 1970}}{\text{INDEX 2019}} \times \text{Cost 2019} = \text{Cost 1970}$$

$$\frac{28.7}{227.3} \times \$900{,}000 = .126 \times \$900{,}000 = \$113{,}400$$

The construction cost of the building in 1970 was $113,400.

**Note:** The city cost indexes for Canada can be used to convert U.S. national averages to local costs in Canadian dollars.

## Example:

To estimate and compare the cost of a building in Toronto, ON in 2019 with the known cost of $600,000 (US$) in New York, NY in 2019:

INDEX Toronto = 110.1

INDEX New York = 132.1

$$\frac{\text{INDEX Toronto}}{\text{INDEX New York}} \times \text{Cost New York} = \text{Cost Toronto}$$

$$\frac{110.1}{132.1} \times \$600{,}000 = .834 \times \$600{,}000 = \$500{,}076$$

The construction cost of the building in Toronto is $500,076 (CN$).

*Historical Cost Index updates and other resources are provided on the following website:
**http://info.thegordiangroup.com/RSMeans.html**