PRELIMINARY ENGINEERING REPORT
LAKES – BEDFORD – FOREST
WATER SUPPLY EVALUATION
BEDFORD COUNTY, VIRGINIA

AUGUST 16, 2010
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Prepared for:

Bedford County Public Service Authority

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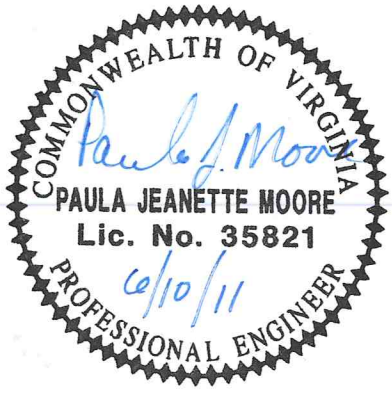

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EXECUTIVE SUMMARY

Background

Countywide water service in Bedford County has been considered for many years. Several countywide water distribution and treatment projects were first documented at a planning level in the 1994 *Comprehensive Water and Wastewater Study* for Bedford County Public Service Authority (BCPSA) by Anderson & Associates, Inc. In 1998 construction began on the BCPSA's first surface water treatment plant serving the High Point subdivision using Smith Mountain Lake (SML) as the source. Subsequent updates to the countywide report, up to and including the most recent *Water and Sewer Master Plan* dated February 12, 2009 by Draper Aden Associates, continue the countywide water service idea. In the *Bedford County 2025 Comprehensive Plan* adopted June 25, 2007, it states, "[the High Point WTP] is expected to become a major source of water for County residents…"

With the successful development and continual expansion of the High Point water treatment plant (WTP) and SML intake, countywide water service is closer than ever to becoming a reality. The High Point WTP now serves an expanded service area including much of the Lakes area, Moneta, and parts of Franklin County. It is believed that this source could be utilized as the raw water for an expanded water treatment plant to serve an expanded service area.

This report takes countywide water service planning to the next step by looking at the technical and financial feasibility of the necessary water system upgrades for countywide service.

Alternatives Evaluated

There are two major scenarios evaluated in this report, providing water service to Forest, identified as Scenario A, and providing water service to Bedford City, identified as Scenario B. Each scenario is developed with an independent solution, although there are many similarities between them. A third minor scenario, water service provided by Bedford City, Scenario C, is discussed briefly. Alternatives were developed and evaluated for each of the major scenarios. They are described below. Maps are included in Appendix A showing each of these alternatives.

Scenario A – Water Service to Forest

- Alternative A1 – Continue To Purchase water from **Lynchburg** for the **Forest** Central Water System
  - This is the "do nothing" alternative, which represents existing conditions; continuing the current practice of purchasing water from Lynchburg to service the Forest system.
  - This alternative presents certain problems for the BCPSA including budgeting and planning difficulties due to the once-a-year "settling up" process, demand charges, and out-of-town factors the BCPSA must pay.
  - This report evaluates the costs of purchasing water from Lynchburg and compares these costs to alternative A2.
- Alternative A2 – Provide water to the **Forest** Central Water System from the **Lakes** Central Water System
  - This alternative evaluates treatment and distribution options for a countywide transmission system, delivering water from the Lakes system to the Forest system. A treatment capacity of 6 MGD is needed to satisfy the future

countywide water demand. The primary transmission routes are Route 122 and Route 460.

- Cost estimates are included for each proposed project and projects are phased in over time as dictated by growth. Costs are compared to alternative A1.

Scenario B – Water Service to Bedford City

Over the past several years, discussions between the City and BCPSA have taken place regarding obtaining water from the BCPSA through either a connection to Forest or a connection to the Lakes. The BCPSA is hopeful that this report will assist with developing a working relationship with the City of Bedford.

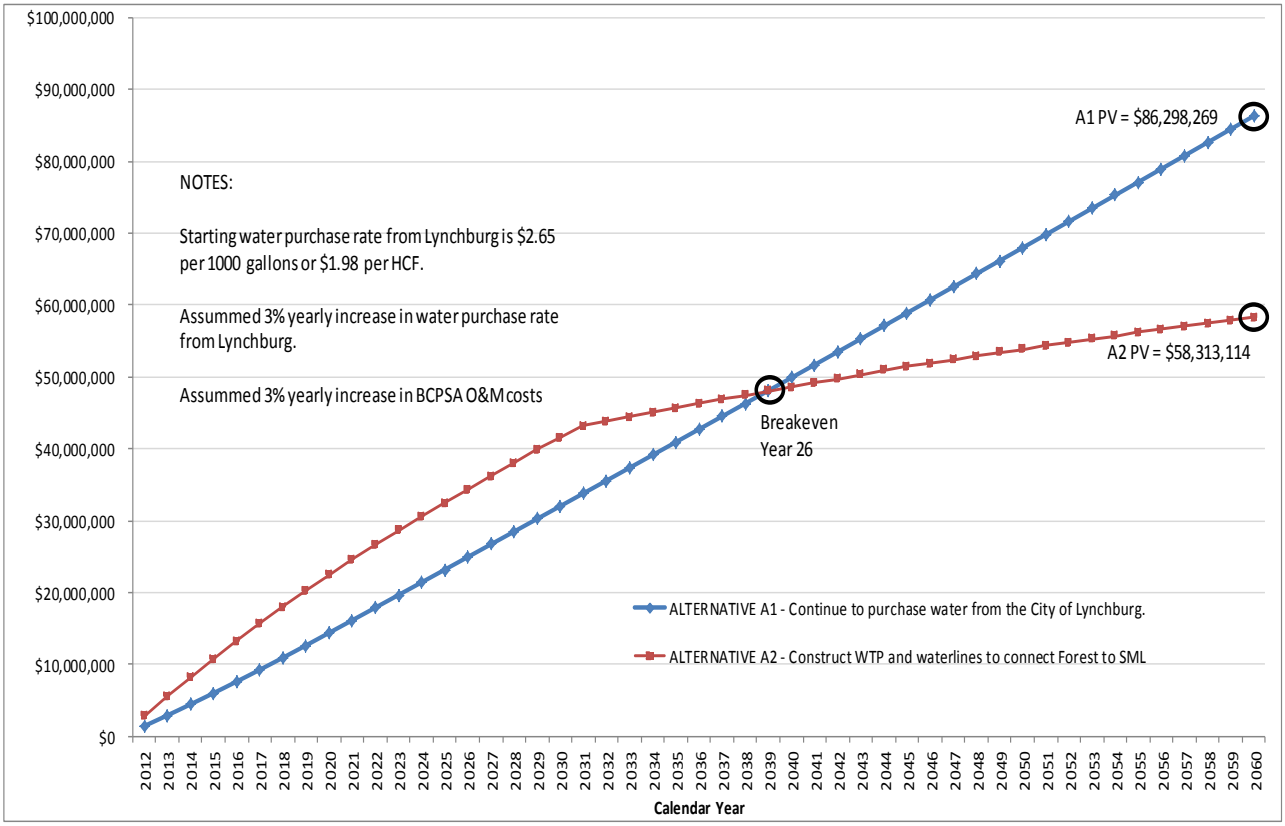
- Alternative B1 – Bedford City continues to supply and maintain its own system
  - This is the "do nothing" alternative, which represents existing conditions; the City would continue to operate and maintain its own independent water system.
  - The City's primary water system concerns are with their source and reservoir. In recent and past droughts, water levels in the reservoir have dropped to critical levels. In addition, upkeep of the reservoir is proving to be very costly to the City with a multi-million dollar dam stabilization project currently being planned.
- Alternative B2 – Provide water to the **City of Bedford** Water System from the **Lakes** Central Water System
  - This alternative evaluates treatment and distribution options to bring water from the Lake to the City of Bedford. A treatment capacity of 6 MGD is recommended and the transmission route is Route 122.
  - Cost estimates are included for each proposed project and are compared to alternative B3.
- Alternative B3 – Purchase water from **Lynchburg**, and provide water to the **City of Bedford** Water System through the Forest Central Water System
  - This alternative requires changes to the water purchase agreement with the City of Lynchburg and evaluates a transmission system along Route 460 to bring water to the City of Bedford.
  - Cost estimates are included for each proposed project as well as the cost of purchasing water from Lynchburg. These costs are compared to alternative B2.

Financial Summary

A present value (PV) cost analysis was prepared for each cost estimate, using the 48 year study period, so that a fair comparison could be made. The PV costs were then analyzed, to determine which alternative would be the most cost effective long term solution. Once that determination was made, a graph of PV cost over time was prepared to determine how many years it would take to make the long term alternative cost effective. Those results are as follows:

Scenario A – Water Service to Forest

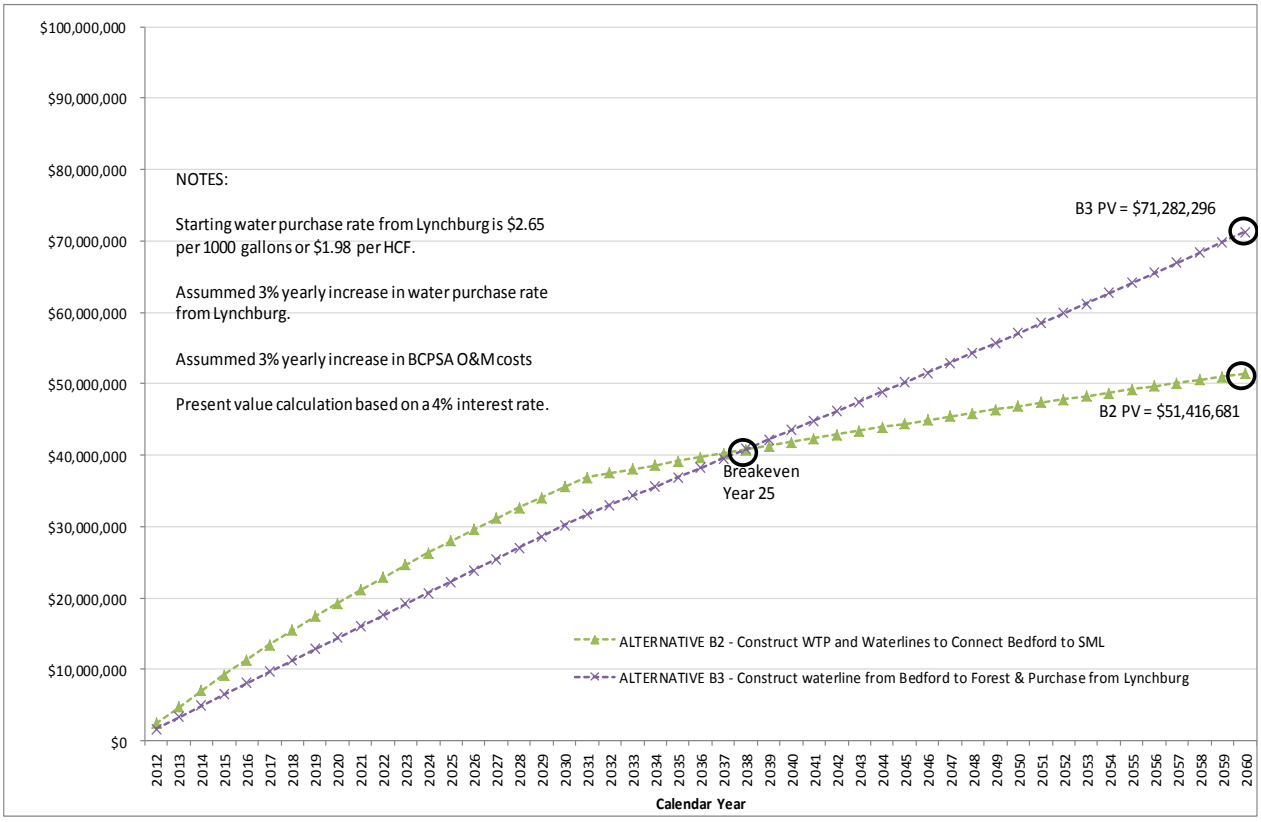
- Alternative A1 – Purchase From Lynchburg: Present Value Cost: $86,298,269
- Alternative A2 – Supply From Lakes: Present Value Cost: $58,313,114



Using the 48 year study period and a PV cost, it is easy to see which alternative is less expensive. The graph also provides valuable information, demonstrating that after a 26 year investment, alternative A2 begins to provide a substantial long term savings to the BCPSA.

Scenario B – Water Service to Bedford

- Alternative B1 – Supply From Bedford: Costs Unknown (City of Bedford)
- Alternative B2 – Supply From Lakes: Present Value Cost: $51,416,681
- Alternative B3 – Supply From Lynchburg: Present Value Cost: $71,282,296



Similarly for Scenario B, the 48 year PV costs are shown above and alternative B2 is significantly cheaper than alternative B3. The graph shows that year 24 is the breakeven year and after which time, alternative B2 provides substantial long term savings over alternative B3.

Between scenarios A and B, many of the same hydraulic constraints were found to occur between the Lakes and Bedford, and Forest and Bedford. Therefore, implementation of Alternative B2 or Alternative B3 inherently brings the system closer to the completion of Alternative A2 making it more cost effective to implement.

Recommendations

Implementing a regional water system within Bedford County and connecting to other regional systems will provide uncalculated value in the future. Safety and security of every water system connected to this new regional system will increase by having an alternate source in times of emergency. Hydraulics will improve over time even as demand increases, by connecting systems together and reducing the distance water has to travel to reach customers. In this way, water quality will also improve.

The report recommends that the BCPSA select Alternative A2 as the most cost effective long term solution to providing water service to the Forest Area. This involves constructing a 24 inch waterline along State Route 122 from the Lakes to the City of Bedford, and then constructing a 20 inch waterline along U.S. Route 460 from the City of Bedford to the Forest area. It also involves upgrading the existing High Point WTP to fully utilize the 1.0 Million Gallon per Day (MGD) capacity, and the construction of a new 5.0 MGD water treatment plant at SML. The intake permit and structure also need to be upgraded to meet capacity.

Construction and related costs for each project phase are shown in the table below.

Recommended Alternative A2 – Project Phases		**Total Project Cost**
WTP 1a	WTP 1.0 MGD Upgrade	$398,060
WTP 1b	WTP 5.0 MGD New	$10,867,285
Phase 1c	Rte 122 24” Transmission Main	$11,152,241
Phase 1d	Rte 460 20” Transmission Main	$7,403,296
Phase 2	Whitehouse Road Loop	$3,187,234
Phase 3	Route 122 Pump Station	$900,900
A2 Total	**Lakes to Forest**	**$33,909,016**

I. INTRODUCTION

A. Background

Countywide water service in Bedford County has been considered for many years. Several countywide water distribution and treatment projects were first documented at a planning level in the 1994 *Comprehensive Water and Wastewater Study* for Bedford County Public Service Authority (BCPSA) by Anderson & Associates, Inc. In 1998 construction began on the BCPSA's first surface water treatment plant serving the High Point subdivision using Smith Mountain Lake (SML) as the source. Subsequent updates to the countywide report, up to and including the most recent *Water and Sewer Master Plan* dated February 12, 2009 by Draper Aden Associates, continue the countywide water service idea. In the *Bedford County 2025 Comprehensive Plan* adopted June 25, 2007, it states, "[the High Point WTP] is expected to become a major source of water for County residents…" The recently drafted *Region 2000 Water Supply Plan* builds upon past reports and provides a guide to future water use planning. As stated in this Plan, "Most of the alternatives that were evaluated for the Plan have been studied in the past, at which time cost estimates were developed. The B&V [Black & Veatch] study of 2003 showed that the most economical division of service would be to have the existing Smith Mountain Lake Water Treatment Plant expanded to 10 MGD in anticipation of selling water to BCPSA customers, City of Bedford, Franklin County and possibly some users in City of Lynchburg or Western Virginia Water Authority." Included in previous regionalization planning documents is a connection to the City of Bedford for mutual benefit of shared water sources and distribution.

With the successful development and continual expansion of the High Point water treatment plant (WTP) and SML intake, countywide water service is closer than ever to becoming a reality. The High Point WTP now serves much of the Lakes area, Moneta, and parts of Franklin County. The WTP was recently upgraded to a capacity of 1 million gallons per day (MGD) and the intake is now permitted for an average daily withdrawal of 2 MGD.

This report takes countywide water service planning to the next step by looking at the technical and financial feasibility of the necessary water system upgrades. Hydraulic capacity and water quality concerns of recommended transmission projects are evaluated, along with intake and treatment capacity upgrades. The financial feasibility of recommended projects is also included herein so that informed decisions may be made for countywide water service now and many years into the future. A planning period of 48 years is evaluated for the water transmission lines and a period of 20 years is considered for the water treatment plant with room for expansion.

B. Present situation

Currently, the BCPSA operates independent water systems in the Lakes area and in the Forest area of Bedford County. The City of Bedford operates an independent water system located centrally within Bedford County. The BCPSA and other private owners operate additional water systems within the County; however, these are not directly being discussed in this report.

The BCPSA currently operates the High Point WTP, which utilizes two Pall AP-4 membrane filter treatment systems. The advantage of membrane filtration is typically less labor and chemical treatment requirements than conventional surface water treatment technologies. The disadvantage is typically higher power costs for

pumping. This PER will only consider membrane filtration technology (pressure type modules) in the evaluation of treatment expansion and operation costs since this is the current treatment technology utilized by BCPSA. However, it is recommended that the BCPSA undertake a more detailed study to evaluate treatment technology options should they determine to move forward with expanding the system capacity.

The Lakes or SML water system withdrawals water from SML which is treated at the High Point WTP currently permitted for 0.77 MGD. Minor pump equipment upgrades will bring the WTP up to its full capacity of 1 MGD. The WTP currently produces an average of 0.26 MGD with the highest daily peak being seen on July 5, 2010 of 0.70 MGD.

By agreement dated October 18, 2002, Franklin County has rights to 400,000 GPD of the 1 MGD treatment capacity in the High Point WTP. Franklin County also has rights to 400,000 gallons of storage contained in the SML 1 MG elevated water storage tank. Also per the same agreement, Franklin County owns approximately 46% capacity in the 18 inch waterline along Route 655, from the tank to Route 122, and 22.9% of the capacity in the 12 inch waterline along Route 122, south to the Lake. As of May 15, 2009, the original agreement was transferred to the Western Virginia Water Authority for operation of Franklin County's water system with all of the terms remaining the same. The original agreement was good through October 31, 2014, but it was renewed on December 1, 2010. The new agreement is good through June 30, 2020.

The Forest water system purchases treated water from the City of Lynchburg. Currently there is no limit to the amount of water purchased in the contractual agreement between the BCPSA and the City of Lynchburg. Current average water usage in Forest is 1.50 MGD.

The City of Lynchburg owns and operates a water treatment plant and sells water to its own customers as well as the BCPSA, Amherst County, and Campbell County. The Water Purchase Contract is in effect from July 1, 2007 through June 30, 2022. Intent to renew or terminate must be provided by June 30, 2020.

The City of Bedford owns and operates a water treatment plant with a permitted capacity of 3.45 MGD. The system currently uses an average of 0.93 MGD.

There have been recent discussions between the County of Bedford and the City of Bedford about the City reverting to "town status". Included in these discussions were the potential merger of the City's water and sewer utilities with those of the BCPSA. However, being that these discussions are very preliminary at the time that this report is being prepared, this report does not evaluate any aspect of such a merger.

C. Analyze alternatives

This report considers the technical and financial factors associated with countywide water service. Three scenarios are detailed herein.

1. Water Service to Forest – Scenario A

   Two alternatives are evaluated for water service to Forest, identified in this report as Scenario A. The first alternative is an evaluation of continued water purchases from Lynchburg. The second alternative includes an evaluation of upgrading treatment capacity and transmitting water from the High Point WTP to the Lakes area and to the Forest area. Also stated in this second alternative is how much remaining capacity is available for the City of Bedford located midway between the Lakes and Forest areas.

2. Water Service to Bedford – Scenario B

   Three alternatives are evaluated for water service to Bedford, identified in this report as Scenario B. The first alternative is a brief evaluation of the City continuing to produce its own water. The second alternative evaluates the requirements of providing water to the City of Bedford from the Lakes area. Treatment capacity upgrades and transmission considerations are addressed similar to the Scenario A alternatives. The third alternative is providing water to the City of Bedford from the Forest area. This last alternative would involve purchasing additional water from the City of Lynchburg as the source and transmitting this water west to Bedford.

3. Water Service from Bedford – Scenario C

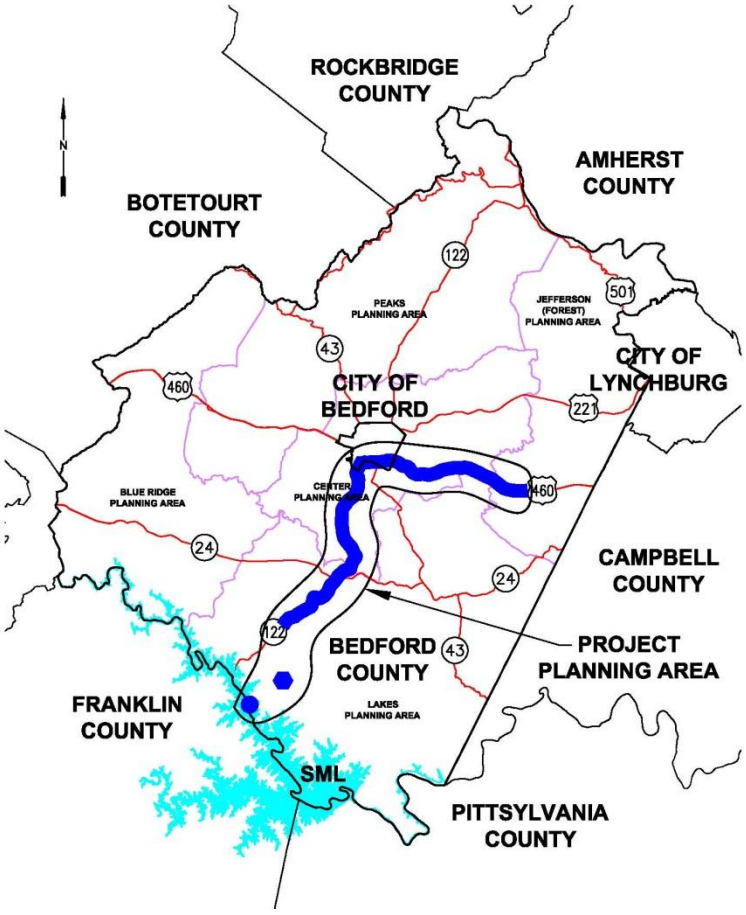
   The City of Bedford has excess capacity in their water system except during periods of drought. Providing service from the City of Bedford is discussed as it relates to the idea of a countywide regional water system.

II. PROJECT PLANNING AREA

A. Location

The projects being evaluated in this report are located within Bedford County, Virginia and would be operated and maintained by the Bedford County Public Service Authority (BCPSA). They span from the Lakes planning area in the southwestern portion of the County, to the southern boundary of the City of Bedford located in the Center planning area, and to the eastern planning area of the County called Jefferson, commonly referred to as Forest. The map shown below in Figure 1 shows these areas.

Figure 1 – Project Planning Area



The Lakes area borders Smith Mountain Lake, which is currently permitted as the drinking water source for the High Point Water Treatment Plant (WTP) and the Lakes regional water system operated by the BCPSA. This water system also currently serves a portion of Franklin County across the Lake.

The countywide project planning area includes the Lakes, Center, and Jefferson planning areas of Bedford County, and the City of Bedford. The Lakes and the City of Bedford are connected by Moneta Road, (State Route 122), which is a two lane primary highway. Bedford and Forest are connected by the East Lynchburg Salem Turnpike, (U.S. Route 460), the majority of which is a four lane divided highway.

The project planning area stops in the Forest area and connects to the existing New London tank that is part of the BCPSA's public water system. The Forest water system is currently supplied by the City of Lynchburg through water purchased and distributed by the BCPSA.

A map titled "Existing Systems" is shown as Figure 2 in Appendix A.

B. Environmental Resources Present

The proposed project alignment mainly follows existing road rights-of-way. In this way, the impact to many environmental resources can be avoided or minimized. However, there may be unavoidable impacts. Although a full Environmental Report (ER) is not being performed concurrently with this PER, letters of inquiry were sent to many environmental agencies in order to solicit input on what environmental resources may be present, avoidance measures, and recommended mitigation measures when impacts are unavoidable. Responses from all agencies solicited were not received within the timeframe of this report. However, the responses that were received are included, and as additional responses are received they will be kept on file for use when a full Environment Report may be performed.

The following agencies were solicited for input; DEQ, DGIF, DHR, DCR, USACE, USFWS, VDH, VDOT, VMRC. DMME was not solicited due their statement of no longer providing standard environmental reviews. If special conditions require input from DMME, a specific inquiry should be made in the future. Any responses received have been included in Appendix E of this report.

The following information may include that which was provided through the environmental inquiry described above, or it may be a result of specific research performed as a part of this report.

1. Farmland

   A Custom Soil Resource Report for Bedford City and Bedford County, Virginia was obtained from the Natural Resources Conservation Service (NRCS) website. The information provided in the report was compared to a list of Prime and other Important Farmlands that was downloaded from the NRCS Soil Data Mart. This comparison revealed that there are many prime and important farmland soils as well as farmland soils of statewide importance within the project area. However, there will be no direct impact to farmland associated with this project, if the proposed improvements are limited to existing road right-of-way.

2. Rangeland

   Information obtained from the online NRCS Soil Data Mart indicates that soils in Bedford County are not suited for use as rangeland.

3. Forestland

Information obtained from the online NRCS Soil Data Mart indicates that soils in Bedford County are well suited for forestland. However, there will be no direct impact to forestland associated with this project, if the proposed improvements are limited to existing road right-of-way.

4. Wetlands

Mapping obtained from the National Wetland Inventory (NWI) database, on the United States Fish and Wildlife Service (USFWS) webpage, indicates that there are no wetlands within the proposed project corridor. The mapping does show several wetlands in the vicinity of the project area but impacts to these wetlands will be avoided by strict adherence to erosion and sediment control practices.

5. Flood Plains & Stream Crossings

There are five known river crossings which include mapped flood plains along the proposed alignment being studied in this report. The five flood plain crossings are described below. Other stream or creek crossings may exist along the proposed alignment, but are smaller in nature and have not been mapped by FEMA.

a. Goose Creek near intersection of Rte. 122 and 801 (1) – Zone A

b. Goose Creek near intersection of Rte. 122 and 801 (2) – Zone A

c. Little Otter River near intersection of Rte 122 and 460 – Zone X

d. Little Otter River approximately one mile west of intersection of Rte 460 and Timber Ridge Road. – Zone A12

e. Big Otter River near intersection of Rte 460 and Bells Mill Road – Zone A

The Flood Insurance Rate Maps (FIRM) maps showing each of these sites is included in Appendix E

A common and practical avoidance measure for these stream crossings includes the use of directional drilling.

6. Historic Sites

Information regarding archaeological and architectural resources of interest within or adjacent to the project area was obtained from the DHR Data Sharing System (DSS). The project corridor was shown roughly 100 feet wide in order to encompass the entire right-of-way as well as potential adjacent land that may be needed for easements and thus impacted during construction. The results showed that there are two archaeological resources and twenty-two architectural resources of interest within the project area. As described in the archaeological resource report the first site (44BE0010) has been totally destroyed, while portions of the second site (44BE0142) have been destroyed. Additionally, due to the fact that substantially all improvements will be concealed below ground we do not anticipate any impact to architectural resources of interest as the view shed will be returned to its original state post construction.

7. Endangered Species/Critical Habitats

Information on threatened and endangered species was obtained from the USFWS online database. There is one known endangered species, the Roanoke Logperch, and several known threatened species within the project area. We do not anticipate impact to threatened and endangered species or critical habitat as the majority of the project corridor will be confined to existing road right-of-way, however species and habitat surveys may be required once agency correspondence is received.

C. Growth Areas and Population

This report includes a compilation of water use growth projections for both Bedford County and the City of Bedford. New projections were not developed; rather, previously documented projections were compiled from the following two reports.

1. Water *and Sewer Master Plan*, prepared for the Bedford County Public Service Authority, dated February 12, 2009, by Draper Aden Associates.
2. *Master Plan for Water and Sewer System Improvements* for the City of Bedford dated April 2000, by Thompson + Litton.

The BCPSA Water and Sewer Master Plan considered Census population figures, Weldon Cooper and Virginia Economic Commission population projections, and the Region 2000 Water Supply plan developed in 2008, in its development of water use projections.

The City of Bedford *Master Plan for Water and Sewer System Improvements* considered the 1998 *City of Bedford Comprehensive Plan*, historic water system production data, the City of Bedford *Economic Development Review*, and the PER *Two Potential Industrial Park Sites for Virginia Region 2000* in its development of water use projections. Supplemental water usage data was provided by the VDH indicting that current usage has dropped over the last 12 month period. Therefore, the growth rate calculated from the reports mentioned above were applied to the recently supplied usage figures.

The growth areas on which this report focuses include the Lakes and Forest areas within Bedford County and the City of Bedford (see Figure 1). Tables 1 through 3 show water demand in the system broken out by planning area, and in sequence show the average daily demand, the peak daily demand, and the peak month daily demand.

Table 1 below shows current water production as of this report, average daily water use growth projections compiled from the above reports and extrapolated as needed to bring the two sources of data into the same timeframe, and totals for the selected timeframes used in this report.

Table 1 – Water use projections, average daily demand, MGD

Year	Lakes	Forest	Bedford City	Total Lakes + Forest	Total Lakes + Bedford	Total Lakes + Forest + Bedford
Current	0.26	1.50	0.93	1.75	1.19	2.68
2020	0.48	1.95	1.13	2.43	1.61	3.56
2030	0.55	2.18	1.45	2.73	2.00	4.18
2040	0.64	2.43	1.68	3.07	2.32	4.75
2050	0.74	2.71	1.95	3.46	2.70	5.41
2060	0.86	3.03	2.27	3.89	3.13	6.16

Table 2 – Water use projections, peak daily demand, MGD

Year	Lakes	Forest	Bedford City	Total Lakes + Forest	Total Lakes + Bedford	Total Lakes + Forest + Bedford
Current	0.51	2.99	1.86	3.50	2.37	5.36
2020	0.95	3.91	2.27	4.86	3.22	7.13
2030	1.10	4.36	2.90	5.46	4.00	8.36
2040	1.28	4.86	3.37	6.14	4.65	9.51
2050	1.49	5.43	3.91	6.92	5.40	10.83
2060	1.73	6.05	4.53	7.78	6.26	12.31

Table 3 – Water use projections, peak monthly demand, MGD

Year	Lakes	Forest	Bedford City	Total Lakes + Forest	Total Lakes + Bedford	Total Lakes + Forest + Bedford
Current	0.69	2.09	1.30	2.78	1.99	4.08
2020	1.17	2.74	1.59	3.91	2.76	5.50
2030	1.21	3.05	2.03	4.26	3.24	6.29
2040	1.24	3.40	2.36	4.64	3.60	7.00
2050	1.24	3.80	2.74	5.04	3.97	7.78
2060	1.21	4.24	3.17	5.45	4.42	8.62

III. EXISTING FACILITIES

A. Lakes

The existing Lakes central water system infrastructure is in very good condition. The WTP was upgraded in 2004 and the oldest transmission infrastructure was installed in 2002. With proper maintenance, this water system infrastructure is suitable for use 40 to 50 years into the future. Two older well systems, Mountain View Shores and Valley Mills Crossing, are still in operation; these systems are more than six miles south of the Lakes central water system. Growth and increasing maintenance needs will dictate the timing of the master planned Mountain View Shores Connector to connect these two well systems to the Central water system.

The original High Point WTP was built in 1997 at a capacity of 60,000 GPD to serve the High Point subdivision. The WTP was upgraded to its current permitted capacity of 770,000 GPD in 2004, and serves the Lakes central water system.

Lakes system storage consists of a 1 MG elevated tank with an overflow elevation of 1220. Approximately 54 miles of distribution lines up to 18 inches in diameter extend to Franklin County across the Lake and north and south to serve several lake-front subdivisions and customers along the way. A 20 inch waterline extends from near the elevated tank, north to Moneta.

A brief review of the existing High Point WTP and permits was performed in order to assess the feasibility of expanding the plant to 1.0 MGD or 2.0 MGD.

Existing Permits

The existing Virginia Water Protection Permit (VWP) issued by DEQ became effective in August 2009, and allows the PSA to withdraw an annual average of 2 MGD and a peak of 2.999 MGD from Smith Mountain Lake. The maximum annual water withdrawal and maximum instantaneous withdrawal shall not exceed 730 MG and 2100 gpm, respectively. This permit was issued on November 30, 2007, and expires on November 30, 2022. This amendment to the original 1998 VWP permit took approximately four years to obtain from the date of initial application.

The VDH Waterworks Operation Permit, with an effective date of March 22, 2010, limits the plant capacity to 0.77 MGD due to the capacity of the finished water pumps. It appears that this 0.77 MGD limitation can be fairly easily overcome by some minor upgrades to the pumps and associated piping. The BCPSA is currently evaluating the necessary changes to bring the plant up to its full 1.0 MGD capacity.

Distribution & Storage

The storage tank on Radford Church Road is a 1,000,000 gallon elevated tank and has capacity for 2 MGD based on its volume and 400 GPD/ERC. Approximately 9,200 linear feet of 12 inch pipe connect the High Point WTP to the larger 18 inch main on Radford Church Road that connects to the storage tank.

Based on current usage, this tank provides almost four days of storage. While this exceeds the VDH *Water Regulations* required minimum, it is a reasonable volume for a newer system and allows for growth of the system.

Finished Water Pumps

The two finished water centrifugal pumps are designed to pump 535 gpm (0.77 MGD) at the head required to fill the High Point tank. There is adequate floor space to replace these pumps with either 1.0 MGD capacity or 2.0 MGD capacity pumps.

Clearwell

The existing clearwell has a capacity of 34,800 gallons. This provides adequate chlorine contact time (CT) for a 4.0 Log Removal Value (LRV) of viruses as required by current VDH *Waterworks Regulations* and Working Memo 880. The proposed VDH *Waterworks Regulations* require an additional 0.5 LRV of Giardia after membrane filtration. Many times, this is best accomplished by increasing clearwell volume or improving baffling rather than increasing disinfectant residual in order to minimize disinfection by-product formation. The easiest solution for a 2.0 MGD expansion at High Point would likely be constructing a new clearwell tank and converting the existing clearwell to a raw water tank. The new clearwell would need to be about 175,000 gallons to provide adequate volume for 0.5 LRV Giardia removal and working volume for operation of the membranes and finished water pumps. There appears to be adequate space to construct a tank this size on the site.

Membranes

The existing building housing the Pall AP-4 membranes includes a footprint to expand to 2 MGD. The existing units are rated at 1.2 MGD. Each skid contains 28 membrane modules. Each membrane module contains 538 square feet of surface area, resulting in a total surface area of 15,064 square feet per skid. The membrane filtration system is designed to operate at 40 gallons per square foot-day (GFD). The system could easily be expanded to 2.0 MGD (2.4 MGD actual capacity) with two additional AP-4 units.

Backwash Recovery System and Disposal Area

The existing backwash disposal area is approximately 3900 square feet. Based on design information of 1.5 minutes per inch percolation rate, the area could support up to 71,000 gallons per day (GPD) of backwash (with no factor of safety). Based on a 99% recovery rate of influent water, approximately 20,000 gallons per day of backwash would need to be disposed of in this area; so it appears adequate. The existing backwash recovery membrane is a Pall AP-3 and is operating at a flux rate of about 30 GFD. The maximum number of modules an AP-3 can hold is 10, so expanding treatment capacity to 2.0 MGD would require that 10 modules be installed and the flux rate be approximately 40 GFD.

Raw Water Strainers

The existing strainers are rated at 1.20 MGD. Additional strainers would be required to increase capacity to 2.0 MGD at the High Point WTP.

Raw Water Pump Station

The raw water pump station consists of a wetwell, valve vault, and two submersible turbine pumps (one on-line and one backup). The pumps are rated for 695 gpm (1 MGD). This pump station would need to be upgraded to achieve a 2.0 MGD capacity.

Intake Screen

The 24 inch diameter wedgewire drum intake screen is rated for 1.11 MGD. A second intake screen would be required to achieve a capacity of 2.0 MGD. It would likely be most feasible to install a separate intake pipe and screen that connects to the existing or upgraded raw water wet well.

Raw Water Pipeline

At 2.0 MGD, the existing 8 inch raw water pipeline would be undersized with a velocity of about 10 FPS and additional pipe losses of 205 feet (C=100). Therefore, a new parallel 8 inch line 3500 feet long would be required to increase capacity.

B. Forest

The Forest water system is greater than 20 years old. Although during the last 20 years the system has been steadily growing, to keep pace with the demands of development. While the age of some portions of the system points towards increased maintenance needs, many recent system expansion projects have been added, improving overall service and distribution. Currently the system is functioning well overall and is suitable for use well into the future with proper maintenance and upgrades.

During the last 20 years, the City of Lynchburg has been the primary source of water for the Forest system. The current agreement with Lynchburg was signed in 2007 and has a 15 year term. The current Contract for water purchase does not include any limit on the amount of water the BCPSA can purchase for its customers and the City's water treatment plant appears to have plenty of capacity to serve Forest's needs.

The BCPSA provides storage in the Forest system in two tanks; the New London tank, a 1 MG elevated tank with an overflow of 1075, and the Altha Grove tank, a 1.2 MG ground storage tank with an overflow of 1075. The most recent tank to be built is the New London 1 MG elevated storage tank, and it was built in 2003. This currently provides for almost 1.5 days of storage. While this exceeds the VDH required minimum, it is not excessive and as growth occurs additional storage capacity may be needed. In the current agreement with the City, no storage sharing is provided, although it may be negotiated if capacity exists in the City.

The distribution system includes approximately 187 miles of waterlines up to 16 inches in diameter. A 12 inch waterline extends from the New London tank to Route 460. A 16 inch waterline extends from the 12 inch waterline west along Route 460 to the intersection with Goode Road.

C. City of Bedford

The City of Bedford owns and operates a water treatment plant with a permitted capacity of 3.45 MGD. System storage includes 3 tanks with a total volume of 3.5 MG; including one 1.0 MG tank located at the WTP and two tanks, 1.5 MG and 1.0 MG, located near the Route 460 bypass. The distribution system includes approximately 92 miles of waterlines up to 16 inches in diameter. Source capacity includes 1.85 MGD from Stony Creek Reservoir, 1.0 MGD from Big Otter River, plus well capacity of 0.6 MGD from 5 wells. Treatment capacity is 3 MGD.

From the *Master Plan for Water and Sewer Improvements* by Thompson + Litton, dated April 2000, existing usage in 2000 was approximately 1.25 MGD. As documented in Amendment I of the *Master Plan*, over the next two years, the City experienced the loss of several large industrial water users, reducing existing usage in 2002 to 1.05 MGD. Recent VDH records show that existing usage in 2010 was 0.93 MGD.

The City's primary water system concerns are with their source and reservoir. In recent and past droughts, water levels in the reservoir have dropped to critical levels. In addition, upkeep of the reservoir is proving to be very costly to the City with a multi-million dollar dam stabilization project currently being planned.

Over the past several years, discussions have taken place regarding obtaining water from the BCPSA through either a connection to Forest or a connection to the Lakes. The BCPSA is hopeful that this report will assist with developing a working relationship with the City of Bedford.

Other system components within the City of Bedford are considered adequate for continued use. The City of Bedford will retain ownership and operation of their system and as such, further investigation into City facilities is not included in this report.

IV. NEED FOR PROJECT

A. System Operation & Maintenance

As previously discussed, source water for the Forest system appears to be adequate and available through the agreement with the City of Lynchburg; however, the practical application of the Water Purchase Contract between the BCPSA and the City of Lynchburg makes it difficult for the BCPSA to properly budget and plan for costs. Once a year, the City performs a cost-of-service analysis on its water system and the balance due is calculated based on the previous year's billings with the BCPSA. At the end of the year, the BCPSA may owe money to the City of Lynchburg, or it may be due a refund from the City. In the past, the BCPSA has owed an unexpected amount of up to $100,000 at year end due in one lump sum payment. The BCPSA has found it difficult to plan for this year end charge during the budgeting process.

In addition to the difficulty of planning for a year end charge, the rate calculation included in the Water Purchase Contract includes a demand charge. This means that the next year's water purchase rate is based on the peak demand of the previous year. This demand factor serves to inflate the rates that the BCPSA must pay. The BCPSA also pays an out-of-town factor that is built into their purchase rate.

Providing countywide regional water service across the County will allow the BCPSA to have improved operations and better control of the budgeting process. Centralizing treatment operations at the Lakes will allow the BCPSA to build on the investment already made, optimize capacity, and develop a regional system with many sources for added security and redundancy.

B. Growth

To meet the future drinking water needs of the County, the BCPSA began the planning process long ago with the 1994 *Comprehensive Water and Wastewater Study* by Anderson & Associates, Inc. and the most recent update to that countywide planning document, the *Water and Sewer Master Plan* dated February 12, 2009 by Draper Aden Associates.

The Bedford County Public Service Authority has and will continue to see the need for countywide water services. According to the Roanoke Times article published on August 16, 2007, "Since the 2000 census, Bedford County has been one of the state's fastest-growing localities outside Northern Virginia." The article adds, "Data from the 2000 census found Forest to be the fastest-growing spot in the western half of the state. The population grew by 135 percent from 1990 to 2000."

Another article by the Roanoke Times dated September 29, 2008 says, "…across the bridge in Bedford County, the former sleepy village of Moneta is being transformed rapidly into a major commercial and residential center. The availability of public water and sewer is sparking a hot phase of growth that could potentially outpace anything the lake has seen…The growth is happening in spite of the depressed economic times nationally."

Building infrastructure across the County is a large investment, but with the potential for growth and potential for service to the City of Bedford, it is the next logical step in keeping ahead of the demand.

The infrastructure evaluated in this report has been phased, in order to meet the growing demand while minimizing the capital expenditures. A combination of projects

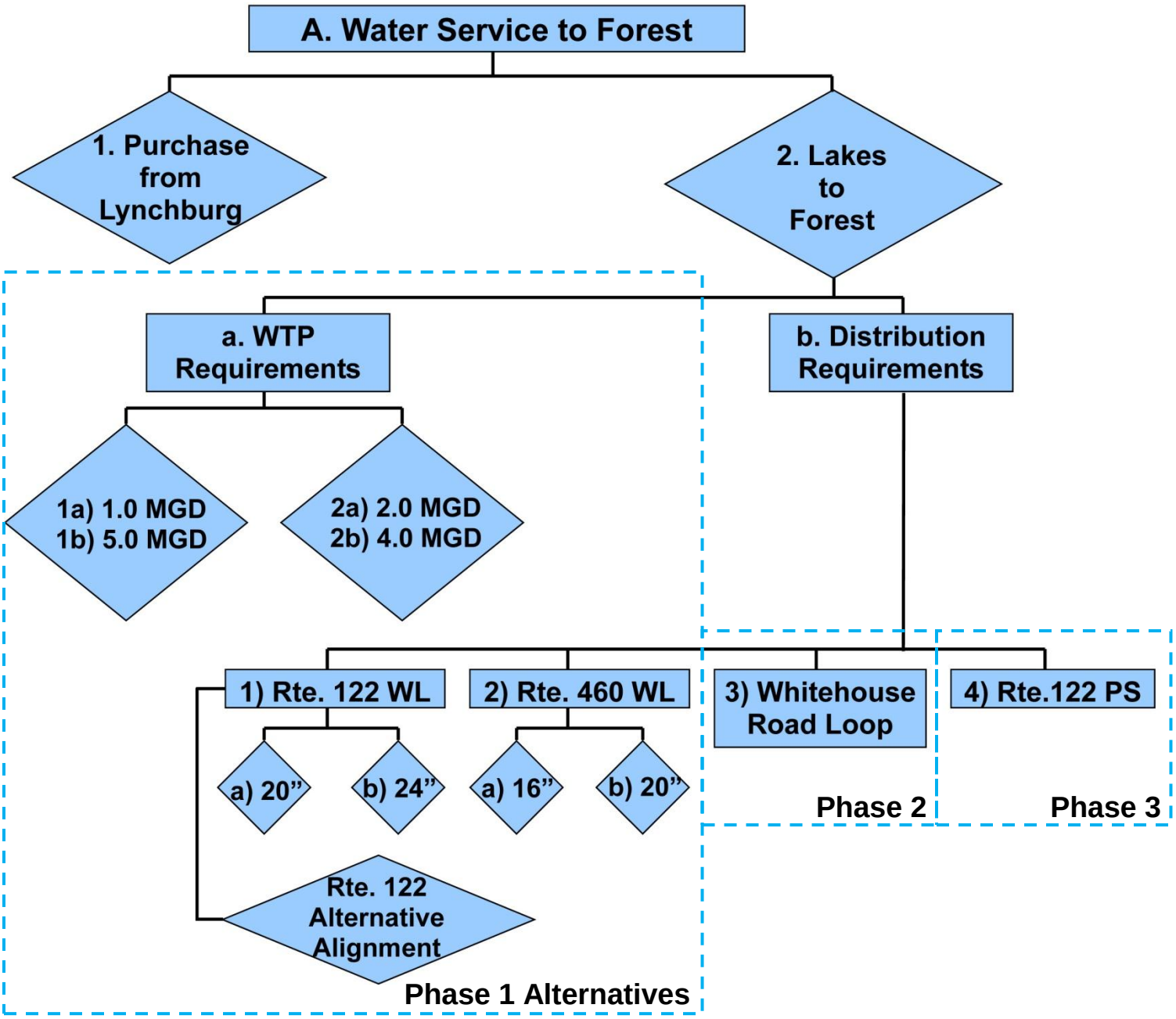
will be needed as the first phase, but some projects are not needed up front and can be phased in over time as demand increases. Timeframes are recommended for future projects, but actual growth and demand will dictate the timing of these future phases.

V. ALTERNATIVES CONSIDERED

A. Water Service to Forest

The first scenario evaluated is the Water Service to Forest scenario. Due to the complex nature of the alternatives and phases that are evaluated, a flow chart is shown below providing a visual map including each component that is evaluated on the following pages.

Figure 2 – Scenario A Flow Chart



1. Purchase Water from Lynchburg

In this alternative, water service to Forest would continue to be provided by the City of Lynchburg. The BCPSA would continue to purchase water under the current Water Purchase Contract and would continue to struggle with annual budgeting and rate setting not knowing what their actual costs are until the end of the year. In addition, potential costs savings by providing their own treated water would not be realized.

The cost of this alternative is evaluated based on a present value calculation of the total cost of water purchased from the City of Lynchburg and a return on investment calculation. In other words, this report analyzes how long it will take for the water purchase option to break even with other alternatives considered. A more detailed breakdown of this cost is included in Appendix B. This money spent could be otherwise invested into different countywide improvements.

Present Value Cost: $86,298.269 (48 year study period)

2. Lakes to Forest

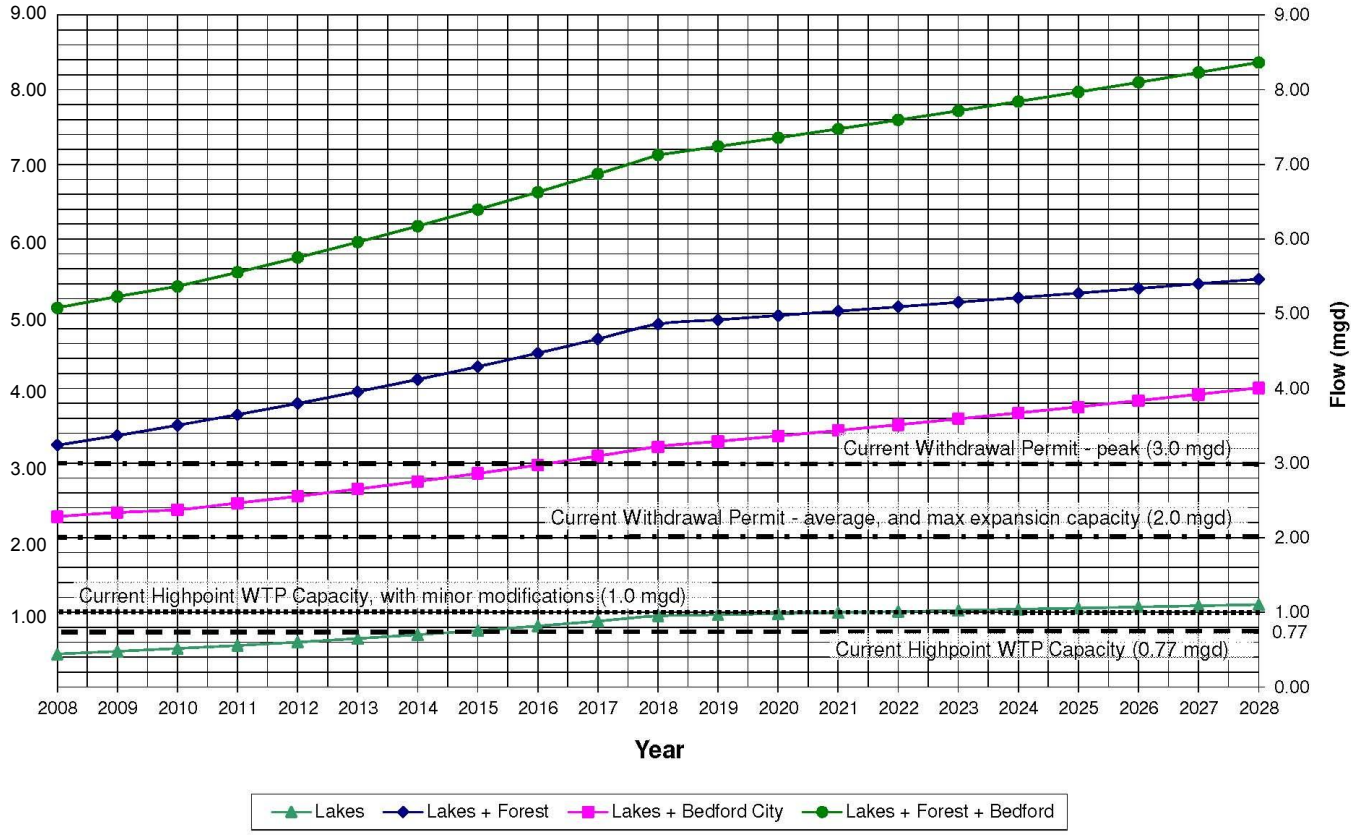
In order to provide an adequate volume of flow to completely supply water service from the Lakes area to Forest, several water system capital improvements are necessary, including intake and treatment capacity upgrades, transmission main and pump station installation.

Each component of the improved water system was evaluated with respect to the water usage projections documented in section II.C of this report and the cost of financing over time. Consideration is given for the timing of the required upgrades so that improvements are phased-in as needed, thus reducing the present value cost of the total project. System improvements are described as follows.

a. Intake and WTP Requirements

Daily peak demand at 20 years is a typical planning period when considering capacity of treatment plant equipment. A summary of projected daily peak demands for the Lakes, Forest, and Bedford systems, and in combination are shown in relation to existing system capacities in Figure 3 below. Based on this figure, it appears that 5.5 MGD minimum treatment capacity is required for serving both the existing Lakes system and the Forest system to satisfy the 20 year daily peak demands. Future planning may be needed to account for the combined demand of the Lakes, Forest, and Bedford systems.

Figure 3 – Peak Daily Flow Projections



Based on a required minimum capacity of 5.5 MGD and a brief evaluation of the existing High Point WTP, it seems the two most feasible alternatives to evaluate are:

WTP Alternatives

1. Upgrade the existing High Point WTP to 1.0 MGD (1a), and build a new 5.0 MGD (1b) treatment facility for a total capacity of 6.0 MGD.

2. Expand the existing High Point WTP capacity to 2.0 MGD (2a), and build a new 4.0 MGD (2b) treatment facility for a total capacity of 6.0 MGD.

Both of these alternatives provide a total capacity of 6.0 MGD. Typically, it is good practice to include some additional capacity in the treatment facility to allow for some uncertainty in projecting future needs as well as the ability to operate at higher capacity if needed to satisfy peak flows. This capacity also provides for Franklin County's current purchased treatment capacity of 400,000 GPD.

Camp 24 has been identified by BCPSA and in other reports as a suitable location for a future regional water treatment plant. This site was used to determine pipe lengths for raw water and finished water transmission mains.

WTP Alternative 1 was separated into phases 1a and 1b for flexibility in phasing and financing. Phase 1a would require new 1.0 MGD capacity high service pumps to be installed at High Point WTP, along with associated piping and electrical revisions. Phase 1b would require a new intake facility, raw water transmission main, and 5.0 MGD water treatment works would be constructed at the Camp 24 site. Filtration equipment would include four Pall AP-6x units (each with 1.25 MGD capacity). Total project costs for this alternative and phases are shown in Table 4.

WTP Alternative 2 was separated into phases 2a and 2b also for flexibility in phasing and financing. Phase 2a would require expansion and upgrades at High Point WTP to increase capacity to 2.0 MGD. This would necessitate installation of a new intake line and screen and new raw water pumps at the raw water pump station. Additionally, a new 8 inch raw water transmission main would need to be installed parallel with the existing 8 inch raw water main. Two more Pall AP-4 units would be installed to increase treatment capacity to 2.0 MGD and new finished water pumps and a clearwell would be installed. In addition to these improvements at High Point, phase 2b includes a new intake facility, raw water transmission main, and 4.0 MGD water treatment works would be constructed at the Camp 24 site. Filtration equipment would include four Pall AP-6 units (each with 1.0 MGD capacity). Total project costs for this alternative and phases are shown in Table 4. Detailed cost estimates for both alternatives are included in Appendix B.

Table 4 – Preliminary Cost Summary for Two Treatment Alternatives and Phases

	Total Construction Cost	Related Cost	Total Project Cost
WTP Alternative 1			**$11,265,345**
Phase 1a – 1 MGD	$306,200	$91,860	$398,060
Phase 1b – 5 MGD	$8,359,450	$2,507,835	$10,867,285
WTP Alternative 2			**$11,914,760**
Phase 2a – 2 MGD	$2,292,100	$687,630	$2,979,730
Phase 2b – 4 MGD	$6,873,100	$2,061,930	$8,935,030

The difference in costs between these two WTP alternatives is likely within the margin of error of the cost estimates performed at this preliminary planning level. Therefore, the two treatment alternatives should be evaluated on other factors besides cost. Table 5 is a decision matrix based on non-cost associated factors that differ between each of these alternatives.

Table 5 – Decision Matrix for Two Treatment Alternatives

WTP Alternative ***Weight***	**Financial Ability to Defer Costs** ***4***	**Coordination w/ Exist Operation** ***3***	**Alternative Treatment Options** ***2***	**Ease of Construction** ***1***	**Score** ***∑Weight x Rating***
1a - 1.0 MGD WTP at High Point 1b - 5.0 MGD New WTP	1	2	2	2	16
2a - 2.0 MGD at High Point 2b - 4.0 MGD New WTP	2	1	1	1	14

1(Least Desirable) – 2(Most Desirable)

Alternative 1 will be easier to coordinate with the existing operation because it only involves replacement of the finished water pumps, whereas Alternative 2 involves work at the raw water pump station and at the treatment plant. Alternative 1 will also provide more opportunity for consideration of other treatment options since all of the new capacity will be in a new facility. Alternative 2 would allow for the full utilization of the existing plant, and could defer the need to finance the larger new WTP. Alternative 2 will require that at least 1.0 MGD of the additional capacity be produced with membrane filtration. Finally, it will be easier to construct a new 5.0 MGD facility than to do extensive modifications at the High Point WTP that has to stay in operation during construction.

By agreement dated October 18, 2002, Franklin County has rights to 400,000 GPD of treatment capacity in the High Point WTP. Franklin County's existing usage is reflected in the current SML WTP production figures, and their current treatments rights of 400,000 GPD are considered in the ultimate capacity. However, any additional future projected demand is not included. Any future studies, including a detailed WTP PER, intake study, and withdrawal permit application should consider future growth needs in Franklin County if they are to continue and grow as a partner in the regional water system.

Operating cost estimates were developed for the recommended improvements. The cost to operate the facility includes amortization of prior improvements at the High Point WTP and is based on the 20 year average daily demand of 2.7 MGD (Lakes plus Forest). Table 6 summarizes these costs and they are detailed in Appendix B. These costs would need to be refined based on the final selection of the treatment technology.

In addition to the WTP upgrades, intake capacity will need to be upgraded as well. A Joint Permit Application should be submitted to DEQ in order to secure the necessary intake capacity in Smith Mountain Lake. As in the past, AEP and FERC likely will be highly involved in the intake permitting process and their requirements should be considered as well. Since this intake is a significant increase over the existing capacity, it may be necessary or desirable to perform additional detailed studies to evaluate locations of intakes as well as styles or configurations of intake structures.

Table 6 – Cost for Water Treatment Plant Upgrade

	WTP Phase 1a	WTP Phase 1b
Annual Operations Cost	$196,400	$439,700
Annual Amortization Cost	$253,200	$855,000
Total Annual Cost	**$449,600**	**$1,294,700**
Average Annual Production (MGD)	1.0	1.73
Cost per 1,000 gallons	**$1.23**	**$2.05**

b. Distribution Requirements

Two main factors were considered in development of the technical aspects of transmitting water from the Lakes to Forest; hydraulic capacity and water quality.

Hydraulic capacity considered the increasing water demands over time needed to serve Forest and sizing of pipes to last the duration of the 48 year planning period. Pressures were evaluated along the route in order to maintain minimum requirements while also controlling high pressures where feasible.

Water quality considerations included the total volume in the proposed pipes and residence times based on current and projected usage.

Distribution Alternatives

Between the Lakes and Forest, there are two primary transmission routes, Route 122 and Route 460. For phasing, these are identified as:

Distribution Phase 1c: Route 122 Transmission Main
Distribution Phase 1d: Route 460 Transmission Main

These alignments were selected due to their characteristics of being primary roads traveled between key demand centers. Bedford County may choose to limit connections along the routes to preserve rural characteristics, but at each end point and some areas along the route, designated growth areas exist and will benefit from the provision of public water service.

A review of the key features, elevations, and ground profile between the Lakes and Forest revealed several important factors that were considered in the planning of a system to transmit water across Bedford County and are summarized in Table 7 below. Pressures shown below represent static conditions with no pressure controlling devices considered yet.

Table 7 – Key Features & Elevations - Lakes to Forest along Routes 122 & 460

Route	Feature Description	Condition	Elevation	Pressure
122	SML Tank Overflow	Start Hydraulic Grade	1220	N/A
122	Goose Creek Crossing	High Pressure	654	245 psi
122	Bunker Hill	Low Pressure	1112	46 psi
460	Bedford Lookout Tower	Low Pressure/No Service	1267	-20 psi
460	Bedford Tank Overflow	Hydraulic Grade	1200	N/A
460	Little Otter R. Crossing	High Pressure	685	223 psi
460	Big Otter R. Crossing	High Pressure	607	257 psi
460	New London Tank Overflow	End Hydraulic Grade	1075	N/A

A graph showing the existing system features and ground profile is included as Figure 3 in Appendix A.

A review of waterline diameters was performed taking into account the increasing demand over time anticipated in the Forest and Lakes water systems. Peak monthly demand and a planning period of 48 years were considered in the sizing of the transmission system. The following distribution transmission main alternatives were evaluated:

Distribution Transmission Main Alternatives
Route 122 Phase 1c Alternatives: 20” or 24”
Route 460 Phase 1d Alternatives: 16” or 20”

A review of the existing distribution systems shows an existing 20 inch waterline along Route 122 in Moneta and an existing 16 inch waterline along Route 460 in Forest. These are the two end-points of the proposed transmission system; therefore, these diameters were chosen as the starting point for analysis. This analysis included extension of a 20 inch waterline along Route 122 to Bedford and a 16 inch waterline along Route 460 from Bedford to Forest.

A hydraulic grade line profile was developed for the 20”/16” transmission system using incremental flow rates representing increasing demand over time. The resulting hydraulic grade line profiles were plotted on the previously discussed ground profile and reviewed for adequacy of pressures and ability to fill each tank. This graph is included as Figure 5 in Appendix A.

It can be seen from this profile that as usage increases, the 20”/16” transmission system cannot support the system adequately. There is extreme headloss in these pipes that would be infeasible to overcome with pumping.

The important features evident on this graph, and the focus of additional improvements, are as follows:

- There is a critical elevation of 1112' near the City of Bedford. This area is commonly referred to as Bunker Hill.
- The hydraulic grade is not adequate to fill the Bedford tank. As demand continues to increase, the hydraulic grade continues to drop to below that of the New London Tank.
- It appears that it would be impractical to try and serve development at an elevation equal to the Bedford Lookout Tower by gravity. Service to this site could be served with a booster station in the future if needed.
- There is significant headloss at the higher flow rates in the existing 18 inch waterline in the Lakes area from the SML tank to Route 122.
- There is significant headloss at the higher flow rates in the existing 12 and 16 inch waterlines that feed the New London Tank.

In order to alleviate the headloss and high and low pressures mentioned previously, additional improvements to the system were evaluated.

A main line pressure reducing valve is needed along the Route 460 waterline going towards Forest. Due to the two creek crossings over Little and Big Otter Creeks and the lower hydraulic gradient of the Forest system, the hydraulic grade can be lowered by approximately 125 feet under static conditions as measured from the City of Bedford tank overflow. As demand increases over time, and during peak usages during the day, the PRV may not provide any pressure reduction. However, it will be needed as part of phase one, to reduce pressures during periods of low flow. However, static pressures may still be as high as 205 psi and should be considered in a detailed distribution PER and during the detailed design phase with selection of pipe material and individual connections.

In order to develop a transmission system that provides adequate long term service to Forest, the evaluation continued with larger waterlines including a 24 inch waterline along Route 122 and a 20 inch waterline along Route 460. Another hydraulic grade line profile was developed and is included as Figure 6 in Appendix A.

This hydraulic grade line shows that headloss is greatly reduced and provides a transmission system that can support gravity flow for several years into the future. This transmission system is not oversized, however, due to the need for future improvements as demand increases. These future improvements are discussed in the following paragraphs. Costs for phases 1c and 1d are summarized below.

	Total Construction Cost	Related Cost	Total Project Cost
Phase 1c	$8,578,647	$2,573,647	$11,152,241
Phase 1d	$5,694,843	$1,708,453	$7,403,296

Phase 1c Alternative Alignment Route 122

An alternate alignment to Route 122 was reviewed in order to bypass the high elevation near Bunker Hill. This alignment includes approximately 14,200 feet of 24 inch waterline along Route 721, 5 Forks Road, and Route 43 into the City, and replaces approximately 13,400 feet of 24 inch waterline along Routes 122 and 460; therefore it is at a slightly higher cost. This alternative alignment is shown on Figure 4 in plan view and Figure 6 in profile view in Appendix A.

Following this alternate alignment will allow the hydraulic grade to drop lower before upgrades are needed, due to the lower elevations along this route.

The primary benefit of this option is to allow placement of a pump station, when needed, closer to Forest along Route 460 providing some energy savings, while also maintaining suction pressures at a comfortable level. Also, reduced pressures would be seen at the Little Otter and Big Otter River crossings. Timing or phasing of the pump station with this option would be much the same as discussed further in Phase 3.

Water service to the area of Bunker Hill would continue to be provided by the City or with a future booster station serving a smaller service area, as the hydraulic grade in the 24 inch transmission main would be too low to serve this area.

Phase 2: Whitehouse Road Loop

Between the SML tank on Radford Church Road and Route 122, there is an existing stretch of 18 inch waterline that is approximately three miles long. This waterline was built in 2002 as part of the original SML central water system. Franklin County paid for a portion of this waterline, thus, by agreement, purchased approximately 46% capacity in the line. This waterline restricts the ultimate capacity of the Lakes to Forest transmission line not allowing for full use of the system. Therefore, an upgrade or parallel installation was evaluated.

A review of the BCPSA Master Plan revealed a proposed growth project, the Whitehouse Road Loop project. This project includes a proposed waterline along Whitehouse Road from the SML tank to Moneta. Although proposed as a 12 inch waterline in the Master Plan, hydraulic

analysis of countywide service, included here, indicates that this project should include approximately 22,100 feet of 18 inch waterline.

Timing of the installation of the Whitehouse Road Loop will depend on the pace of growth. It appears that this project is not needed to serve the current water demand of the Lakes and Forest, but can be put off until 2015, or when peak demand in the system approaches 3.5 MGD. A hydraulic grade line graph has been prepared to show the benefits to the system upon installation of the Whitehouse Road Loop. The plan and profile of this alignment are shown in Appendix A, Figures 4, and 7 respectively.

	Total Construction Cost	Related Cost	Total Project Cost
Phase 2	$2,451,719	$735,516	$3,187,234

Phase 3: Route 122 Pump Station

Following the installation of the Whitehouse Road Loop, further upgrades are not needed until approximately 2030 or when peak demand approaches 4.3 MGD, at which point the projected demand causes the hydraulic grade to drop below the New London tank overflow, therefore, not filling. A hydraulic grade line was prepared as Figure 7A in Appendix A to show the benefits of the proposed pump station.

A preliminary location for the proposed pump station is along Route 122 in the vicinity of Route 689. This location was chosen based on an elevation that will provide adequate suction pressure as well as overcoming the high elevations on approach to the City of Bedford. This location can be seen in Figure 4 in Appendix A.

When the system demand reaches a point that this pump station is needed, a decision may be needed as to what hydraulic grade to boost to. In order to serve Forest, a lower hydraulic grade is needed; however, with this pump station proposed, it is now feasible to combine efforts and boost pressure to fill the City of Bedford's tanks. It should be noted; however, that any extra energy pumped into the system will be lost through the Route 460 PRV. It may be desirable in the future to evaluate the benefits of energy recovery through a flow generator at the PRV station.

	Total Construction Cost	Related Cost	Total Project Cost
Phase 3	$693,000	$207,900	$900,900

Water Age

Water age will increase as a result of the large diameter and long lengths of waterlines being evaluated here. Table 8 below shows the amount of storage in each of the waterline segments discussed thus far and how that compares to usage in the system. The total days of storage added as a result of the pipeline volume and projected usage is also shown.

Table 8 – Volume and age of water in proposed 24”/20” Transmission Main

Phase	Timeline	Water Transmission Segment	Volume in Pipe, gallons	Demand in Forest, MGD	Age of Water Added, hours	Age of Water Added, days
1c	Startup	Route 122 24” Waterline	1,669,000	1.49	40	1.67
1d		Route 460 20” Waterline	823,000			
2	2015	Whitehouse Road Loop, 18” Waterline	292,144	1.78	38	1.56
3	2030	Pump Station		2.23	30	1.25
	2060			3.03	22	.92

It should be noted that the above numbers depend on full water service to the Forest water system. If a reduced amount of flow is provided through these lines, water age will increase and quality will degrade. Disinfection by-products formation may be a concern in the future system due to the large diameters and length proposed here. Flushing may become necessary if the residency time becomes too high in the waterlines.

A detailed distribution PER should be performed to further evaluate water age and the potential for formation of disinfection-by-products in the system. The final design shall comply with state and federal standards including the disinfection-by-products rule.

Cost Summary

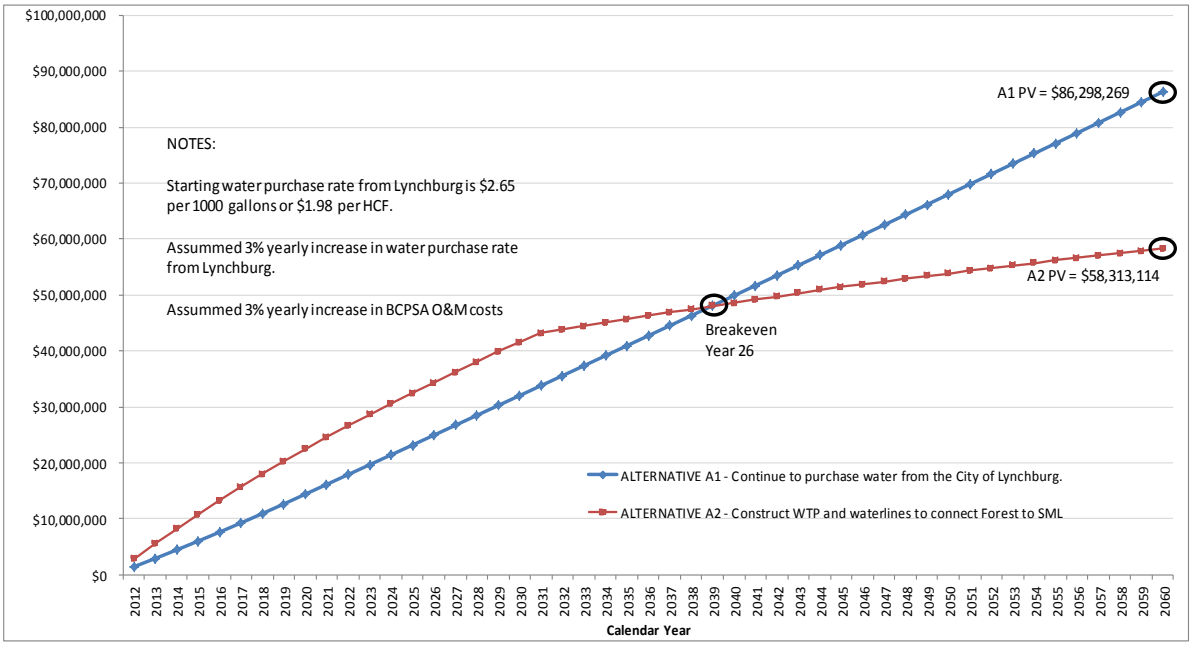
Total project cost and present value cost estimates were prepared for each of the alternatives and phases evaluated to provide water service to the Forest area and they are summarized in Table 9 below. Present value costs are considered over the 48 year study period and used to compare the costs over the life of the project. Detailed cost estimates can be found in Appendix B of this report.

Table 9 – Present Value Cost Comparison of Water Service to Forest Scenario A.

Alternative	Description	Total Project Cost	Present Value Cost
A1	**Purchase Water From Lynchburg**	**N/A**	**$86,298,269**
A2	**Lakes to Forest**		
WTP 1a	WTP 1.0 MGD Upgrade	$398,060	
WTP 1b	WTP 5.0 MGD New	$10,867,285	
Phase 1c	24" Rte 122 Transmission Main	$11,152,241	
Phase 1d	20" Rte 460 Transmission Main	$7,403,296	
Phase 2	Whitehouse Road Loop	$3,187,234	
Phase 3	Route 122 Pump Station	$900,900	
A2 Total	**Lakes to Forest**	**$33,909,016**	**$58,313,114**

Figure 4 below demonstrates the present value over time of both alternatives and the benefit gained over time of alternative A2. After year 26, alternative A2 continues to gain value over alternative A1. Although A2 requires a large capital investment up front, the savings realized by producing the water versus buying it provide a better long term benefit.

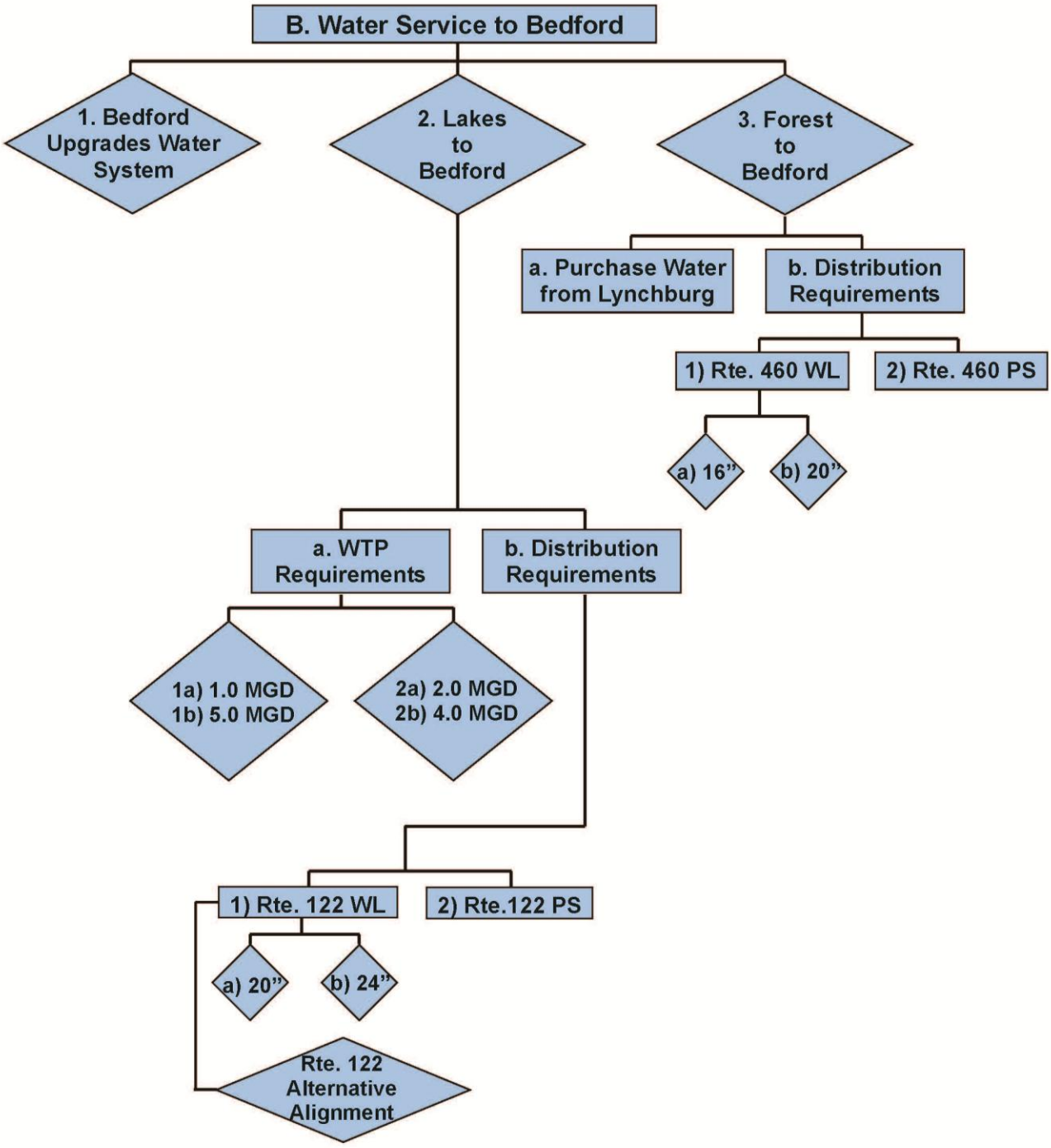
Figure 4 – Present value over time, comparing alternatives A1 and A2



B. Water Service to Bedford

As noted previously, in order to aid in the understanding of the alternatives and phases evaluated herein, the following flow chart is provided to show where each component fits in with the overall project.

Figure 5 - Scenario B Flow Chart



1. Bedford Upgrades Water System

Under this alternative, the City of Bedford is faced with costly development of new source water in order to have adequate capacity during drought situations. The City is hydraulically isolated from any other water systems, so no other backup or emergency sources exist. A regional solution is one logical answer to this problem, and the BCPSA is the closest water system operator with the resources to implement a regional solution. Therefore, for the benefit of the community, the alternative of the City of Bedford upgrading or adding capacity to their system is no longer considered in this report.

Present Value Cost: Unknown (City of Bedford)

2. Lakes to Bedford

Serving the City of Bedford with water from the Lakes system and High Point WTP has many of the same challenges as the Lakes to Forest options previously discussed. In this evaluation, consideration was given for full supply of the City's projected water needs.

The City's water storage tank overflow elevation is just 20 feet below that of the SML tank. This leaves very little room for headloss. As a result, waterline diameters were evaluated with respect to gravity versus pumped flow. Again, the Whitehouse Road Loop, at a construction cost of $2.5 million, provides additional flow capacity in the system and delays the need for the pump station. However, a pump station is ultimately required to supply the future water demands of the City of Bedford, and at a construction cost of $700,000, appears to be the most cost effective option. The plan view, and hydraulic grade line profile of this option are shown in Figures 8 and 9 in Appendix A.

Water treatment plant upgrades with respect to service to the City of Bedford were discussed and evaluated in Section V.A.2 of this report.

Table 10 below summarizes the total project costs for alternative B2.

Table 10 – Total Project Cost of Water Service - Lakes to Bedford

	Description	Total Construction Cost	Related Cost	Total Project Cost
B2	**Lakes to Bedford**			
WTP Phase 1a	WTP 1.0 MGD Upgrade	$306,200	$91,860	$398,060
WTP Phase 1b	WTP 5.0 MGD New	$8,359,450	$2,507,835	$10,867,285
Phase 1c	24" Transmission Main	$8,578,647	$2,573,594	$11,152,241
Phase 2	Route 122 Pump Station	$693,000	$207,900	$900,900
B2 Total		**$17,937,297**	**$5,381,189**	**$23,318,486**

As discussed previously, water age will increase with the installation of large transmission mains. If usage through these lines is low, water age will increase and water quality will degrade. An example of lower flow rates is shown in Table 11 below. The age is shown for the Lakes to Bedford 24 inch waterline with an estimated flow to Bedford of 0.5 MGD.

Table 11 – Volume and age of water in proposed 24" Lakes to Bedford Transmission Main

Alternative	Water Transmission Segment	Volume in Pipe, gallons	Demand in Bedford, MGD	Age of Water Added, hours	Age of Water Added, days
B2	Route 122 24" Waterline	1,669,000	0.5	80	3.34

The importance of having a committed water usage volume flowing through the waterlines on a regular basis is emphasized, so that the water does not stagnate and become a health hazard. A minimum flow rate of 834,500 GPD is needed to keep the total days of storage in the Route 122 waterline down to two days.

3. Forest to Bedford

The Water Purchase Contract between the City of Lynchburg and the BCPSA allows for and does not limit expansion of the BCPSA's service area and provision of water to its customers in other parts of the County. However, the Contract also states that "Unless approved by the City, the Authority will not resell any water purchased from the City to other localities." Therefore, before the BCPSA could provide service to the City of Bedford, Lynchburg's approval would need to be obtained. It should be noted that a merger of Bedford City's utilities with the BCPSA may eliminate this need for Lynchburg City's approval.

Improvements would be needed for the provision of water service along Route 460 from Forest to Bedford. An inspection of the hydraulic grade line profiles previously discussed reveals that pumping will be required under all scenarios. The New London tank is approximately 125 feet below the Bedford tanks. An evaluation of the hydraulics was again made with respect to line diameter, pumping energy required, and pressures in the system. Figures 10 and 11 of Appendix A show the plan, and hydraulic grade line respectively.

Since pumping is required in all scenarios, a 16 inch waterline was evaluated to compare to the 20 inch waterline previously recommended. However, the energy required to pump through the 16 inch waterline requires over 200 hp. It is not felt to be feasible to drop down in pipe size due to the additional energy requirements that would be seen. In addition, this pumping energy requirement also assumes that the existing 12 inch water line serving the New London tank will be upgraded to 16 inches. Projects include a 20 inch water line along Route 460 and an upgrade of the tank line to 16 inches. A pump station along Route 460 is also needed. Costs for these projects are estimated and summarized in the Table 12.

Table 12 – Total Project & Present Value Cost of Water Service – Forest to Bedford

Description	Total Project Cost	Present Value Cost
B3 Forest to Bedford		
Route 460 WL & PS	$8,503,990	
B3 Total		**$71,282,296**

Water Quality is again a significant concern with this alternative. A minimum regular usage of 412,000 GPD is required in order to maintain two days of storage volume in the proposed 20 inch Route 460 waterline.

C. Water Service from Bedford

The City of Bedford currently has 2.52 MGD excess capacity in their WTP; however, this capacity is only available during non-drought conditions. When a drought is occurring, the available capacity may be zero depending on the severity of the drought. Therefore, there may be the opportunity to share water resources across the County when the City has excess capacity. However, as mentioned previously with regards to water availability, a regular minimum usage is needed through any water line in order to maintain quality standards. The details of when capacity exists in the City and how to guarantee the minimum usage required for water quality need to be analyzed; however, that topic is beyond the scope of this report.

VI. SELECTION OF AN ALTERNATIVE

A. Water Service to Forest

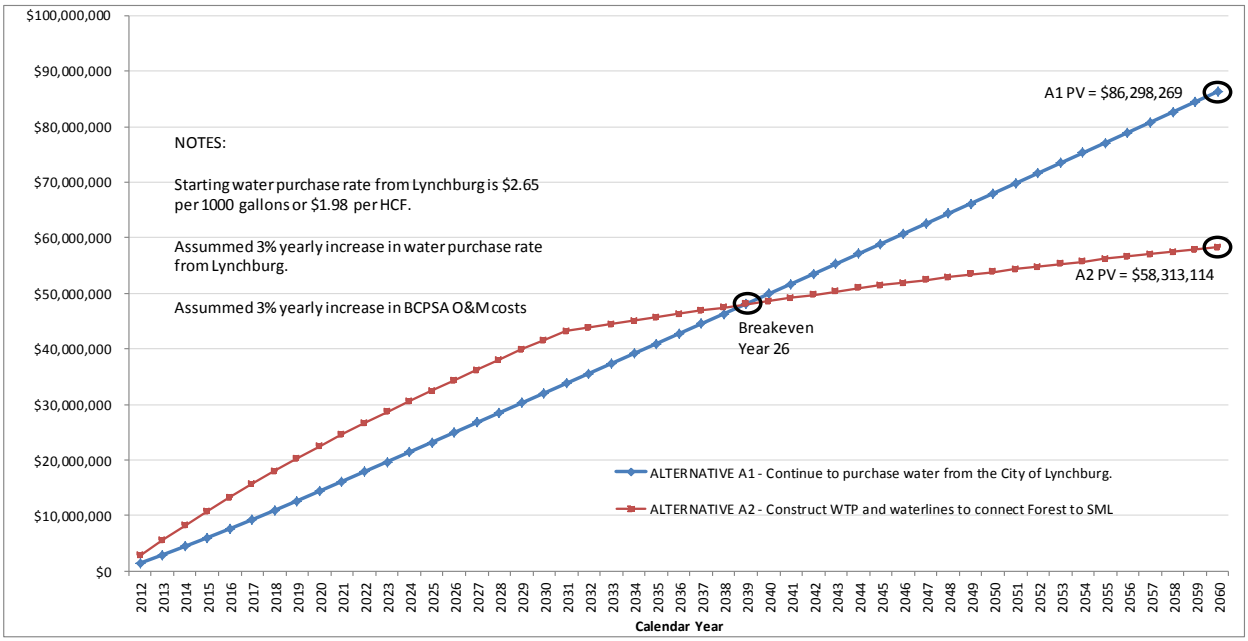
The costs shown in Table 13 below show the total project and PV costs of the two alternatives for serving Forest. A PV cost analysis was prepared for each cost estimate, using the 48 year study period, so that a fair comparison could be made. The PV costs were then analyzed, to determine which alternative would be the most cost effective long term solution. Once that determination was made, a graph of PV cost over time was prepared to determine how many years it would take to make the long term alternative cost effective.

Table 13 – Present Value Cost Comparison of Water Service to Forest Scenario A.

Alternative	Description	Total Project Cost	Present Value Cost
A1	**Purchase Water From Lynchburg**	**N/A**	**$86,298,269**
A2	**Lakes to Forest**		
WTP 1a	WTP 1.0 MGD Upgrade	$398,060	
WTP 1b	WTP 5.0 MGD New	$10,867,285	
Phase 1c	24” Rte 122 Transmission Main	$11,152,241	
Phase 1d	20” Rte 460 Transmission Main	$7,403,296	
Phase 2	Whitehouse Road Loop	$3,187,234	
Phase 3	Route 122 Pump Station	$900,900	
A2 Total	**Lakes to Forest**	**$33,909,016**	**$58,313,114**

Using the 48 year study period and a PV cost, it is easy to see which alternative is more cost effective. The graph, shown in Figure 6 below, also provides valuable information, demonstrating that after a 26 year investment, alternative A2 begins to provide a substantial long term savings to the BCPSA. The BCPSA is currently paying up to $1.5 million per year to the City of Lynchburg; these funds could be invested into alternative A2. This situation is analogous to renting versus buying a home.

Figure 6 – Present value over time, comparing alternatives A1 and A2



In addition, implementing a regional water system within Bedford County and connecting to other regional systems will provide uncalculated value in the future. Safety and security of every water system connected to this new regional system will increase by having an alternate source in times of emergency. Hydraulics will improve over time even as demand increases, by connecting systems together and reducing the distance water has to travel to reach customers. In this way, water quality will also improve.

Calculations titled Project Planning Factors are included for several of the scenarios evaluated in this report in Appendix D. These calculations consider all existing system revenues and expenses that the BCPSA incurs. The proposed project costs are added and the resulting balance is displayed indicating whether or not supplemental funding is needed.

With all these factors having been evaluated, alternative A2 is the recommended alternative.

B. Water Service to Bedford

Evaluation of alternatives B2 and B3 are only applicable if alternative A1 is ultimately selected above. However, as previously discussed, many of the same hydraulic constraints are seen between the Lakes and Bedford, and Forest and Bedford. Therefore, implementation of B2 or B3 inherently brings the system closer to alternative A2. It is difficult to look at these scenarios as completely independent options.

As noted previously, alternative B3 is contingent on acquiring approval from the City of Lynchburg. An amendment to the Water Purchases Contract will likely be necessary.

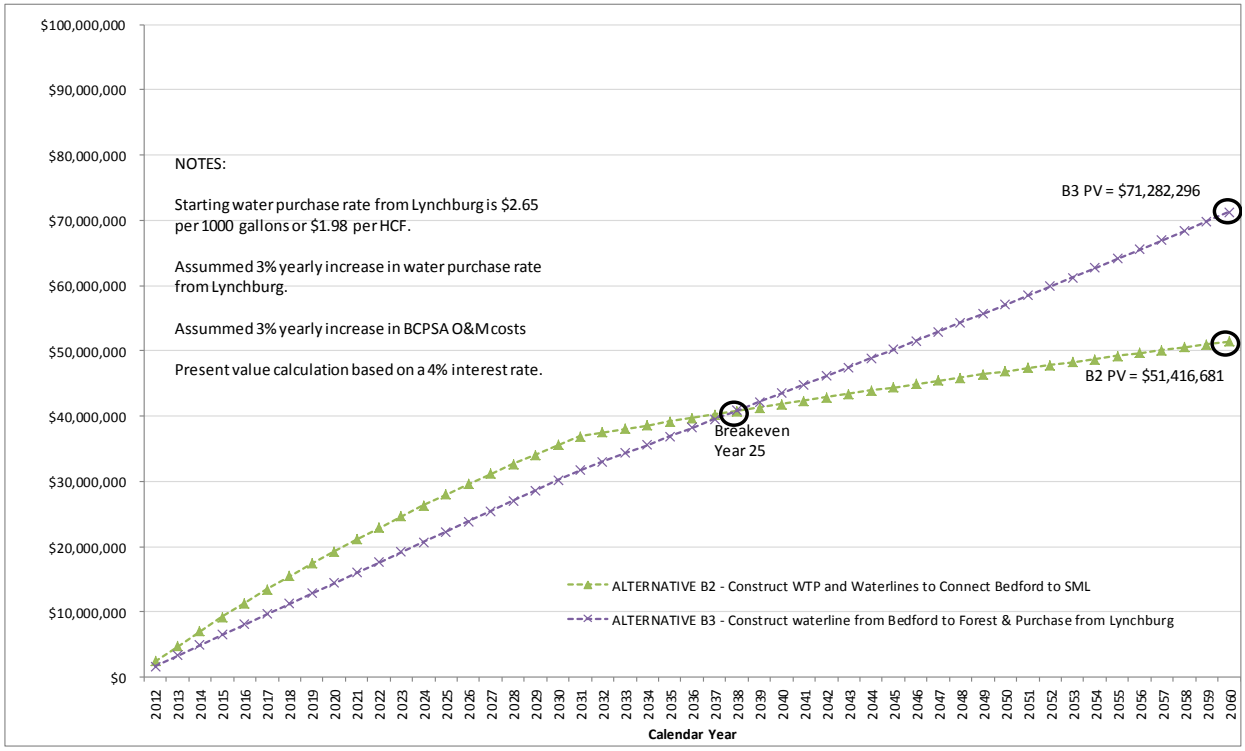
The costs shown in Table 14 below show the total project and PV costs of the two alternatives for serving Bedford. A PV cost analysis was prepared for each cost estimate, using the 48 year study period, so that a fair comparison could be made. The PV costs were then analyzed, to determine which alternative would be the most cost effective long term solution. Once that determination was made, a graph of PV cost over time was prepared to determine how many years it would take to make the long term alternative cost effective.

Table 14 – Present Value Cost Comparison of Alternatives B2 and B3

Alternative	Description	Present Value Cost
B2	Lakes to Bedford	$51,416,681
B3	Forest to Bedford	$71,282,296

Using the 48 year study period and a PV cost, it is easy to see which alternative is cheaper. The graph, shown in Figure 7 below, also provides valuable information, demonstrating that after a 24 year investment, alternative B2 begins to provide a substantial long term savings to the BCPSA. Therefore, alternative B2 is the recommended option.

Figure 7 – Present value over time, comparing alternatives B2 and B3.



VII. PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

A. Water Service to Forest

It is recommended that alternative A2 be implemented in order to bring water service to the Forest area of Bedford County from the Lakes regional water system. The components of this project are detailed as follows.

A2 – Phase 1 Immediate (Year 2012)

- Treatment Recommendations
  - Implement the minor upgrades needed to bring the existing High Point WTP to a capacity of 1.0 MGD. **– WTP Phase 1a**
  - Prepare a detailed water treatment PER evaluating treatment technologies, intake configurations, and regulatory requirements including disinfection-by-products.
  - Apply for a modification of the existing VWP permit to allow for a 6.0 MGD withdrawal. This could take as long as 4 years based on previous experience. We recommend this permit modification be requested immediately if BCPSA decides to pursue connection to either the Forest or Bedford City systems.
  - Design and construct a new 5.0 MGD facility to accommodate expansion of the BCPSA distribution system and customer base for service to the Forest area and to Bedford City if necessary. **– WTP Phase 1b**

    The new facility should be designed for an immediate capacity of 5.0 MGD to accommodate the 20 year peak daily flows. During these periods, the High Point WTP would also need to operate in order to meet the demand. During some times of the year, High Point may be able to operate at greatly reduced capacity or to be shutdown since 5.0 MGD capacity will handle the average daily demand to 20 years.
- Distribution Recommendations
  - Discuss with the City of Bedford and agree on terms for purchase of any of the excess capacity in the new transmission system. Also discuss if they want to purchase additional capacity and upgrade the system at a pace faster than planned.
  - Prepare a detailed water distribution PER evaluating fire flows, pressures, water age and the potential for formation of disinfection-by-products in the system.
  - Design and construct the Route 122 transmission main consisting of 71,000 feet of 24 inch waterline extending between Lakes and the City of Bedford. **– Distribution Phase 1c**
  - Design and construct the Route 460 transmission main consisting of 50,400 feet of 20 inch waterline extending between the City of Bedford and Forest. **– Distribution Phase 1d.**

Table 15 – Alternative A2 Phase 1 Treatment & Distribution Costs

	Total Construction Cost	**Related Cost**	**Total Project Cost**
Phase 1a – 1 MGD	$306,200	$91,860	$398,060
Phase 1b – 5 MGD	$8,359,450	$2,507,835	$10,867,285
Phase 1c	$8,578,647	$2,573,647	$11,152,241
Phase 1d	$5,694,843	$1,708,453	$7,403,296
Total	**$22,939,140**	**$6,881,795**	**$29,820,882**

A2 – Phase 2 Year 2015

- Distribution Recommendations
  - Design and construct the Whitehouse Road Loop consisting of 22,100 feet of 18 inch waterline extending between the SML Tank and Moneta. **– Distribution Phase 2**

Table 16 – Alternative A2 Phase 2 Distribution Costs 2015

	Total Construction Cost	Related Cost	Total Project Cost
Phase 2	**$2,451,719**	**$735,516**	**$3,187,234**

A2 – Phase 3 Year 2030

- Pumping Recommendations
  - Design and construct the Route 122 pump station for an ultimate capacity of 3000 gpm. **– Distribution Phase 3**

Table 17 – Alternative A2 Phase 3 Pumping Costs 2030

	Total Construction Cost	Related Cost	Total Project Cost
Phase 3	**$693,000**	**$207,900**	**$900,900**

Table 18 - Alternative A2 Total Costs

	Total Construction Cost	**Related Cost**	**Total Project Cost**
Phase 1a – 1 MGD	$306,200	$91,860	$398,060
Phase 1b – 5 MGD	$8,359,450	$2,507,835	$10,867,285
Phase 1c	$8,578,647	$2,573,647	$11,152,241
Phase 1d	$5,694,843	$1,708,453	$7,403,296
Phase 2	$2,451,719	$735,516	$3,187,234
Phase 3	$693,000	$207,900	$900,900
Total	**26,083,859**	**$7,825,211**	**$33,909,016**

B. Water Service to Bedford

It is recommended that alternative B2 be implemented in order to bring water service to the City of Bedford from the Lakes area. If alternative A2 is implemented as detailed above, many of the requirements will overlap, however, this recommendation is being provided as an independent solution. The components of this project are detailed as follows.

B2 – Immediate (Year 2012)

- Treatment Recommendations
  - Implement the minor upgrades needed to bring the existing High Point WTP to a capacity of 1.0 MGD.
  - Prepare a detailed water treatment PER evaluating treatment technologies, intake configurations, and regulatory requirements including disinfection-by-products.
  - Apply for a modification of the existing VWP permit to allow for a 6.0 MGD withdrawal. This could take as long as 4 years based on previous experience. We recommend this permit modification be requested immediately if BCPSA decides to pursue connection to the Bedford City system.
  - Design and construct a new 5.0 MGD facility to accommodate expansion of the BCPSA distribution system and customer base for service to Bedford City.

    The new facility should be designed for an immediate capacity of 5.0 MGD to accommodate the 20 year peak daily flows. During these periods, the High Point WTP would also need to operate in order to meet the demand. During some times of the year, High Point may be able to operate at greatly reduced capacity or to be shutdown since 5.0 MGD capacity will handle the average daily demand to 20 years.
- Distribution Recommendations
  - Discuss with the City of Bedford and agree on terms for purchase of water and agree on minimum purchase requirements to maintain water quality.
  - Design and construct the Route 122 transmission main consisting of 71,000 feet of 24 inch waterline extending between Lakes and the City of Bedford.

Table 19 – Alternative B2 Total Costs

	Description	Total Construction Cost	Related Cost	Total Project Cost
B2	**Lakes to Bedford**			
WTP Phase 1a	WTP 1.0 MGD Upgrade	$306,200	$91,860	$398,060
WTP Phase 1b	WTP 5.0 MGD New	$8,359,450	$2,507,835	$10,867,285
Phase 1c	24” Transmission Main	$8,578,647	$2,573,594	$11,152,241
Phase 2	Route 122 Pump Station	$693,000	$207,900	$900,900
B2 Total		**$17,937,297**	**$5,381,189**	**$23,318,486**

APPENDIX A

Maps

BEDFORD COUNTY PLANNING AREAS

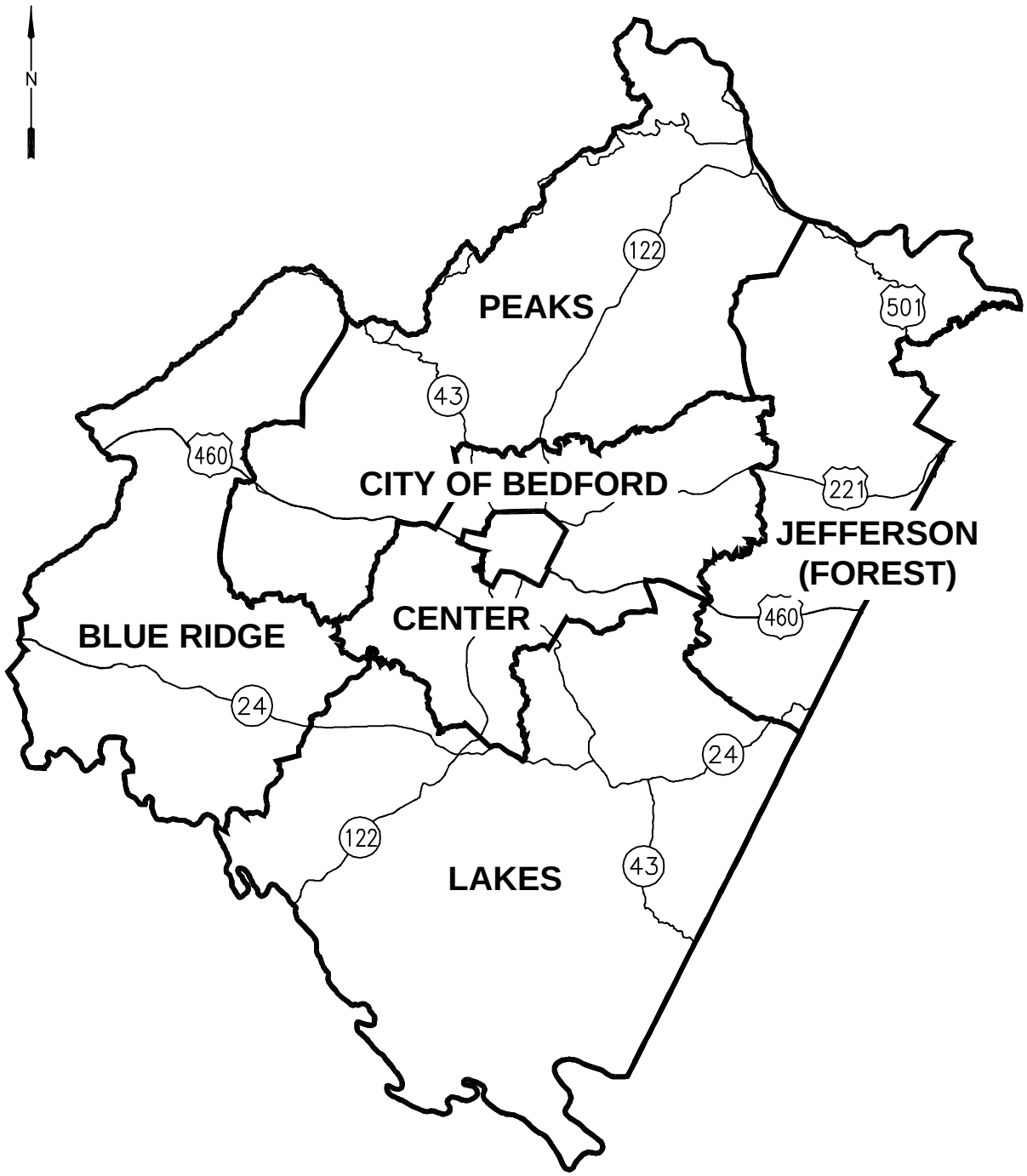


FIGURE 1

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ANDERSON AND ASSOCIATES, Inc.

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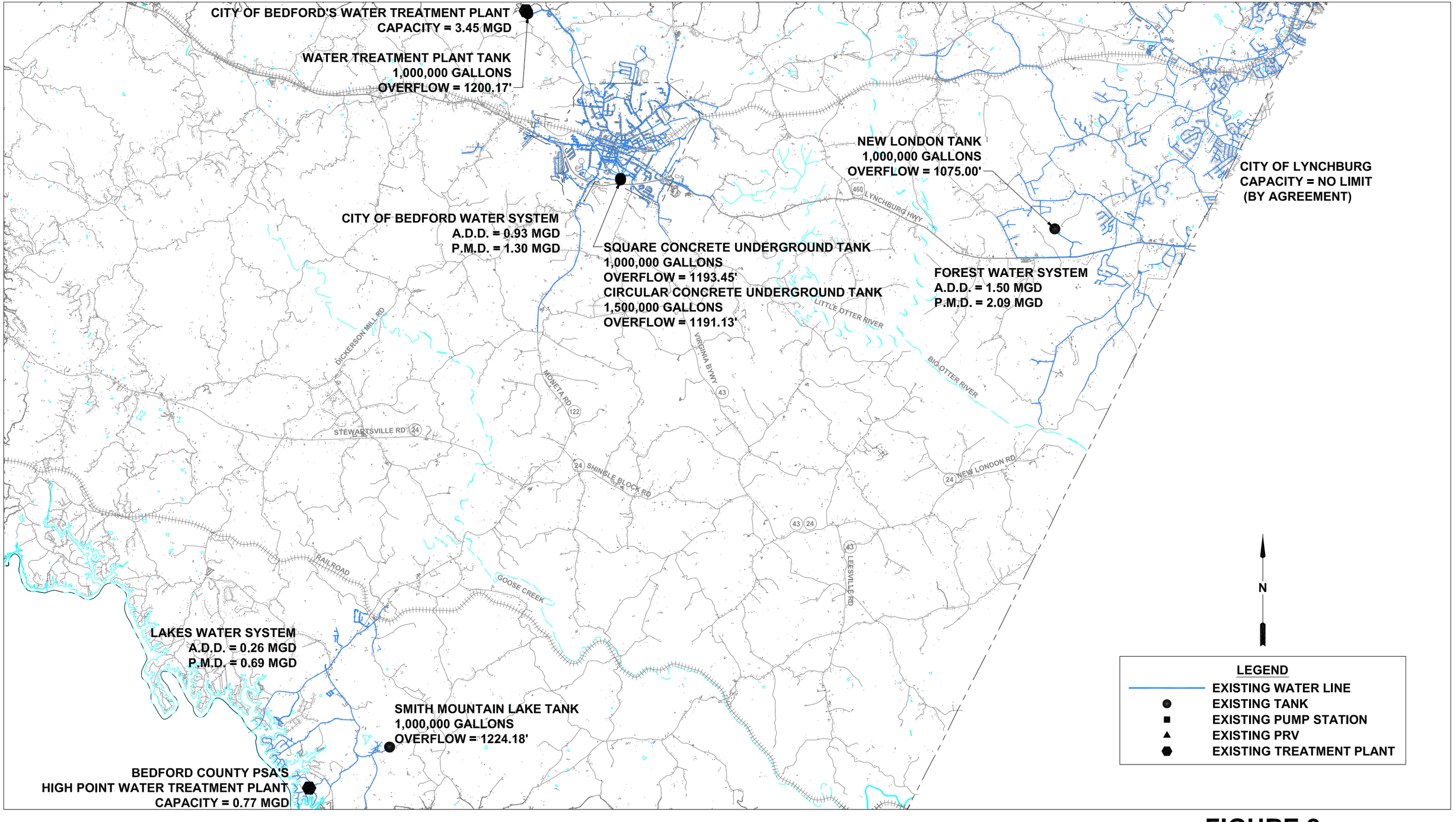
BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

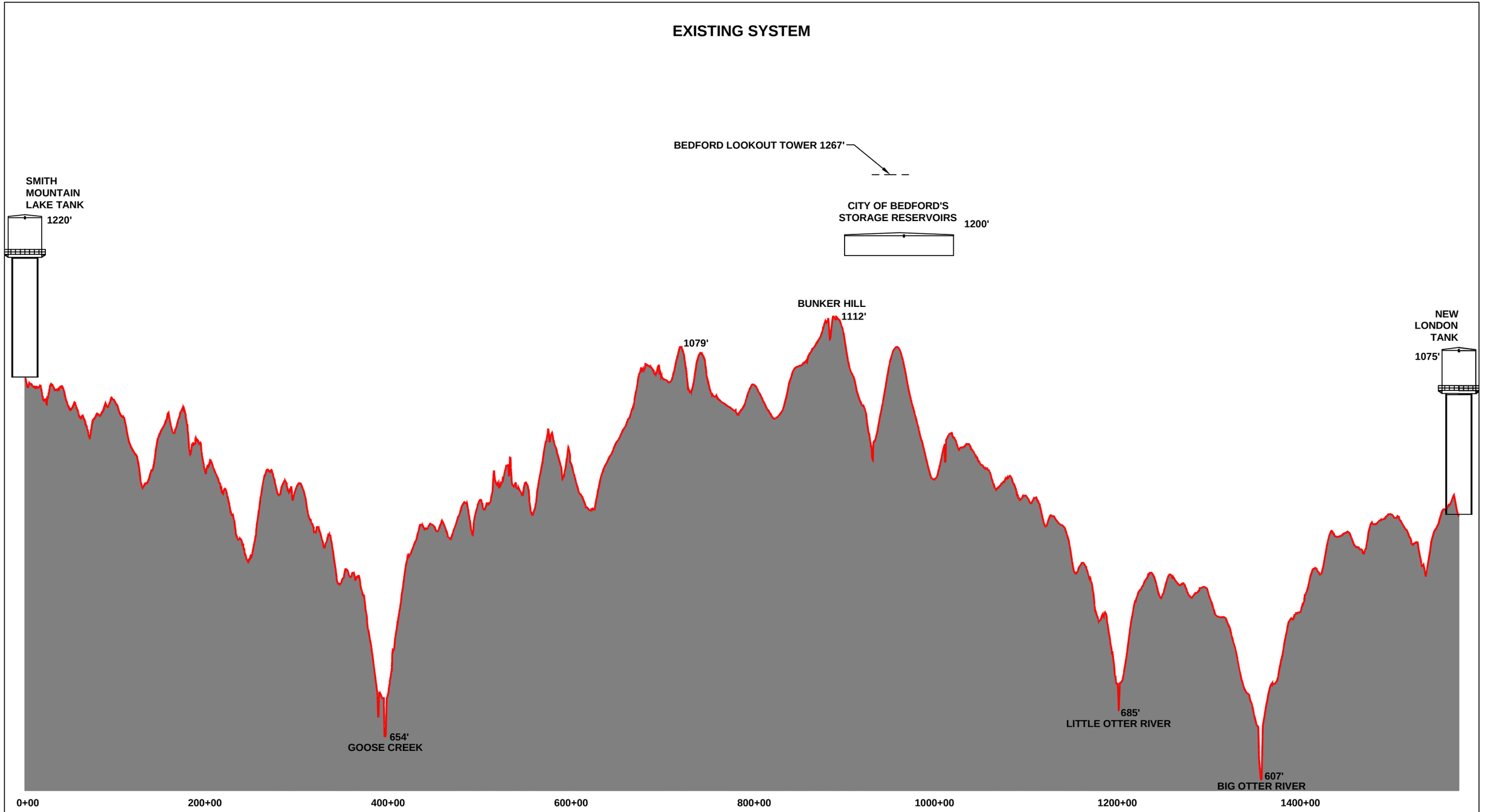


ANDERSON AND ASSOCIATES, Inc.

FIGURE 2
EXISTING SYSTEMS

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

EXISTING SYSTEM



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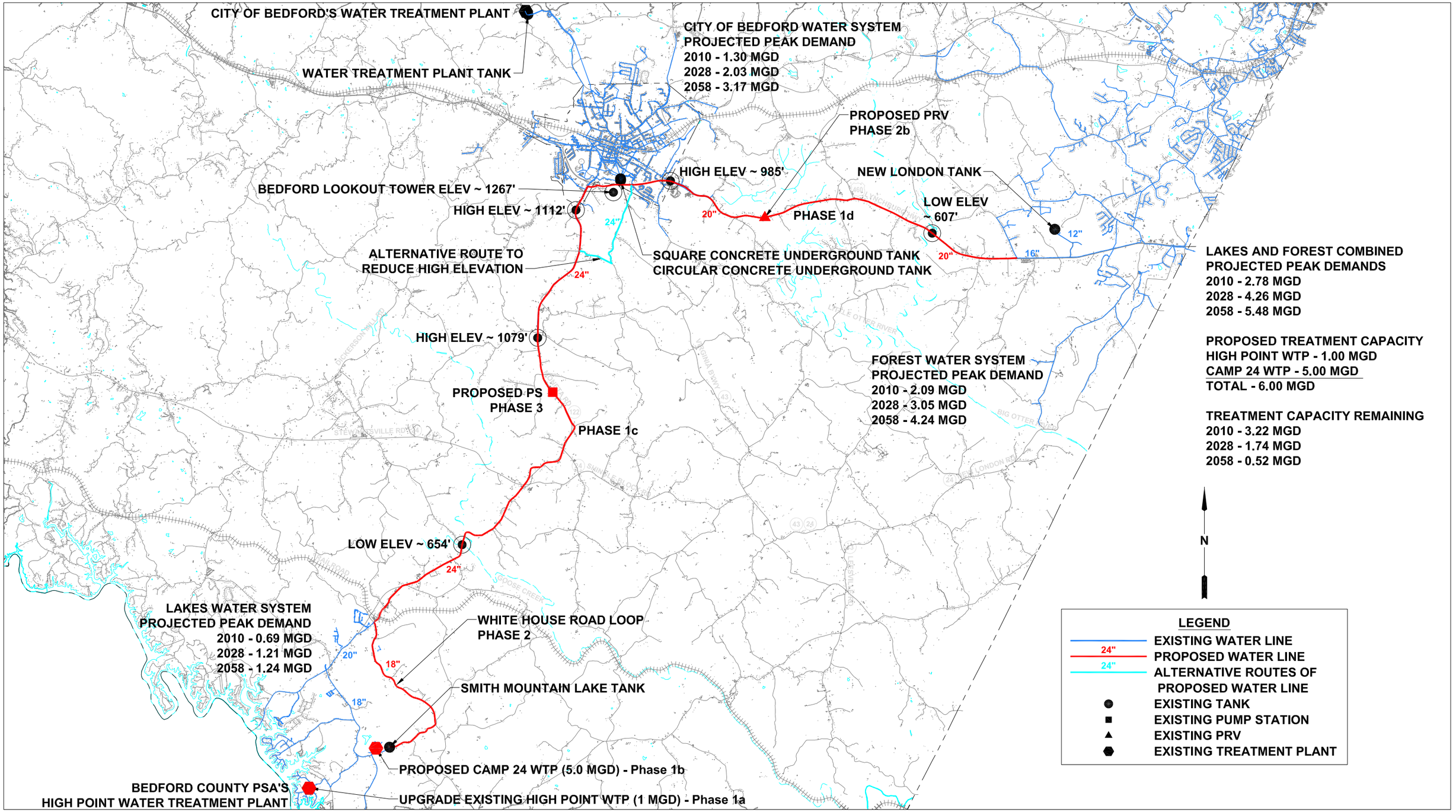
ANDERSON AND ASSOCIATES, Inc.

FIGURE 3
EXISTING PROFILE

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY



DISTRIBUTION PHASES 1c, 1d, 2, & 3

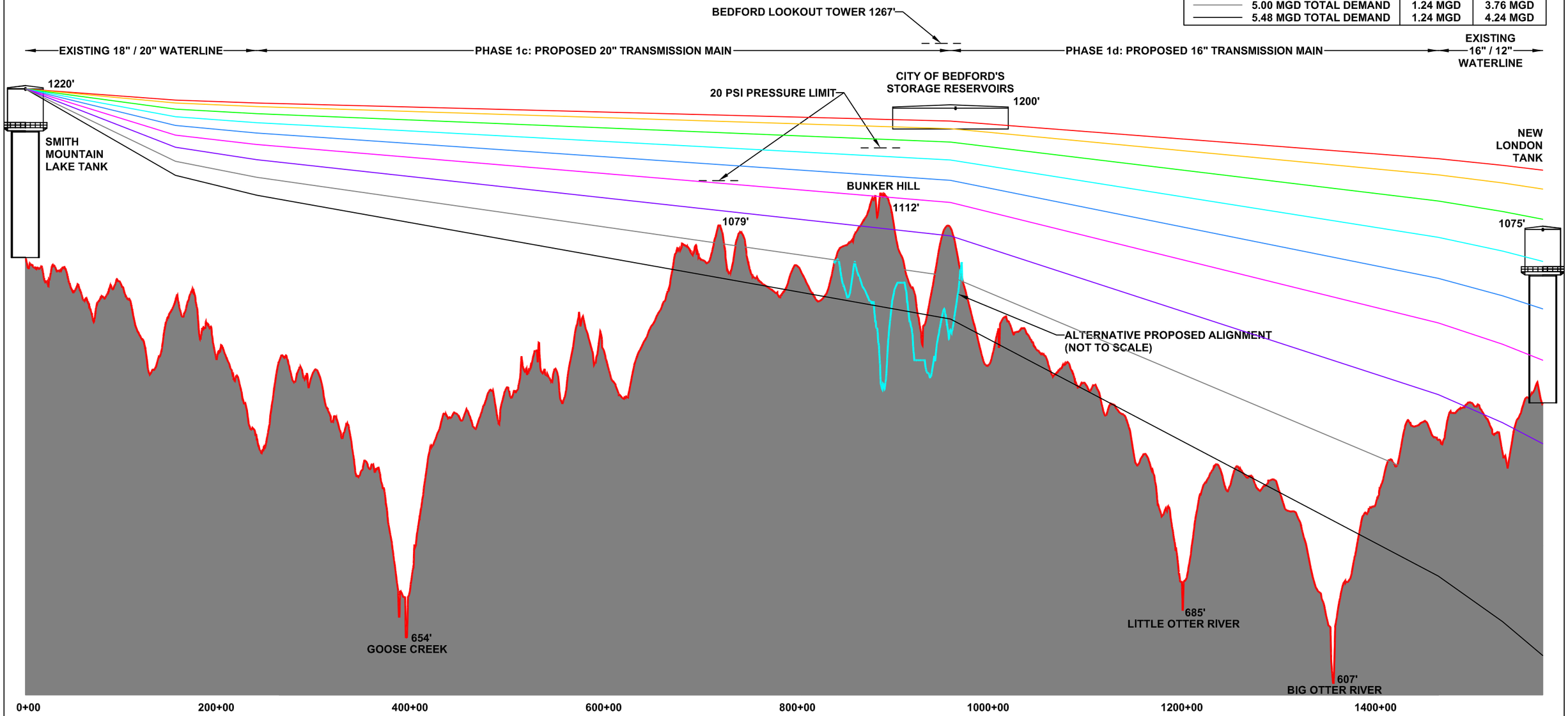
FIGURE 4 PROPOSED ALTERNATIVE A2 MAP

ANDERSON AND ASSOCIATES, Inc.

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1c: 20" ROUTE 122 LAKES TO FOREST TRANSMISSION MAIN
PHASE 1d: 16" ROUTE 460 LAKES TO FOREST TRANSMISSION MAIN

LEGEND	LAKES	FOREST
1.76 MGD TOTAL DEMAND	0.26 MGD	1.50 MGD
2.00 MGD TOTAL DEMAND	0.32 MGD	1.68 MGD
2.50 MGD TOTAL DEMAND	0.59 MGD	1.91 MGD
3.00 MGD TOTAL DEMAND	0.78 MGD	2.22 MGD
3.50 MGD TOTAL DEMAND	0.98 MGD	2.52 MGD
4.00 MGD TOTAL DEMAND	1.18 MGD	2.82 MGD
4.50 MGD TOTAL DEMAND	1.23 MGD	3.27 MGD
5.00 MGD TOTAL DEMAND	1.24 MGD	3.76 MGD
5.48 MGD TOTAL DEMAND	1.24 MGD	4.24 MGD



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SCALE IN FEET

ANDERSON AND ASSOCIATES, Inc.

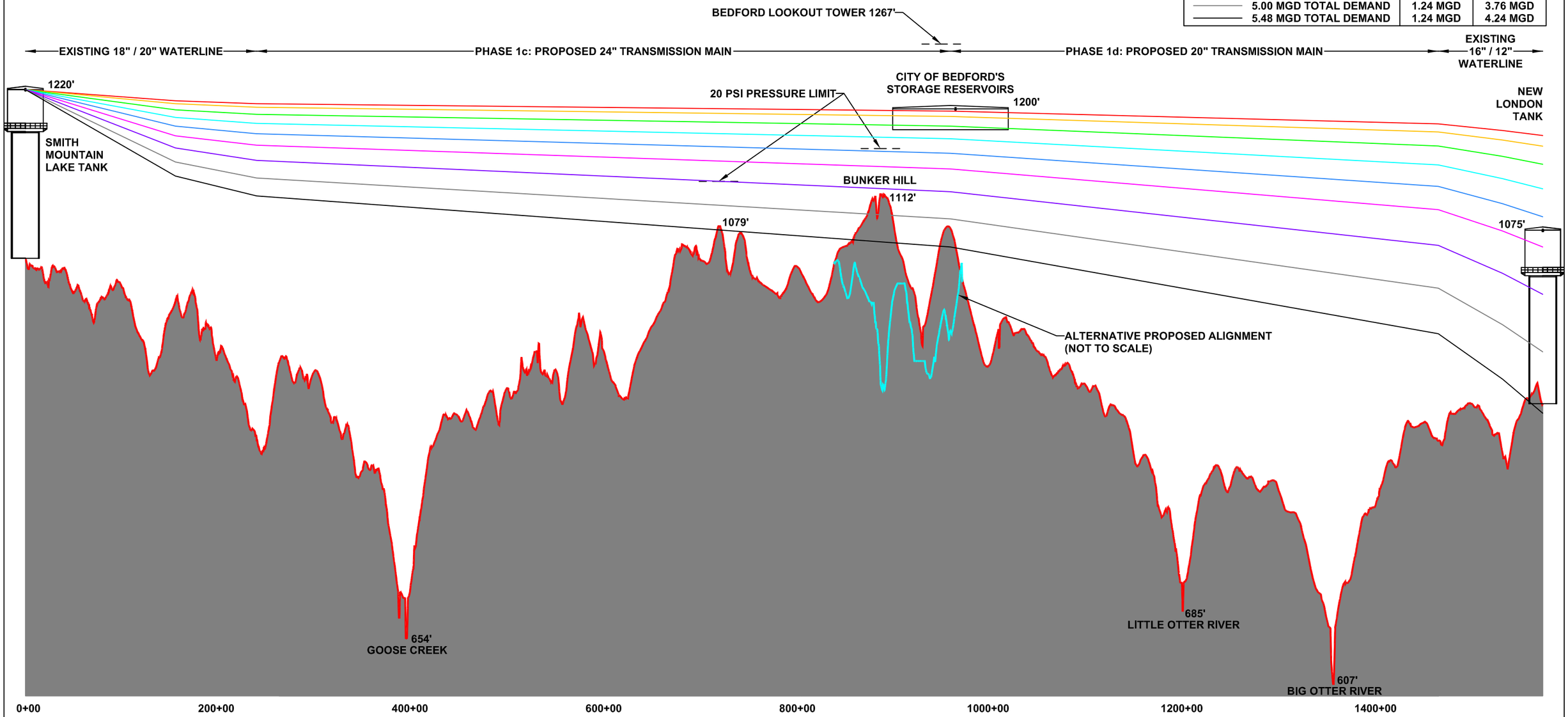
DISTRIBUTION PHASES 1c & 1d

FIGURE 5 PROPOSED ALTERNATIVE A2 GRAPH

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1c: 24" ROUTE 122 LAKES TO FOREST TRANSMISSION MAIN
PHASE 1d: 20" ROUTE 460 LAKES TO FOREST TRANSMISSION MAIN

LEGEND	LAKES	FOREST
1.76 MGD TOTAL DEMAND	0.26 MGD	1.50 MGD
2.00 MGD TOTAL DEMAND	0.32 MGD	1.68 MGD
2.50 MGD TOTAL DEMAND	0.59 MGD	1.91 MGD
3.00 MGD TOTAL DEMAND	0.78 MGD	2.22 MGD
3.50 MGD TOTAL DEMAND	0.98 MGD	2.52 MGD
4.00 MGD TOTAL DEMAND	1.18 MGD	2.82 MGD
4.50 MGD TOTAL DEMAND	1.23 MGD	3.27 MGD
5.00 MGD TOTAL DEMAND	1.24 MGD	3.76 MGD
5.48 MGD TOTAL DEMAND	1.24 MGD	4.24 MGD



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SCALE IN FEET

ANDERSON AND ASSOCIATES, Inc.

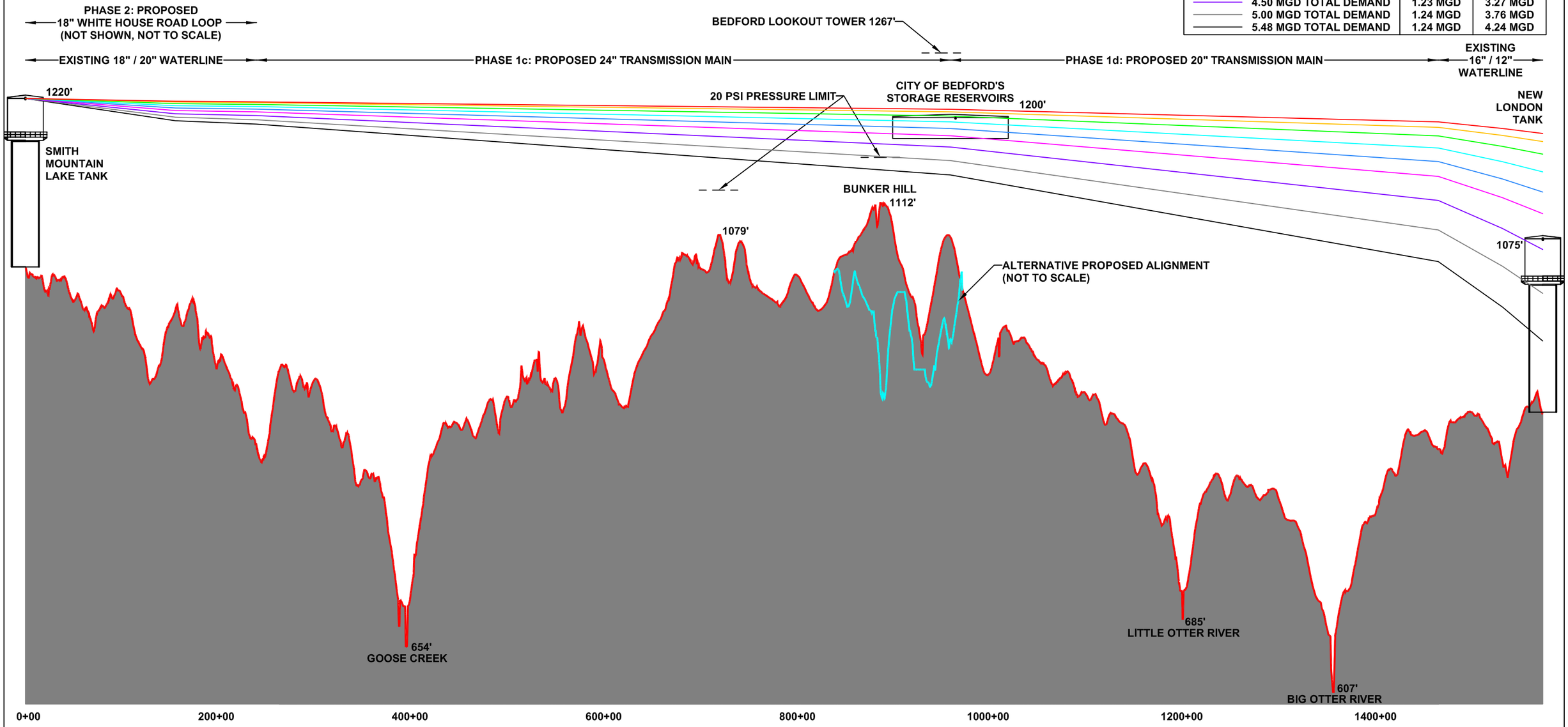
DISTRIBUTION PHASES 1c & 1d

FIGURE 6
PROPOSED ALTERNATIVE A2 GRAPH

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1c: 24" ROUTE 122 LAKES TO FOREST TRANSMISSION MAIN
PHASE 1d: 20" ROUTE 460 LAKES TO FOREST TRANSMISSION MAIN
PHASE 2: 18" WHITE HOUSE ROAD LOOP

LEGEND	LAKES	FOREST
1.76 MGD TOTAL DEMAND	0.26 MGD	1.50 MGD
2.00 MGD TOTAL DEMAND	0.32 MGD	1.68 MGD
2.50 MGD TOTAL DEMAND	0.59 MGD	1.91 MGD
3.00 MGD TOTAL DEMAND	0.78 MGD	2.22 MGD
3.50 MGD TOTAL DEMAND	0.98 MGD	2.52 MGD
4.00 MGD TOTAL DEMAND	1.18 MGD	2.82 MGD
4.50 MGD TOTAL DEMAND	1.23 MGD	3.27 MGD
5.00 MGD TOTAL DEMAND	1.24 MGD	3.76 MGD
5.48 MGD TOTAL DEMAND	1.24 MGD	4.24 MGD



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SCALE IN FEET

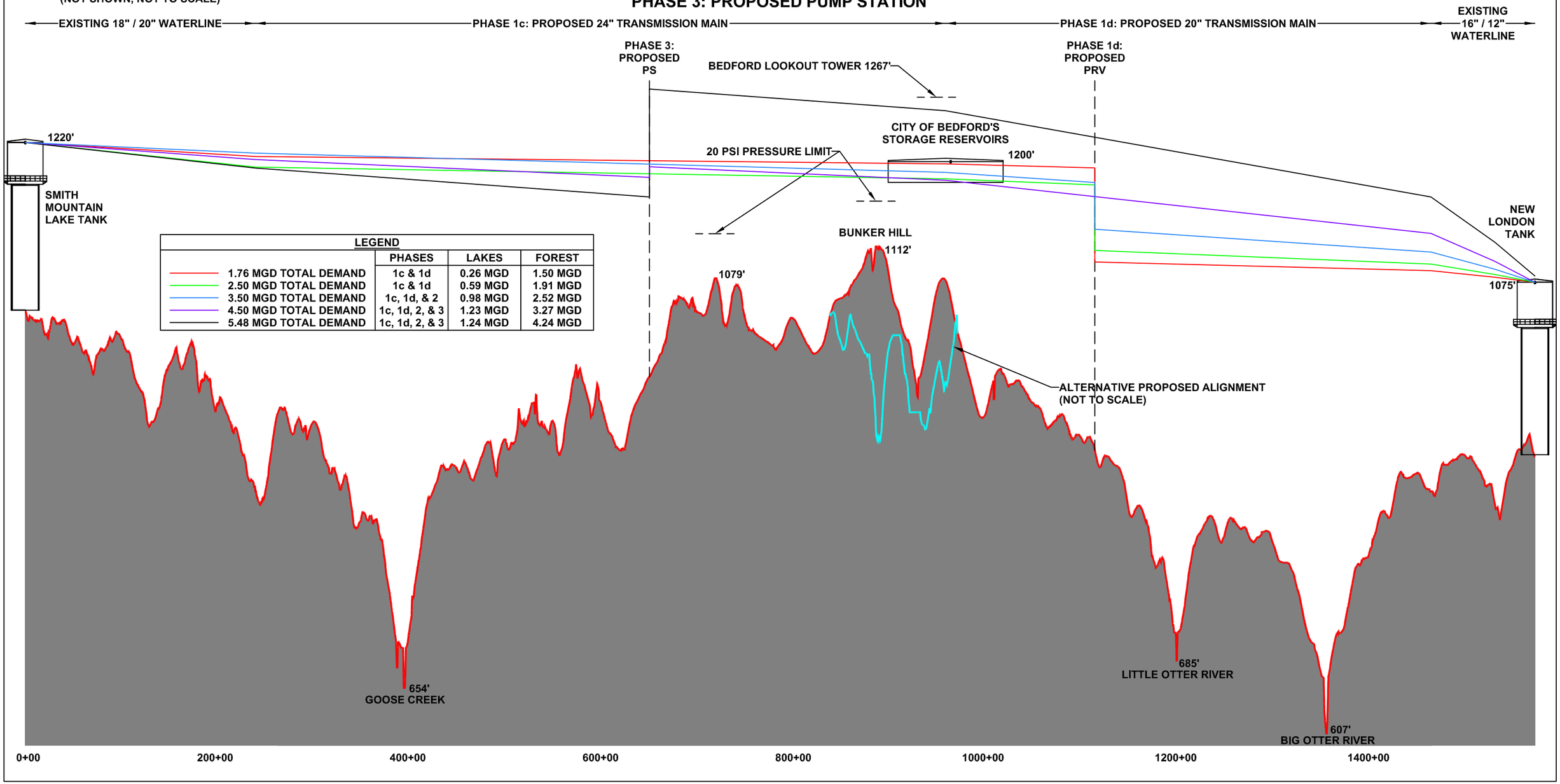
ANDERSON AND ASSOCIATES, Inc.

DISTRIBUTION PHASES 1c, 1d, & 2

FIGURE 7
PROPOSED ALTERNATIVE A2 GRAPH

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1c: 24" ROUTE 122 LAKES TO FOREST TRANSMISSION MAIN
PHASE 1d: 20" ROUTE 460 LAKES TO FOREST TRANSMISSION MAIN
PHASE 2: 18" WHITE HOUSE ROAD LOOP
PHASE 3: PROPOSED PUMP STATION



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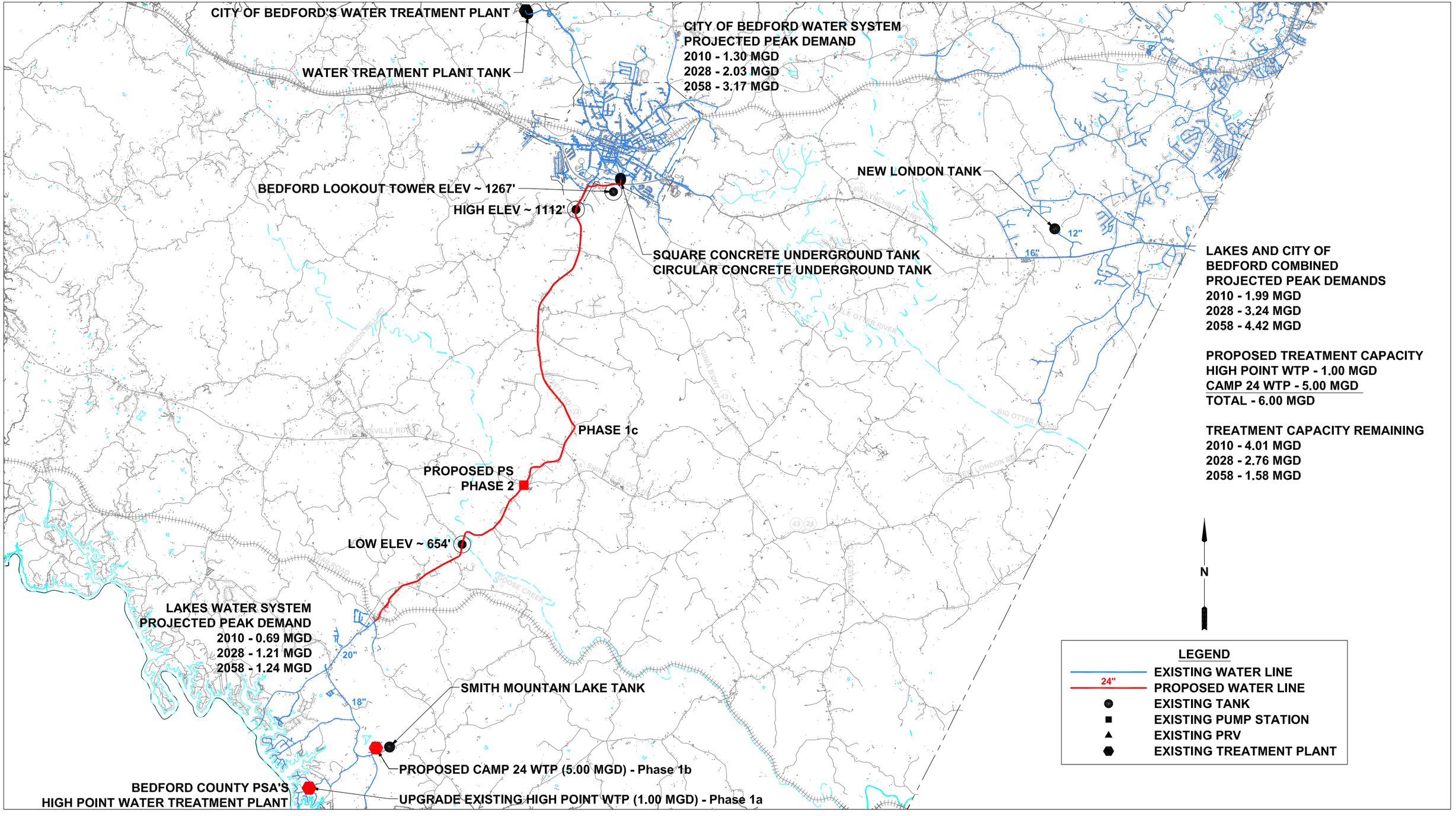
SCALE IN FEET

ANDERSON AND ASSOCIATES, Inc.

DISTRIBUTION PHASES 1c, 1d, 2, & 3

FIGURE 7A PROPOSED ALTERNATIVE A2 GRAPH

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY



DISTRIBUTION PHASES 1a, 1b, 1c, & 2

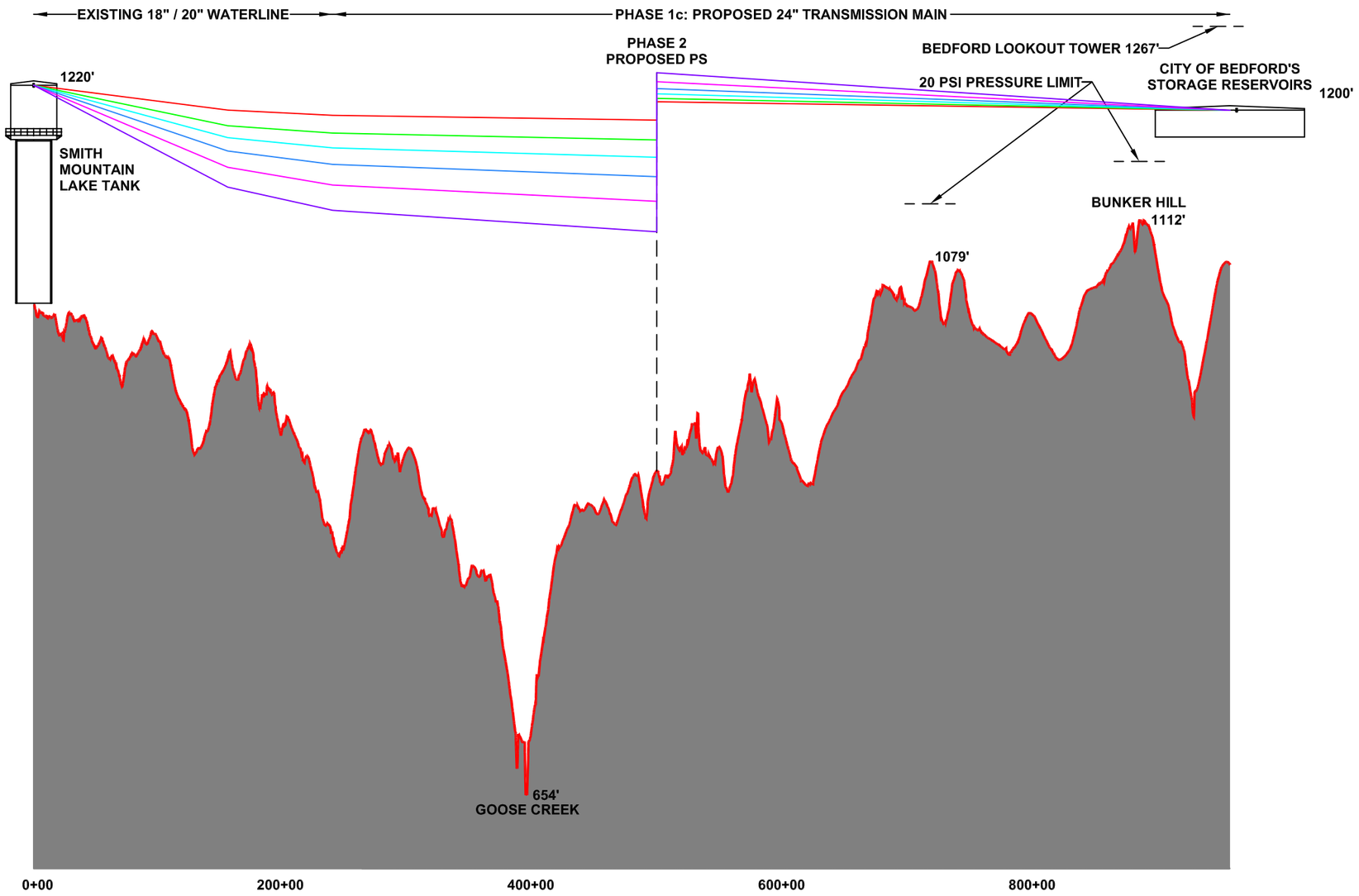
FIGURE 8 PROPOSED ALTERNATIVE B2 MAP

ANDERSON AND ASSOCIATES, Inc.

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1c: 24" ROUTE 122 LAKES TO CITY OF BEDFORD TRANSMISSION MAIN

LEGEND	CITY OF BEDFORD	LAKES
2010 PROJECTED PEAK DEMAND	1.30 MGD	0.69 MGD
2018 PROJECTED PEAK DEMAND	1.59 MGD	1.17 MGD
2028 PROJECTED PEAK DEMAND	2.03 MGD	1.21 MGD
2038 PROJECTED PEAK DEMAND	2.36 MGD	1.24 MGD
2048 PROJECTED PEAK DEMAND	2.74 MGD	1.24 MGD
2058 PROJECTED PEAK DEMAND	3.17 MGD	1.24 MGD



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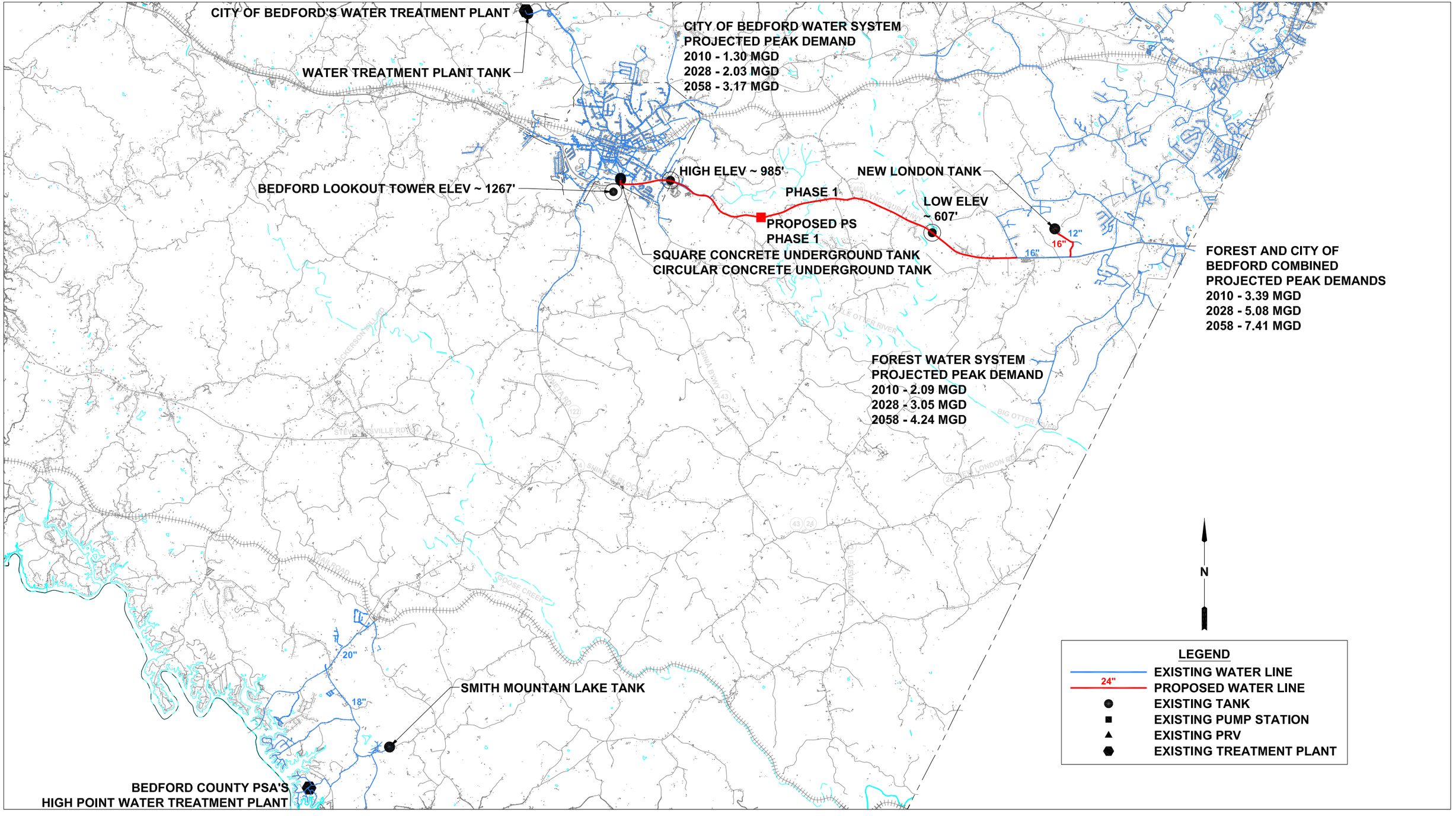
DISTRIBUTION PHASES 1c & 2

FIGURE 9
PROPOSED ALTERNATIVE B2 GRAPH

ANDERSON AND ASSOCIATES, Inc.

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY



DISTRIBUTION PHASE 1

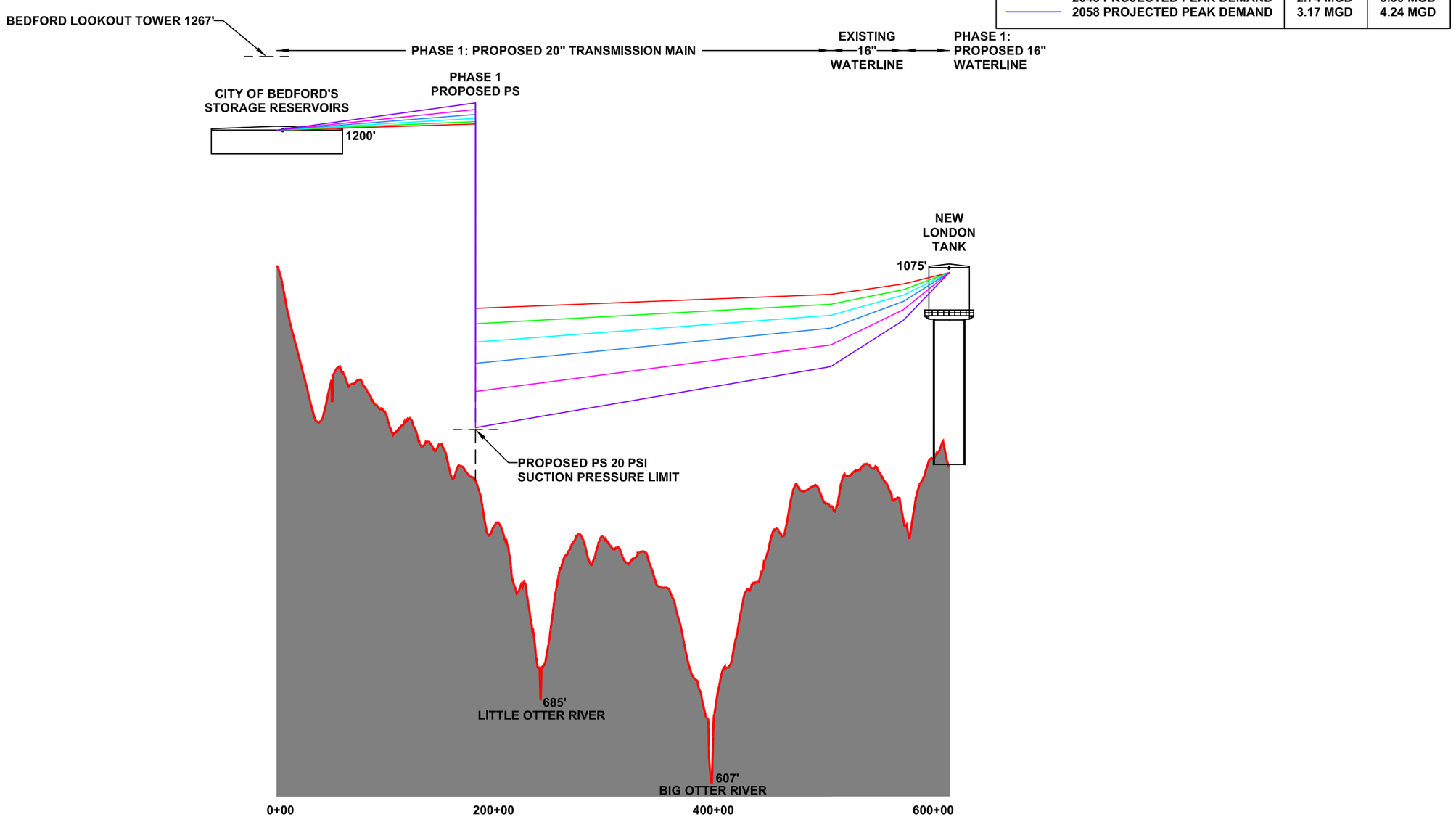
FIGURE 10
PROPOSED ALTERNATIVE B3 MAP

ANDERSON AND ASSOCIATES, Inc.

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY

PROPOSED SYSTEM WITH
PHASE 1: 20" ROUTE 460 FOREST TO CITY OF BEDFORD TRANSMISSION MAIN

LEGEND	CITY OF BEDFORD	FOREST
2010 PROJECTED PEAK DEMAND	1.30 MGD	2.09 MGD
2018 PROJECTED PEAK DEMAND	1.59 MGD	2.74 MGD
2028 PROJECTED PEAK DEMAND	2.03 MGD	3.05 MGD
2038 PROJECTED PEAK DEMAND	2.36 MGD	3.40 MGD
2048 PROJECTED PEAK DEMAND	2.74 MGD	3.80 MGD
2058 PROJECTED PEAK DEMAND	3.17 MGD	4.24 MGD



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SCALE IN FEET

ANDERSON AND ASSOCIATES, Inc.

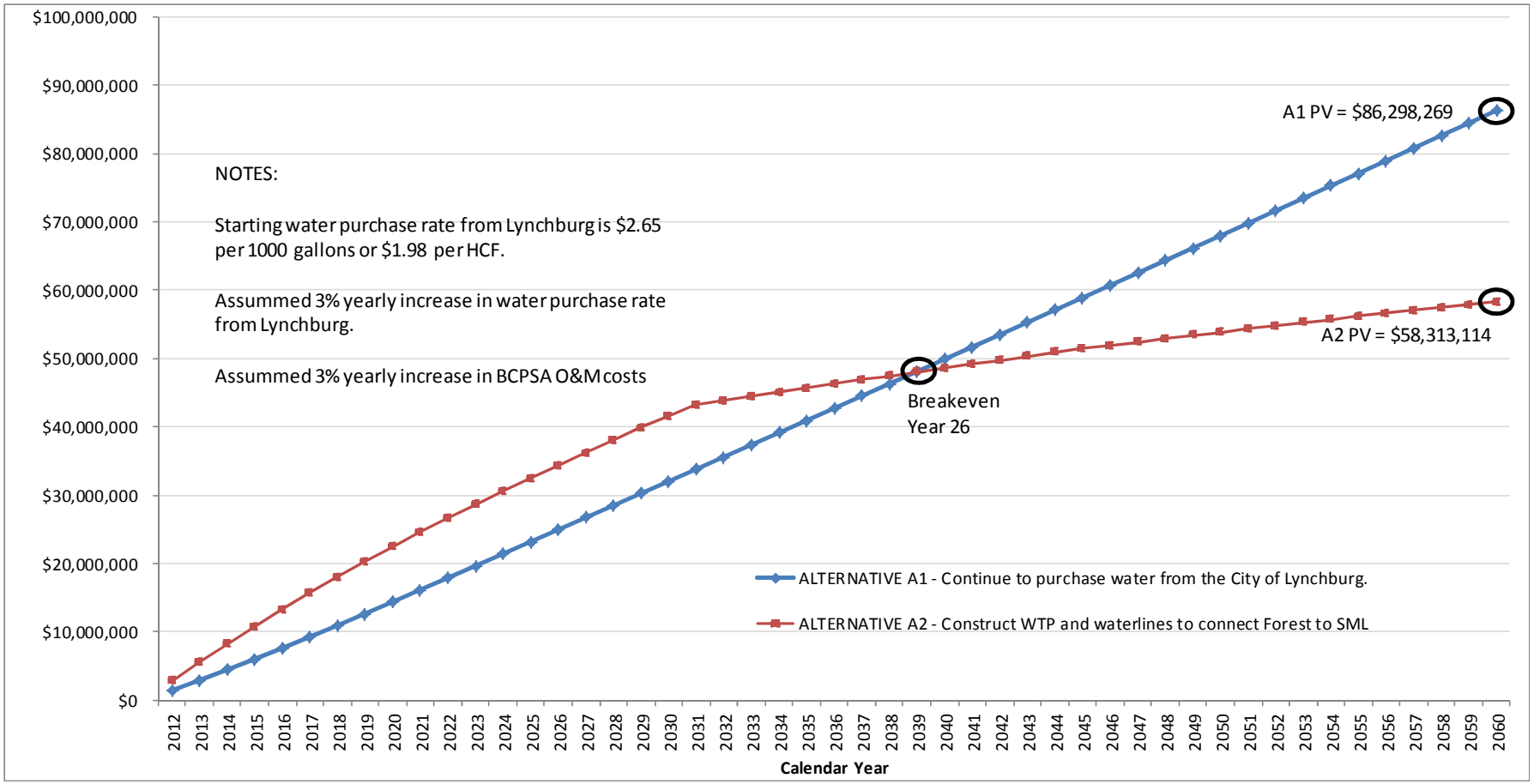
DISTRIBUTION PHASE 1

FIGURE 11
PROPOSED ALTERNATIVE B3 GRAPH

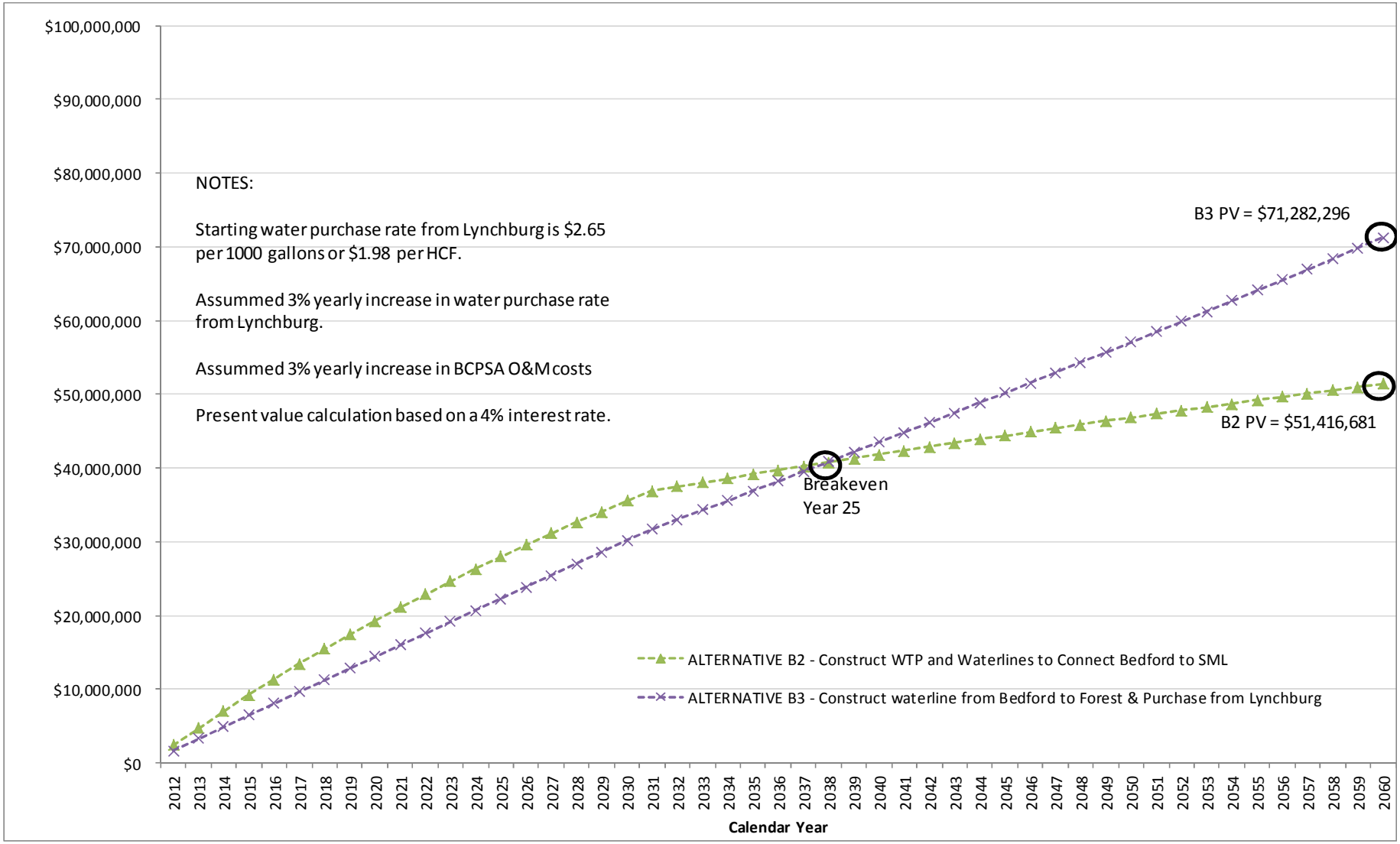
APPENDIX B

Cost Estimates

Present Value Analysis – Graph of Alternatives A1 & A2



Present Value Analysis – Graph of Alternatives B2 & B3



Summary of all the Alternatives – Annual Analysis of Present Value Costs

$2.65 Starting Rate for Lynchburg Per 1000 gallons
3% Assumed Rate Increase with Lynchburg *
3% Assumed Increase in O&M Costs

$1.98 Per HCF
20 Debt Service Period (Years)
4.0% Interest Rate on Debt

ALTERNATIVE A1 - Continue to purchase water from the City of Lynchburg.
ALTERNATIVE A2 - Construct WTP and waterlines to connect Forest to SML
ALTERNATIVE B2 - Construct WTP and Waterlines to Connect Bedford to SML
ALTERNATIVE B3 - Construct waterline from Bedford to Forest & Purchase from Lynchburg

YEAR							
Calendar	#	A1	A2	Savings / (Costs) IfA2 is selected	B2	B3	Savings / (Costs) If B2 is selected
2012	0	$1,450,875	$2,831,587	($1,380,712)	$2,409,201	$1,635,897	($773,304)
2013	1	$2,941,624	$5,572,541	($2,630,916)	$4,745,649	$3,261,898	($1,483,751)
2014	2	$4,471,538	$8,226,512	($3,754,974)	$7,012,239	$4,878,768	($2,133,471)
2015	3	$6,039,528	$10,796,329	($4,756,801)	$9,211,178	$6,486,823	($2,724,354)
2016	4	$7,644,773	$13,285,143	($5,640,370)	$11,344,952	$8,086,621	($3,258,332)
2017	5	$9,286,378	$15,695,853	($6,409,475)	$13,415,844	$9,678,602	($3,737,242)
2018	6	$10,963,565	$18,031,395	($7,067,830)	$15,426,173	$11,263,282	($4,162,891)
2019	7	$12,675,465	$20,294,444	($7,618,979)	$17,378,046	$12,841,051	($4,536,995)
2020	8	$14,421,328	$22,487,715	($8,066,387)	$19,273,611	$14,412,373	($4,861,237)
2021	9	$16,170,808	$24,613,659	($8,442,850)	$21,114,792	$15,983,780	($5,131,012)
2022	10	$17,923,724	$26,674,758	($8,751,034)	$22,903,557	$17,555,551	($5,348,005)
2023	11	$19,679,749	$28,673,230	($8,993,481)	$24,641,642	$19,127,810	($5,513,832)
2024	12	$21,438,657	$30,611,320	($9,172,663)	$26,330,821	$20,700,751	($5,630,070)
2025	13	$23,200,341	$32,491,312	($9,290,971)	$27,972,907	$22,274,652	($5,698,255)
2026	14	$24,964,519	$34,315,211	($9,350,692)	$29,569,477	$23,849,616	($5,719,861)
2027	15	$26,731,016	$36,215,416	($9,484,400)	$31,122,145	$25,425,823	($5,696,322)
2028	16	$28,499,450	$38,058,300	($9,558,850)	$32,632,279	$27,003,245	($5,629,034)
2029	17	$30,269,875	$39,846,177	($9,576,303)	$34,101,566	$28,582,233	($5,519,333)
2030	18	$32,041,780	$41,580,705	($9,538,926)	$35,531,159	$30,162,611	($5,368,548)
2031	19	$33,816,714	$43,223,864	($9,407,150)	$36,891,210	$31,725,925	($5,165,285)
2032	20	$35,594,722	$43,856,368	($8,261,646)	$37,462,775	$33,009,887	($4,452,887)
2033	21	$37,375,188	$44,479,637	($7,104,449)	$38,028,784	$34,299,530	($3,729,254)
2034	22	$39,158,408	$45,094,056	($5,935,648)	$38,589,453	$35,594,994	($2,994,459)
2035	23	$40,943,542	$45,699,610	($4,756,067)	$39,144,636	$36,895,595	($2,249,041)
2036	24	$42,730,705	$46,296,602	($3,565,897)	$39,694,486	$38,201,344	($1,493,142)
2037	25	$44,519,692	$46,885,220	($2,365,528)	$40,239,055	$39,512,023	($727,031)
2038	26	$46,310,421	$47,465,685	($1,155,264)	$40,778,428	$40,827,503	$49,075
2039	27	$48,102,420	$48,038,084	$64,337	$41,312,573	$42,147,369	$834,797
2040	28	$49,895,845	$48,602,698	$1,293,148	$41,841,643	$43,471,671	$1,630,028
2041	29	$51,692,642	$49,159,673	$2,532,970	$42,365,670	$44,803,085	$2,437,416
2042	30	$53,492,052	$49,752,717	$3,739,336	$42,884,548	$46,140,961	$3,256,414
2043	31	$55,294,583	$50,337,428	$4,957,155	$43,398,537	$47,485,590	$4,087,054
2044	32	$57,099,689	$50,911,314	$6,188,375	$43,907,590	$48,836,481	$4,928,891
2045	33	$58,906,902	$51,415,343	$7,491,559	$44,411,685	$50,193,199	$5,781,514
2046	34	$60,716,528	$51,914,017	$8,802,512	$44,911,013	$51,555,895	$6,644,881
2047	35	$62,527,631	$52,407,210	$10,120,421	$45,405,420	$52,923,781	$7,518,361
2048	36	$64,340,787	$52,895,212	$11,445,575	$45,895,166	$54,297,218	$8,402,052
2049	37	$66,155,246	$53,377,945	$12,777,301	$46,380,147	$55,675,558	$9,295,411
2050	38	$67,971,112	$53,855,561	$14,115,551	$46,860,489	$57,058,806	$10,198,317
2051	39	$69,790,462	$54,328,027	$15,462,435	$47,336,137	$58,449,768	$11,113,631
2052	40	$71,613,617	$54,795,557	$16,818,060	$47,807,281	$59,848,590	$12,041,309
2053	41	$73,440,175	$55,258,173	$18,182,002	$48,273,921	$61,254,871	$12,980,950
2054	42	$75,269,837	$55,715,922	$19,553,915	$48,736,083	$62,668,289	$13,932,206
2055	43	$77,102,414	$56,168,878	$20,933,537	$49,193,821	$64,088,608	$14,894,787
2056	44	$78,936,814	$56,616,381	$22,320,433	$49,646,962	$65,514,889	$15,867,928
2057	45	$80,774,104	$57,047,145	$23,726,959	$50,095,866	$66,947,876	$16,852,010
2058	46	$82,613,402	$57,473,728	$25,139,674	$50,540,413	$68,386,796	$17,846,383
2059	47	$84,455,026	$57,895,714	$26,559,312	$50,980,770	$69,831,814	$18,851,044
2060	48	$86,298,269	$58,313,114	$27,985,156	$51,416,861	$71,282,296	$19,865,435

*Water purchase costs are calculated using a 3% per year rate of increase. This is based on an interpretation of the *Water Utility Cost of Service Study* dated June 2006 prepared by Black & Veatch Corporation for the City of Lynchburg.

ALTERNATIVE A1 – Continue to purchase water from the City of Lynchburg

Cost Estimate: Present value of water purchased.

YEAR	#	*PURCHASED WATER COST (per 1000gal)	AVERAGE WATER USAGE MGD	PROJECTED ANNUAL COST	ANNUAL PRESENT VALUE	TOTAL PRESENT VALUE
2012	0	$2.65	1.50	$1,450,875	$1,450,875	$1,450,875
2013	1	$2.73	1.56	$1,550,441	$1,490,749	$2,941,624
2014	2	$2.81	1.61	$1,654,676	$1,529,913	$4,471,538
2015	3	$2.90	1.67	$1,763,769	$1,567,991	$6,039,528
2016	4	$2.98	1.73	$1,877,918	$1,605,245	$7,644,773
2017	5	$3.07	1.78	$1,997,330	$1,641,605	$9,286,378
2018	6	$3.16	1.84	$2,122,215	$1,677,187	$10,963,565
2019	7	$3.26	1.89	$2,252,796	$1,711,900	$12,675,465
2020	8	$3.36	1.95	$2,389,303	$1,745,863	$14,421,328
2021	9	$3.46	1.97	$2,490,009	$1,749,480	$16,170,808
2022	10	$3.56	2.00	$2,594,607	$1,752,916	$17,923,724
2023	11	$3.67	2.02	$2,703,240	$1,756,024	$19,679,749
2024	12	$3.78	2.04	$2,816,055	$1,758,908	$21,438,657
2025	13	$3.89	2.07	$2,933,207	$1,761,684	$23,200,341
2026	14	$4.01	2.09	$3,054,853	$1,764,178	$24,964,519
2027	15	$4.13	2.11	$3,181,159	$1,766,497	$26,731,016
2028	16	$4.25	2.13	$3,312,293	$1,768,433	$28,499,450
2029	17	$4.38	2.16	$3,448,432	$1,770,425	$30,269,875
2030	18	$4.51	2.18	$3,589,759	$1,771,905	$32,041,780
2031	19	$4.65	2.21	$3,739,854	$1,774,935	$33,816,714
2032	20	$4.79	2.23	$3,895,723	$1,778,008	$35,594,722
2033	21	$4.93	2.26	$4,057,579	$1,780,466	$37,375,188
2034	22	$5.08	2.28	$4,225,640	$1,783,220	$39,158,408
2035	23	$5.23	2.31	$4,400,133	$1,785,134	$40,943,542
2036	24	$5.39	2.33	$4,581,293	$1,787,162	$42,730,705
2037	25	$5.55	2.36	$4,769,362	$1,788,988	$44,519,692
2038	26	$5.71	2.38	$4,964,592	$1,790,728	$46,310,421
2039	27	$5.89	2.41	$5,167,243	$1,792,000	$48,102,420
2040	28	$6.06	2.43	$5,377,585	$1,793,425	$49,895,845
2041	29	$6.24	2.46	$5,602,736	$1,796,797	$51,692,642
2042	30	$6.43	2.49	$5,836,555	$1,799,410	$53,492,052
2043	31	$6.63	2.51	$6,079,362	$1,802,531	$55,294,583
2044	32	$6.82	2.54	$6,331,483	$1,805,106	$57,099,689
2045	33	$7.03	2.57	$6,593,261	$1,807,213	$58,906,902
2046	34	$7.24	2.60	$6,865,047	$1,809,626	$60,716,528
2047	35	$7.46	2.63	$7,147,206	$1,811,102	$62,527,631
2048	36	$7.68	2.65	$7,440,117	$1,813,156	$64,340,787
2049	37	$7.91	2.68	$7,744,169	$1,814,459	$66,155,246
2050	38	$8.15	2.71	$8,059,769	$1,815,866	$67,971,112
2051	39	$8.39	2.74	$8,399,587	$1,819,351	$69,790,462
2052	40	$8.64	2.77	$8,752,542	$1,823,154	$71,613,617
2053	41	$8.90	2.81	$9,119,113	$1,826,558	$73,440,175
2054	42	$9.17	2.84	$9,499,802	$1,829,662	$75,269,837
2055	43	$9.45	2.87	$9,895,125	$1,832,577	$77,102,414
2056	44	$9.73	2.90	$10,305,618	$1,834,400	$78,936,814
2057	45	$10.02	2.93	$10,731,834	$1,837,290	$80,774,104
2058	46	$10.32	2.97	$11,174,349	$1,839,298	$82,613,402
2059	47	$10.63	3.00	$11,633,755	$1,841,623	$84,455,026
2060	48	$10.95	3.03	$12,110,670	$1,843,244	$86,298,269

*Water purchase costs are calculated using a 3% per year rate of increase. This is based on an interpretation of the *Water Utility Cost of Service Study* dated June 2006 prepared by Black & Veatch Corporation for the City of Lynchburg.

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML

Summary of Project Phase Annual & Present Value Costs

ALTERNATIVE A2 Phase 1a - Expand Highpoint WTP to 1.0 MGD
ALTERNATIVE A2 Phase 1b - Construct New 5.0 MGD WTP
ALTERNATIVE A2 Phase 1c - LAKES TO BEDFORD - Route 122 24" Waterline
ALTERNATIVE A2 Phase 1d - BEDFORD TO FOREST - Route 460 20" Waterline
ALTERNATIVE A2 Phase 2 - WHITEHOUSE ROAD LOOP - 18" Waterline - built in year 15
ALTERNATIVE A2 Phase 3 - ROUTE 122 PUMP STATION - built in year 30

Year	#	Phase 1a	Phase 1b	Phase 1c	Phase 1d	Phase 2	Phase 3	Total Annual Costs	Annual Present Value	Total Present Value
2012	0	$225,690	$1,239,334	$821,311	$545,251			$2,831,587	$ 2,831,587	$ 2,831,587
2013	1	$231,582	$1,252,525	$821,333	$545,267			$2,850,706	$ 2,740,954	$ 5,572,541
2014	2	$237,651	$1,266,112	$821,355	$545,282			$2,870,399	$ 2,653,971	$ 8,226,512
2015	3	$243,902	$1,280,106	$821,377	$545,298			$2,890,683	$ 2,569,817	$ 10,796,329
2016	4	$250,340	$1,294,520	$821,401	$545,315			$2,911,575	$ 2,488,814	$ 13,285,143
2017	5	$256,971	$1,309,367	$821,425	$545,332			$2,933,094	$ 2,410,710	$ 15,695,853
2018	6	$263,802	$1,324,659	$821,449	$545,349			$2,955,259	$ 2,335,541	$ 18,031,395
2019	7	$270,837	$1,340,409	$821,475	$545,367			$2,978,089	$ 2,263,049	$ 20,294,444
2020	8	$278,084	$1,356,633	$821,501	$545,386			$3,001,603	$ 2,193,271	$ 22,487,715
2021	9	$285,547	$1,373,343	$821,528	$545,405			$3,025,823	$ 2,125,943	$ 24,613,659
2022	10	$293,235	$1,390,554	$821,556	$545,425			$3,050,769	$ 2,061,100	$ 26,674,758
2023	11	$301,153	$1,408,281	$821,584	$545,445			$3,076,464	$ 1,998,471	$ 28,673,230
2024	12	$309,309	$1,426,541	$821,614	$545,466			$3,102,930	$ 1,938,090	$ 30,611,320
2025	13	$317,710	$1,445,348	$821,644	$545,488			$3,130,190	$ 1,879,992	$ 32,491,312
2026	14	$326,363	$1,464,720	$821,675	$545,510			$3,158,267	$ 1,823,899	$ 34,315,211
2027	15	$335,275	$1,484,672	$821,708	$545,533	$234,757		$3,421,944	$ 1,900,205	$ 36,215,416
2028	16	$344,454	$1,505,223	$821,741	$545,556	$234,764		$3,451,738	$ 1,842,883	$ 38,058,300
2029	17	$353,909	$1,526,391	$821,775	$545,581	$234,771		$3,482,427	$ 1,787,878	$ 39,846,177
2030	18	$363,648	$1,548,194	$821,810	$545,605	$234,778		$3,514,036	$ 1,734,528	$ 41,580,705
2031	19	$372,552	$1,539,895	$790,285	$524,679	$234,786		$3,462,198	$ 1,643,159	$ 43,223,864
2032	20	$354,720	$794,147	$1,282	$910	$234,794		$1,385,854	$ 632,504	$ 43,856,368
2033	21	$365,362	$817,972	$1,321	$938	$234,802		$1,420,394	$ 623,269	$ 44,479,637
2034	22	$376,323	$842,511	$1,360	$966	$234,811		$1,455,970	$ 614,419	$ 45,094,056
2035	23	$387,612	$867,786	$1,401	$995	$234,819		$1,492,614	$ 605,553	$ 45,699,610
2036	24	$399,241	$893,820	$1,443	$1,025	$234,828		$1,530,356	$ 596,992	$ 46,296,602
2037	25	$411,218	$920,634	$1,487	$1,055	$234,837		$1,569,231	$ 588,619	$ 46,885,220
2038	26	$423,555	$948,253	$1,531	$1,087	$234,847		$1,609,273	$ 580,465	$ 47,465,685
2039	27	$436,261	$976,701	$1,577	$1,120	$234,857		$1,650,515	$ 572,399	$ 48,038,084
2040	28	$449,349	$1,006,002	$1,624	$1,153	$234,867		$1,692,995	$ 564,614	$ 48,602,698
2041	29	$462,829	$1,036,182	$1,673	$1,188	$234,877		$1,736,749	$ 556,975	$ 49,159,673
2042	30	$476,714	$1,067,267	$1,723	$1,223	$234,888	$141,778	$1,923,594	$ 593,044	$ 49,752,717
2043	31	$491,016	$1,099,285	$1,775	$1,260	$234,898	$143,809	$1,972,044	$ 584,711	$ 50,337,428
2044	32	$505,746	$1,132,264	$1,828	$1,298	$225,890	$145,902	$2,012,928	$ 573,886	$ 50,911,314
2045	33	$520,919	$1,166,232	$1,883	$1,337	$423	$148,058	$1,838,851	$ 504,029	$ 51,415,343
2046	34	$536,546	$1,201,219	$1,940	$1,377	$423	$150,278	$1,891,783	$ 498,674	$ 51,914,017
2047	35	$552,643	$1,237,255	$1,998	$1,418	$423	$152,565	$1,946,302	$ 493,193	$ 52,407,210
2048	36	$569,222	$1,274,373	$2,058	$1,461	$436	$154,920	$2,002,469	$ 488,002	$ 52,895,212
2049	37	$586,299	$1,312,604	$2,120	$1,505	$449	$157,346	$2,060,322	$ 482,733	$ 53,377,945
2050	38	$603,887	$1,351,982	$2,183	$1,550	$463	$159,845	$2,119,910	$ 477,616	$ 53,855,561
2051	39	$622,004	$1,392,542	$2,249	$1,596	$477	$162,418	$2,181,286	$ 472,466	$ 54,328,027
2052	40	$640,664	$1,434,318	$2,316	$1,644	$491	$165,069	$2,244,503	$ 467,530	$ 54,795,557
2053	41	$659,884	$1,477,348	$2,386	$1,693	$506	$167,800	$2,309,616	$ 462,616	$ 55,258,173
2054	42	$679,681	$1,521,668	$2,457	$1,744	$521	$170,612	$2,376,683	$ 457,749	$ 55,715,922
2055	43	$700,071	$1,567,318	$2,531	$1,797	$536	$173,509	$2,445,762	$ 452,955	$ 56,168,878
2056	44	$721,073	$1,614,338	$2,607	$1,850	$553	$173,645	$2,514,065	$ 447,504	$ 56,616,381
2057	45	$742,705	$1,662,768	$2,685	$1,906	$569	$105,513	$2,516,146	$ 430,764	$ 57,047,145
2058	46	$764,987	$1,712,651	$2,765	$1,963	$586	$108,679	$2,591,631	$ 426,582	$ 57,473,728
2059	47	$787,936	$1,764,030	$2,848	$2,022	$221	$108,679	$2,665,737	$ 421,986	$ 57,895,714
2060	48	$811,574	$1,816,951	$2,934	$2,083	$221	$108,679	$2,742,442	$ 417,400	$ 58,313,114

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

Assumption: Equipment is procured by BCPSA directly.

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$13,300	$13,300	
Raw Water Strainers	1	LS	$25,000	$25,000	
850 GPM Finish Water Pumps & VFD (Highpoint WTP)	2	EA	$100,000	$200,000	
Piping/Valve Upgrades (Highpoint WTP)	1	LS	$15,000	$15,000	
Electrical Upgrades (Highpoint WTP)	1	LS	$25,000	$25,000	
Contingency	10%	LS	$27,900	$27,900	
Total Construction Cost					**$ 306,200**
B. PROJECT RELATED COST @ 30%					**$ 91,860**
Total Project Alternative A2 Phase 1a Estimated Loan Amount					**$ 398,060**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	1	LS	$196,400	$196,400	
Line Maintenance	-	LF		$0	
Water Purchases ($2.50/1000 gal)	-	MGD		$0	
Total Annual Operation & Maintenance Cost				**$196,400**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Operations & Maintenance Cost Estimate: A2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

		UNIT COST	
A.	**OPERATIONS**		
	Salary and Wages (Regular)		
	Production & Treatment	$38,325	(Labor @ $35/hr, 3 MH/day, 365 days/yr)
	Salary and Wages (OT)		
	Production & Treatment	$1,916	
	Lab Testing	$2,500	
	Electric		
	Process Equipment/Pumps	$73,600	(see Power Cost calculations below)
	Lights/Heating/Instrumentation	$15,100	(see Power Cost calculations below)
	Lab Supplies	$1,000	
	Repair & Maintenance Supplies		
	Production & Treatment	$7,500	
	Pumping & Storage	$1,000	
	Line Maintenance	$1,000	
	Membrane Replacement	$34,000	Membrane Replacement (68 @ $5000, twice per 20 yrs)
	Hypochlorite	$10,859	(35 gals/day, 365 days/yr, @ $0.85/gal)
	Corrosion control (Zinc Orthophospate)	$2,190	(12 gals/day, 365 days/yr, @ $0.50/gal)
	CIP Chemicals (50% Citric Acid)	$2,700	($15/gal @ 180 gal/yr)
	CIP Chemicals (25% Caustic Soda)	$1,440	($8/gal @180 gal/yr)
	EFM/CIP Chemicals (12.5% NaOCl)	$1,275	($0.85/gal @ 1500 gal/yr)
	Permits/Fees/advertising	$2,000	
	Total Operations Cost	$196,400	
B.	**AMORTIZATION OF IMPROVEMENTS**		
	1.0 MGD WTP Cost	$398,060	
	Existing Capital Improvements	$4,006,293	
	Total Project Cost	$4,404,353	
	Interest Rate	4	%
	Term	20	years
	Total Amortization Cost	$324,100	
C.	**ANNUAL COST BREAKDOWN**		
	Total Annual Cost	$520,500	
	Average Annual Production (MGD)	1.00	
	Cost per 1,000 gallons	$1.43	

D. POWER COSTS

Monthly Demand Charge ($/kW)	$12.00	Current AEP Demand Charge							
Energy Charge ($/kWh)	$0.07	Current AEP Energy Charge							
Motor Efficiency	0.96								
Annual Operation of Plant (hrs)	8760								
Pumps	Raw Water Pump	Finished Water	Feed	RF	CIP	EFM Heater	Compressor	Building Load	
No.	1	1	2	2	1	1	1	1	
Frequency of Operation	100%	100%	75%	25%	15%	15%	28%	100%	
Operation, hours	8760	8760	6570	2190	1314	1314	2453	8760	
Rated Capacity, gpm	700	700	450	900	40				
TDH, feet	200	130	100	100	120				
Motor hp	10	15	25	25	3		5		
Pump Efficiency	80%	80%	70%	70%	65%				
Power, kW	26.5	17	17.0	34.0	0.9	45	4	20	
Demand Cost, $	$3,810	$2,477	$2,449	$4,899	$131	$90	$533	$2,880	
Energy Cost, $	$21,127	$13,732	$11,641	$7,761	$134	$4,139	$635	$12,264	
Total Cost, $	$24,937	$16,209	$14,091	$12,660	$264	$4,229	$1,168	$15,144	
							Total Equipment	$73,600	
							Total Building	$15,100	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

Construction Cost:		$306,200
Project Related Costs	$	91,860
Total Loan:		$398,060

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$13,368	$15,922	$196,400	$225,690
2013	1	$13,902	$15,388	$202,292	$231,582
2014	2	$14,458	$14,832	$208,361	$237,651
2015	3	$15,037	$14,253	$214,612	$243,902
2016	4	$15,638	$13,652	$221,050	$250,340
2017	5	$16,264	$13,026	$227,681	$256,971
2018	6	$16,914	$12,376	$234,512	$263,802
2019	7	$17,591	$11,699	$241,547	$270,837
2020	8	$18,294	$10,996	$248,794	$278,084
2021	9	$19,026	$10,264	$256,257	$285,547
2022	10	$19,787	$9,503	$263,945	$293,235
2023	11	$20,579	$8,711	$271,864	$301,153
2024	12	$21,402	$7,888	$280,019	$309,309
2025	13	$22,258	$7,032	$288,420	$317,710
2026	14	$23,148	$6,142	$297,073	$326,363
2027	15	$24,074	$5,216	$305,985	$335,275
2028	16	$25,037	$4,253	$315,164	$344,454
2029	17	$26,039	$3,251	$324,619	$353,909
2030	18	$27,080	$2,210	$334,358	$363,648
2031	19	$27,037	$1,127	$344,389	$372,552
2032	20	$0	$0	$354,720	$354,720
2033	21	$0	$0	$365,362	$365,362
2034	22	$0	$0	$376,323	$376,323
2035	23	$0	$0	$387,612	$387,612
2036	24	$0	$0	$399,241	$399,241
2037	25	$0	$0	$411,218	$411,218
2038	26	$0	$0	$423,555	$423,555
2039	27	$0	$0	$436,261	$436,261
2040	28	$0	$0	$449,349	$449,349
2041	29	$0	$0	$462,829	$462,829
2042	30	$0	$0	$476,714	$476,714
2043	31	$0	$0	$491,016	$491,016
2044	32	$0	$0	$505,746	$505,746
2045	33	$0	$0	$520,919	$520,919
2046	34	$0	$0	$536,546	$536,546
2047	35	$0	$0	$552,643	$552,643
2048	36	$0	$0	$569,222	$569,222
2049	37	$0	$0	$586,299	$586,299
2050	38	$0	$0	$603,887	$603,887
2051	39	$0	$0	$622,004	$622,004
2052	40	$0	$0	$640,664	$640,664
2053	41	$0	$0	$659,884	$659,884
2054	42	$0	$0	$679,681	$679,681
2055	43	$0	$0	$700,071	$700,071
2056	44	$0	$0	$721,073	$721,073
2057	45	$0	$0	$742,705	$742,705
2058	46	$0	$0	$764,987	$764,987
2059	47	$0	$0	$787,936	$787,936
2060	48	$0	$0	$811,574	$811,574

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

	Enter values
Loan amount	$398,060
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 29,289.95
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 187,739.03

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 398,060.00	$ 29,289.95	$ -	$ 29,289.95	$ 13,367.55	$ 15,922.40	$ 384,692.45	$ 15,922.40
2	7/1/2013	$ 384,692.45	$ 29,289.95	$ -	$ 29,289.95	$ 13,902.25	$ 15,387.70	$ 370,790.19	$ 31,310.10
3	7/1/2014	$ 370,790.19	$ 29,289.95	$ -	$ 29,289.95	$ 14,458.34	$ 14,831.61	$ 356,331.85	$ 46,141.71
4	7/1/2015	$ 356,331.85	$ 29,289.95	$ -	$ 29,289.95	$ 15,036.68	$ 14,253.27	$ 341,295.17	$ 60,394.98
5	7/1/2016	$ 341,295.17	$ 29,289.95	$ -	$ 29,289.95	$ 15,638.14	$ 13,651.81	$ 325,657.03	$ 74,046.79
6	7/1/2017	$ 325,657.03	$ 29,289.95	$ -	$ 29,289.95	$ 16,263.67	$ 13,026.28	$ 309,393.36	$ 87,073.07
7	7/1/2018	$ 309,393.36	$ 29,289.95	$ -	$ 29,289.95	$ 16,914.22	$ 12,375.73	$ 292,479.14	$ 99,448.80
8	7/1/2019	$ 292,479.14	$ 29,289.95	$ -	$ 29,289.95	$ 17,590.79	$ 11,699.17	$ 274,888.36	$ 111,147.97
9	7/1/2020	$ 274,888.36	$ 29,289.95	$ -	$ 29,289.95	$ 18,294.42	$ 10,995.53	$ 256,593.94	$ 122,143.50
10	7/1/2021	$ 256,593.94	$ 29,289.95	$ -	$ 29,289.95	$ 19,026.19	$ 10,263.76	$ 237,567.74	$ 132,407.26
11	7/1/2022	$ 237,567.74	$ 29,289.95	$ -	$ 29,289.95	$ 19,787.24	$ 9,502.71	$ 217,780.50	$ 141,909.97
12	7/1/2023	$ 217,780.50	$ 29,289.95	$ -	$ 29,289.95	$ 20,578.73	$ 8,711.22	$ 197,201.77	$ 150,621.19
13	7/1/2024	$ 197,201.77	$ 29,289.95	$ -	$ 29,289.95	$ 21,401.88	$ 7,888.07	$ 175,799.89	$ 158,509.26
14	7/1/2025	$ 175,799.89	$ 29,289.95	$ -	$ 29,289.95	$ 22,257.96	$ 7,032.00	$ 153,541.93	$ 165,541.26
15	7/1/2026	$ 153,541.93	$ 29,289.95	$ -	$ 29,289.95	$ 23,148.27	$ 6,141.68	$ 130,393.66	$ 171,682.93
16	7/1/2027	$ 130,393.66	$ 29,289.95	$ -	$ 29,289.95	$ 24,074.21	$ 5,215.75	$ 106,319.46	$ 176,898.68
17	7/1/2028	$ 106,319.46	$ 29,289.95	$ -	$ 29,289.95	$ 25,037.17	$ 4,252.78	$ 81,282.28	$ 181,151.46
18	7/1/2029	$ 81,282.28	$ 29,289.95	$ -	$ 29,289.95	$ 26,038.66	$ 3,251.29	$ 55,243.62	$ 184,402.75
19	7/1/2030	$ 55,243.62	$ 29,289.95	$ -	$ 29,289.95	$ 27,080.21	$ 2,209.74	$ 28,163.41	$ 186,612.49
20	7/1/2031	$ 28,163.41	$ 29,289.95	$ -	$ 28,163.41	$ 27,036.88	$ 1,126.54	$ -	$ 187,739.03

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 1b – Construct New 5.0 MGD WTP

Assumption: Equipment is procured by BCPSA directly.

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$361,900	$361,900	
Raw Water Intake					
Intake Screen	1	EA	$67,500	$67,500	
Buoys	1	LS	$15,000	$15,000	
Intake Pipe	300	LF	$350	$105,000	
Site Work	1	LS	$10,000	$10,000	
Excavation	1	LS	$39,000	$39,000	
Intake Structure	1	EA	$75,000	$75,000	
Valve Box	1	EA	$5,000	$5,000	
Air System	1	LS	$10,000	$10,000	
CMU Building and Foundation/Slab (10'x10')	100	SF	$135	$13,500	
Raw Water Pumps	2	EA	$25,000	$50,000	
Piping and Valves	1	LS	$35,000	$35,000	
Electrical	1	LS	$25,000	$25,000	
Electrical Service	1	LS	$24,500	$24,500	
Yard Structures & Piping					
18" Raw Water Line	14,850	LF	$73	$1,084,100	
Raw Water Level Control/Chemical Injection Vault	1	LS	$25,000	$25,000	
Drain, Filtrate, & Misc. Yard Piping	1	LS	$50,000	$50,000	
Sanitary Sewer and Backwash Piping	1	LS	$50,000	$50,000	
Treatment Building					
Sitework & Grading	1	LS	$100,000	$100,000	
Pre-Engineered Metal Building and Foundation/Slab (120'x60')	7,200	SF	$65	$468,000	
Mechanical and HVAC	1	LS	$75,000	$75,000	
Piping/Plumbing	1	LS	$60,000	$60,000	
Building Electrical	1	LS	$300,000	$300,000	
Backup Generator					
800 KW Generator	1	LS	$400,000	$400,000	
Treatment Equipment					
Raw Water Strainers	1	LS	$125,000	$125,000	
Membrane Filter Skids (w/compressors, CIP, pumps)	1	LS	$1,400,000	$1,400,000	
Disinfection Equipment	1	LS	$100,000	$100,000	
pH Adjustment/Corrosion Control Equipment	1	LS	$75,000	$75,000	
Finish Water Pumps					
3500 GPM Finish Water Pumps & VFD	2	EA	$160,000	$320,000	
Electrical	1	LS	$100,000	$100,000	
Tanks					
Sitework & Grading	1	LS	$60,000	$60,000	
Raw Water Tank	100,000	GAL	$3.00	$300,000	
Clearwell Tank	435,000	GAL	$3.00	$1,305,000	
Piping	1	LS	$100,000	$100,000	
Instrumentation	1	LS	$40,000	$40,000	
Laboratory					
Analytical Equipment	1	LS	$25,000	$25,000	
Fume Hood/Safety Equipment	1	LS	$25,000	$25,000	
Lab Counters/Cabinets/Furnishings	400	SF	$65	$26,000	
Process Monitoring					
SCADA & Controls	1	LS	$150,000	$150,000	
Contingency	10%			$759,950	
Total Construction Cost					**$ 8,359,450**
B. PROJECT RELATED COST @ 30%					**$ 2,507,835**
Total Project Alternative A2 Phase 1b Estimated Loan Amount					**$ 10,867,285**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	1	LS	$439,700	$439,700	
Line Maintenance	-	LF		$0	
Water Purchases ($2.50/1000 gal)	-	MGD		$0	
Total Annual Operation & Maintenance Cost				**$439,700**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Operation & Maintenance Cost Estimate: A2, Phase 1b – Construct New 5.0 MGD WTP

		UNIT COST	
A.	**OPERATIONS**		
	Salary and Wages (Regular)		
	Production & Treatment	$63,875	(Labor @ $35/hr, 5 MH/day, 365 days/yr)
	Salary and Wages (OT)		
	Production & Treatment	$3,194	
	Lab Testing	$7,500	
	Electric		
	Process Equipment/Pumps	$124,900	(see Power Cost calculations below)
	Lights/Heating/Instrumentation	$37,900	(see Power Cost calculations below)
	Lab Supplies	$2,500	
	Repair & Maintenance Supplies		
	Production & Treatment	$10,000	
	Pumping & Storage	$4,000	
	Line Maintenance	$1,500	
	Membrane Replacement	$148,000	Membrane Replacement (296 @ $5000, twice per 20 yrs)
	Hypochlorite	$20,166	(65 gals/day, 365 days/yr, @ $0.85/gal)
	Corrosion control (Zinc Orthophospate)	$3,285	(18 gals/day, 365 days/yr, @ $0.50/gal)
	CIP Chemicals (50% Citric Acid)	$4,800	($15/gal @ 320 gal/yr)
	CIP Chemicals (25% Caustic Soda)	$2,560	($8/gal @ 320gal/yr)
	EFM/CIP Chemicals (12.5% NaOCl)	$3,485	($0.85/gal @ 4100 gal/yr)
	Permits/Fees/advertising	$2,000	
	Total Operations Cost	$439,700	

B.	**AMORTIZATION OF IMPROVEMENTS**		
	5.0 MGD WTP Cost	$10,867,285	
	Existing Capital Improvements	$4,006,293	
	Total Project Cost	$14,873,578	
	Interest Rate	4	%
	Term	20	years
	Total Amortization Cost	$1,094,400	

C.	**ANNUAL COST BREAKDOWN**		
	Total Annual Cost	$1,534,100	
	Average Annual Production (MGD)	1.73	
	Cost per 1,000 gallons	$2.43	

D. POWER COSTS

Monthly Demand Charge ($/kW)	$12.00	Current AEP Demand Charge
Energy Charge ($/kWh)	$0.07	Current AEP Energy Charge
Motor Efficiency	0.96	
Annual Operation of Plant (hrs)	8760	

Pumps	Raw Water Pump	Finished Water	Feed	RF	CIP	EFM Heater	Compressor	Building Load
No.	1	1	4	2	1	1	1	1
Frequency of Operation	34%	34%	34%	17%	15%	15%	28%	100%
Operation, hours	2978	2978	2978	1489	1314	1314	2453	8760
Rated Capacity, gpm	3500	3500	900	900	40			
TDH, feet	200	130	100	100	120			
Motor hp	10	15	25	25	3		5	
Pump Efficiency	80%	80%	70%	70%	65%			
Power, kW	132.3	86	68.0	34.0	0.9	45	4	50
Demand Cost, $	$6,477	$12,383	$9,798	$4,899	$131	$90	$533	$7,200
Energy Cost, $	$35,915	$23,345	$21,109	$5,277	$134	$4,139	$635	$30,660
Total Cost, $	$42,393	$35,728	$30,907	$10,176	$264	$4,229	$1,168	$37,860

Total Equipment $124,900
Total Building $37,900

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 1b – Construct New 5.0 MGD WTP

Construction Cost:		$8,359,450
Project Related Costs:	$	2,507,835
Total Loan:		$10,867,285

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$364,942	$434,691	$439,700	$1,239,334
2013	1	$379,540	$420,094	$452,891	$1,252,525
2014	2	$394,722	$404,912	$466,478	$1,266,112
2015	3	$410,511	$389,123	$480,472	$1,280,106
2016	4	$426,931	$372,703	$494,886	$1,294,520
2017	5	$444,008	$355,626	$509,733	$1,309,367
2018	6	$461,769	$337,865	$525,025	$1,324,659
2019	7	$480,239	$319,394	$540,776	$1,340,409
2020	8	$499,449	$300,185	$556,999	$1,356,633
2021	9	$519,427	$280,207	$573,709	$1,373,343
2022	10	$540,204	$259,430	$590,920	$1,390,554
2023	11	$561,812	$237,822	$608,648	$1,408,281
2024	12	$584,285	$215,349	$626,907	$1,426,541
2025	13	$607,656	$191,978	$645,714	$1,445,348
2026	14	$631,962	$167,672	$665,086	$1,464,720
2027	15	$657,241	$142,393	$685,038	$1,484,672
2028	16	$683,530	$116,103	$705,589	$1,505,223
2029	17	$710,872	$88,762	$726,757	$1,526,391
2030	18	$739,306	$60,327	$748,560	$1,548,194
2031	19	$738,124	$30,755	$771,017	$1,539,895
2032	20	$0	$0	$794,147	$794,147
2033	21	$0	$0	$817,972	$817,972
2034	22	$0	$0	$842,511	$842,511
2035	23	$0	$0	$867,786	$867,786
2036	24	$0	$0	$893,820	$893,820
2037	25	$0	$0	$920,634	$920,634
2038	26	$0	$0	$948,253	$948,253
2039	27	$0	$0	$976,701	$976,701
2040	28	$0	$0	$1,006,002	$1,006,002
2041	29	$0	$0	$1,036,182	$1,036,182
2042	30	$0	$0	$1,067,267	$1,067,267
2043	31	$0	$0	$1,099,285	$1,099,285
2044	32	$0	$0	$1,132,264	$1,132,264
2045	33	$0	$0	$1,166,232	$1,166,232
2046	34	$0	$0	$1,201,219	$1,201,219
2047	35	$0	$0	$1,237,255	$1,237,255
2048	36	$0	$0	$1,274,373	$1,274,373
2049	37	$0	$0	$1,312,604	$1,312,604
2050	38	$0	$0	$1,351,982	$1,351,982
2051	39	$0	$0	$1,392,542	$1,392,542
2052	40	$0	$0	$1,434,318	$1,434,318
2053	41	$0	$0	$1,477,348	$1,477,348
2054	42	$0	$0	$1,521,668	$1,521,668
2055	43	$0	$0	$1,567,318	$1,567,318
2056	44	$0	$0	$1,614,338	$1,614,338
2057	45	$0	$0	$1,662,768	$1,662,768
2058	46	$0	$0	$1,712,651	$1,712,651
2059	47	$0	$0	$1,764,030	$1,764,030
2060	48	$0	$0	$1,816,951	$1,816,951

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 1b – Construct New 5.0 MGD WTP

	Enter values
Loan amount	$10,867,285
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 799,633.85
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 5,125,392.03

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 10,867,285.00	$ 799,633.85	$ -	$ 799,633.85	$ 364,942.45	$ 434,691.40	$ 10,502,342.55	$ 434,691.40
2	7/1/2013	$ 10,502,342.55	$ 799,633.85	$ -	$ 799,633.85	$ 379,540.15	$ 420,093.70	$ 10,122,802.40	$ 854,785.10
3	7/1/2014	$ 10,122,802.40	$ 799,633.85	$ -	$ 799,633.85	$ 394,721.76	$ 404,912.10	$ 9,728,080.64	$ 1,259,697.20
4	7/1/2015	$ 9,728,080.64	$ 799,633.85	$ -	$ 799,633.85	$ 410,510.63	$ 389,123.23	$ 9,317,570.02	$ 1,648,820.42
5	7/1/2016	$ 9,317,570.02	$ 799,633.85	$ -	$ 799,633.85	$ 426,931.05	$ 372,702.80	$ 8,890,638.97	$ 2,021,523.22
6	7/1/2017	$ 8,890,638.97	$ 799,633.85	$ -	$ 799,633.85	$ 444,008.29	$ 355,625.56	$ 8,446,630.67	$ 2,377,148.78
7	7/1/2018	$ 8,446,630.67	$ 799,633.85	$ -	$ 799,633.85	$ 461,768.62	$ 337,865.23	$ 7,984,862.05	$ 2,715,014.01
8	7/1/2019	$ 7,984,862.05	$ 799,633.85	$ -	$ 799,633.85	$ 480,239.37	$ 319,394.48	$ 7,504,622.68	$ 3,034,408.49
9	7/1/2020	$ 7,504,622.68	$ 799,633.85	$ -	$ 799,633.85	$ 499,448.94	$ 300,184.91	$ 7,005,173.73	$ 3,334,593.40
10	7/1/2021	$ 7,005,173.73	$ 799,633.85	$ -	$ 799,633.85	$ 519,426.90	$ 280,206.95	$ 6,485,746.83	$ 3,614,800.35
11	7/1/2022	$ 6,485,746.83	$ 799,633.85	$ -	$ 799,633.85	$ 540,203.98	$ 259,429.87	$ 5,945,542.85	$ 3,874,230.22
12	7/1/2023	$ 5,945,542.85	$ 799,633.85	$ -	$ 799,633.85	$ 561,812.14	$ 237,821.71	$ 5,383,730.72	$ 4,112,051.94
13	7/1/2024	$ 5,383,730.72	$ 799,633.85	$ -	$ 799,633.85	$ 584,284.62	$ 215,349.23	$ 4,799,446.09	$ 4,327,401.16
14	7/1/2025	$ 4,799,446.09	$ 799,633.85	$ -	$ 799,633.85	$ 607,656.01	$ 191,977.84	$ 4,191,790.09	$ 4,519,379.01
15	7/1/2026	$ 4,191,790.09	$ 799,633.85	$ -	$ 799,633.85	$ 631,962.25	$ 167,671.60	$ 3,559,827.84	$ 4,687,050.61
16	7/1/2027	$ 3,559,827.84	$ 799,633.85	$ -	$ 799,633.85	$ 657,240.74	$ 142,393.11	$ 2,902,587.10	$ 4,829,443.73
17	7/1/2028	$ 2,902,587.10	$ 799,633.85	$ -	$ 799,633.85	$ 683,530.37	$ 116,103.48	$ 2,219,056.73	$ 4,945,547.21
18	7/1/2029	$ 2,219,056.73	$ 799,633.85	$ -	$ 799,633.85	$ 710,871.58	$ 88,762.27	$ 1,508,185.15	$ 5,034,309.48
19	7/1/2030	$ 1,508,185.15	$ 799,633.85	$ -	$ 799,633.85	$ 739,306.45	$ 60,327.41	$ 768,878.70	$ 5,094,636.88
20	7/1/2031	$ 768,878.70	$ 799,633.85	$ -	$ 768,878.70	$ 738,123.56	$ 30,755.15	$ -	$ 5,125,392.03

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 2a – Expand Highpoint WTP to 2.0 MGD

Assumption: Equipment is procured by BCPSA directly.

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$99,200	$99,200	
Raw Water Intake					
Intake Screen	1	EA	$67,500	$67,500	
Buoys	1	LS	$15,000	$15,000	
Intake Pipe	600	LF	$350	$210,000	
Site Work	1	LS	$10,000	$10,000	
Excavation	1	LS	$39,000	$39,000	
Intake Structure	1	EA	$75,000	$75,000	
Valve Box	1	EA	$5,000	$5,000	
Air System	1	LS	$10,000	$10,000	
CMU Building and Foundation/Slab (10'x10')	100	SF	$135	$13,500	
Raw Water Pumps	4	EA	$25,000	$100,000	
Piping and Valves	1	LS	$35,000	$35,000	
Electrical	1	LS	$25,000	$25,000	
Electrical Service	1	LS	$24,500	$24,500	
Yard Structures & Piping					
8" Raw Water Line	3,500	LF	$40	$140,000	
Treatment Equipment					
Raw Water Strainers	1	LS	$50,000	$50,000	
Membrane Filter Skids (Highpoint)	1	LS	$370,000	$370,000	
Finish Water Pumps					
700 GPM Finish Water Pumps & VFD (Highpoint WTP)	2	EA	$100,000	$200,000	
Piping/Valve Upgrades (Highpoint WTP)	1	LS	$15,000	$15,000	
Electrical Upgrades (Highpoint WTP)	1	LS	$25,000	$25,000	
Tanks					
Sitework & Grading	1	LS	$10,000	$10,000	
Clearwell Tank (Highpoint)	175,000	GAL	$3.00	$525,000	
Piping	1	LS	$10,000	$10,000	
Instrumentation	1	LS	$10,000	$10,000	
Contingency	10%			$208,400	
Total Construction Cost					**$2,292,100**
B. PROJECT RELATED COST @ 30%					**$687,630**
Total Project Alternative A2 Phase 2a Estimated Loan Amount					**$ 2,979,730**

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 2b – Construct New 4.0 MGD WTP

Assumption: Equipment is procured by BCPSA directly.

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$297,500	$297,500	
Yard Structures & Piping					
16" Raw Water Line	14,850	LF	$68	$1,009,800	
Raw Water Level Control/Chemical Injection Vault	1	LS	$25,000	$25,000	
Drain, Filtrate, & Misc. Yard Piping	1	LS	$50,000	$50,000	
Sanitary Sewer and Backwash Piping	1	LS	$50,000	$50,000	
Treatment Building					
Sitework & Grading	1	LS	$100,000	$100,000	
Pre-Engineered Metal Building and Foundation/Slab (100'x60')	6,000	SF	$65	$390,000	
Mechanical and HVAC	1	LS	$75,000	$75,000	
Piping/Plumbing	1	LS	$60,000	$60,000	
Building Electrical	1	LS	$300,000	$300,000	
Backup Generator					
800 KW Generator	1	LS	$400,000	$400,000	
Treatment Equipment					
Raw Water Strainers	1	LS	$100,000	$100,000	
Membrane Filter Skids (w/compressors, CIP, pumps)	1	LS	$1,100,000	$1,100,000	
Disinfection Equipment	1	LS	$100,000	$100,000	
pH Adjustment/Corrosion Control Equipment	1	LS	$75,000	$75,000	
Finish Water Pumps					
2800 GPM Finish Water Pumps & VFD	2	EA	$135,000	$270,000	
Electrical	1	LS	$100,000	$100,000	
Tanks					
Sitework & Grading	1	LS	$50,000	$50,000	
Raw Water Tank	100,000	GAL	$3.00	$300,000	
Clearwell Tank	350,000	GAL	$3.00	$1,050,000	
Piping	1	LS	$90,000	$90,000	
Instrumentation	1	LS	$30,000	$30,000	
Laboratory					
Analytical Equipment	1	LS	$25,000	$25,000	
Fume Hood/Safety Equipment	1	LS	$25,000	$25,000	
Lab Counters/Cabinets/Furnishings	400	SF	$65	$26,000	
Process Monitoring					
SCADA & Controls	1	LS	$150,000	$150,000	
Contingency	10%			$624,800	
Total Construction Cost					**$6,873,100**
Related Costs	30%				**$2,061,930**
Total Project Alternative A2 Phase 2b Estimated Loan Amount					**$8,935,030**

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST - Route 122					
Mobilization (5%)	1	LS	$ 408,507.00	$ 408,507.00	
24" Waterline	71,000	LF	$ 85.00	$ 6,035,000.00	
24" Gate Valve & Box	71	EA	$ 3,000.00	$ 213,000.00	
Air Release Valve	12	EA	$ 3,000.00	$ 36,000.00	
Blow Off Valve	12	EA	$ 3,000.00	$ 36,000.00	
Road Bore Setup	25	LS	$ 5,000.00	$ 125,000.00	
Steel Casing Pipe	1,500	LF	$ 400.00	$ 600,000.00	
Creek/River Crossing	3	EA	$ 50,000.00	$ 150,000.00	
Concrete Encasement	300	LF	$ 50.00	$ 15,000.00	
Railroad Crossing	1	LS	$ 150,000.00	$ 150,000.00	
Connect to Existing Water System	2	EA	$ 10,000.00	$ 20,000.00	
Asphalt Removal and Replacement	474	SY	$ 100.00	$ 47,400.00	
Contingencies (10%)	1	LS	$ 742,740.00	$ 742,740.00	
Total Construction Cost Lakes to Bedford					**$8,578,647**
B. PROJECT RELATED COST @ 30%					**$2,573,594**
Total Project Alternative A2 Phase 1c Estimated Loan Amount					**$11,152,241**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	-	LS	$ 336,840.00	$ -	
WTP Power Equipment	-	LS	$ 170,100.00	$ -	
WTP Power Building	-	LS	$ 37,860.00	$ -	
Line Maintenance	71,000	LF	$ 0.01	$ 710.00	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500.00	$ -	
Total Annual Operation & Maintenance Cost				**$ 710.00**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

Construction Cost:		$8,578,647
Project Related Costs:	$	2,573,594
Total Loan:		$11,152,241

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$374,512	$446,090	$710	$821,311
2013	1	$389,492	$431,109	$731	$821,333
2014	2	$405,072	$415,529	$753	$821,355
2015	3	$421,275	$399,327	$776	$821,377
2016	4	$438,126	$382,476	$799	$821,401
2017	5	$455,651	$364,951	$823	$821,425
2018	6	$473,877	$346,725	$848	$821,449
2019	7	$492,832	$327,769	$873	$821,475
2020	8	$512,545	$308,056	$899	$821,501
2021	9	$533,047	$287,554	$926	$821,528
2022	10	$554,369	$266,233	$954	$821,556
2023	11	$576,544	$244,058	$983	$821,584
2024	12	$599,605	$220,996	$1,012	$821,614
2025	13	$623,590	$197,012	$1,043	$821,644
2026	14	$648,533	$172,068	$1,074	$821,675
2027	15	$674,475	$146,127	$1,106	$821,708
2028	16	$701,454	$119,148	$1,139	$821,741
2029	17	$729,512	$91,090	$1,174	$821,775
2030	18	$758,692	$61,909	$1,209	$821,810
2031	19	$757,478	$31,562	$1,245	$790,285
2032	20	$0	$0	$1,282	$1,282
2033	21	$0	$0	$1,321	$1,321
2034	22	$0	$0	$1,360	$1,360
2035	23	$0	$0	$1,401	$1,401
2036	24	$0	$0	$1,443	$1,443
2037	25	$0	$0	$1,487	$1,487
2038	26	$0	$0	$1,531	$1,531
2039	27	$0	$0	$1,577	$1,577
2040	28	$0	$0	$1,624	$1,624
2041	29	$0	$0	$1,673	$1,673
2042	30	$0	$0	$1,723	$1,723
2043	31	$0	$0	$1,775	$1,775
2044	32	$0	$0	$1,828	$1,828
2045	33	$0	$0	$1,883	$1,883
2046	34	$0	$0	$1,940	$1,940
2047	35	$0	$0	$1,998	$1,998
2048	36	$0	$0	$2,058	$2,058
2049	37	$0	$0	$2,120	$2,120
2050	38	$0	$0	$2,183	$2,183
2051	39	$0	$0	$2,249	$2,249
2052	40	$0	$0	$2,316	$2,316
2053	41	$0	$0	$2,386	$2,386
2054	42	$0	$0	$2,457	$2,457
2055	43	$0	$0	$2,531	$2,531
2056	44	$0	$0	$2,607	$2,607
2057	45	$0	$0	$2,685	$2,685
2058	46	$0	$0	$2,765	$2,765
2059	47	$0	$0	$2,848	$2,848
2060	48	$0	$0	$2,934	$2,934

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

	Enter values
Loan amount	$11,152,241
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

Loan summary	
Scheduled payment	$ 820,601.42
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 5,259,787.30

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 11,152,241.10	$ 820,601.42	$ -	$ 820,601.42	$ 374,511.78	$ 446,089.64	$ 10,777,729.32	$ 446,089.64
2	7/1/2013	$ 10,777,729.32	$ 820,601.42	$ -	$ 820,601.42	$ 389,492.25	$ 431,109.17	$ 10,388,237.08	$ 877,198.82
3	7/1/2014	$ 10,388,237.08	$ 820,601.42	$ -	$ 820,601.42	$ 405,071.94	$ 415,529.48	$ 9,983,165.14	$ 1,292,728.30
4	7/1/2015	$ 9,983,165.14	$ 820,601.42	$ -	$ 820,601.42	$ 421,274.81	$ 399,326.61	$ 9,561,890.32	$ 1,692,054.91
5	7/1/2016	$ 9,561,890.32	$ 820,601.42	$ -	$ 820,601.42	$ 438,125.81	$ 382,475.61	$ 9,123,764.52	$ 2,074,530.52
6	7/1/2017	$ 9,123,764.52	$ 820,601.42	$ -	$ 820,601.42	$ 455,650.84	$ 364,950.58	$ 8,668,113.68	$ 2,439,481.10
7	7/1/2018	$ 8,668,113.68	$ 820,601.42	$ -	$ 820,601.42	$ 473,876.87	$ 346,724.55	$ 8,194,236.80	$ 2,786,205.65
8	7/1/2019	$ 8,194,236.80	$ 820,601.42	$ -	$ 820,601.42	$ 492,831.95	$ 327,769.47	$ 7,701,404.86	$ 3,113,975.12
9	7/1/2020	$ 7,701,404.86	$ 820,601.42	$ -	$ 820,601.42	$ 512,545.23	$ 308,056.19	$ 7,188,859.63	$ 3,422,031.31
10	7/1/2021	$ 7,188,859.63	$ 820,601.42	$ -	$ 820,601.42	$ 533,047.03	$ 287,554.39	$ 6,655,812.60	$ 3,709,585.70
11	7/1/2022	$ 6,655,812.60	$ 820,601.42	$ -	$ 820,601.42	$ 554,368.92	$ 266,232.50	$ 6,101,443.68	$ 3,975,818.20
12	7/1/2023	$ 6,101,443.68	$ 820,601.42	$ -	$ 820,601.42	$ 576,543.67	$ 244,057.75	$ 5,524,900.01	$ 4,219,875.95
13	7/1/2024	$ 5,524,900.01	$ 820,601.42	$ -	$ 820,601.42	$ 599,605.42	$ 220,996.00	$ 4,925,294.59	$ 4,440,871.95
14	7/1/2025	$ 4,925,294.59	$ 820,601.42	$ -	$ 820,601.42	$ 623,589.64	$ 197,011.78	$ 4,301,704.95	$ 4,637,883.73
15	7/1/2026	$ 4,301,704.95	$ 820,601.42	$ -	$ 820,601.42	$ 648,533.22	$ 172,068.20	$ 3,653,171.73	$ 4,809,951.93
16	7/1/2027	$ 3,653,171.73	$ 820,601.42	$ -	$ 820,601.42	$ 674,474.55	$ 146,126.87	$ 2,978,697.18	$ 4,956,078.80
17	7/1/2028	$ 2,978,697.18	$ 820,601.42	$ -	$ 820,601.42	$ 701,453.53	$ 119,147.89	$ 2,277,243.64	$ 5,075,226.69
18	7/1/2029	$ 2,277,243.64	$ 820,601.42	$ -	$ 820,601.42	$ 729,511.67	$ 91,089.75	$ 1,547,731.97	$ 5,166,316.43
19	7/1/2030	$ 1,547,731.97	$ 820,601.42	$ -	$ 820,601.42	$ 758,692.14	$ 61,909.28	$ 789,039.83	$ 5,228,225.71
20	7/1/2031	$ 789,039.83	$ 820,601.42	$ -	$ 789,039.83	$ 757,478.23	$ 31,561.59	$ -	$ 5,259,787.30

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 1d – Bedford to Forest – Route 460 – 20" Water Line

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST - Route 460					
Mobilization (5%)	1	LS	$ 271,183.00	$ 271,183.00	
20" Waterline	50,400	LF	$ 75.00	$ 3,780,000.00	
20" Gate Valve & Box	61	EA	$ 2,500.00	$ 153,000.00	
Air Release Valve	9	EA	$ 3,000.00	$ 27,000.00	
Blow Off Valve	9	EA	$ 3,000.00	$ 27,000.00	
Road Bore Setup	20	LS	$ 5,000.00	$ 100,000.00	
Route 460 Crossing	1	LS	$ 150,000.00	$ 150,000.00	
Steel Casing Pipe	1,200	LF	$ 400.00	$ 480,000.00	
Creek/River Crossing	2	EA	$ 50,000.00	$ 100,000.00	
Concrete Encasement	200	LF	$ 50.00	$ 10,000.00	
Connect to Existing Water System	2	EA	$ 10,000.00	$ 20,000.00	
Asphalt Removal and Replacement	336	SY	$ 100.00	$ 33,600.00	
Mainline PRV	1	EA	$ 50,000.00	$ 50,000.00	
Contingencies (10%)	1	LS	$ 493,060.00	$ 493,060.00	
Total Construction Cost Bedford to Forest					**$ 5,694,843**
B. PROJECT RELATED COST @ 30%					**$ 1,708,453**
Total Project Alternative A2 Phase 1d Estimated Loan Amount					**$ 7,403,296**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	-	LS	$ -	$ -	
Line Maintenance	50,400	LF	$ 0.01	$ 504.00	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500.00	$ -	
Total Annual Operation & Maintenance Cost				**$ 504.00**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 1d – Bedford to Forest – Route 460 – 20" Water Line

Construction Cost:		$5,694,843
Project Related Costs:	$	1,708,453
Total Loan:		$7,403,296

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$248,616	$296,132	$504	$545,251
2013	1	$258,560	$286,187	$519	$545,267
2014	2	$268,903	$275,845	$535	$545,282
2015	3	$279,659	$265,089	$551	$545,298
2016	4	$290,845	$253,902	$567	$545,315
2017	5	$302,479	$242,269	$584	$545,332
2018	6	$314,578	$230,169	$602	$545,349
2019	7	$327,161	$217,586	$620	$545,367
2020	8	$340,248	$204,500	$638	$545,386
2021	9	$353,858	$190,890	$658	$545,405
2022	10	$368,012	$176,736	$677	$545,425
2023	11	$382,732	$162,015	$698	$545,445
2024	12	$398,042	$146,706	$719	$545,466
2025	13	$413,963	$130,784	$740	$545,488
2026	14	$430,522	$114,226	$762	$545,510
2027	15	$447,743	$97,005	$785	$545,533
2028	16	$465,652	$79,095	$809	$545,556
2029	17	$484,279	$60,469	$833	$545,581
2030	18	$503,650	$41,098	$858	$545,605
2031	19	$502,844	$20,952	$884	$524,679
2032	20	$0	$0	$910	$910
2033	21	$0	$0	$938	$938
2034	22	$0	$0	$966	$966
2035	23	$0	$0	$995	$995
2036	24	$0	$0	$1,025	$1,025
2037	25	$0	$0	$1,055	$1,055
2038	26	$0	$0	$1,087	$1,087
2039	27	$0	$0	$1,120	$1,120
2040	28	$0	$0	$1,153	$1,153
2041	29	$0	$0	$1,188	$1,188
2042	30	$0	$0	$1,223	$1,223
2043	31	$0	$0	$1,260	$1,260
2044	32	$0	$0	$1,298	$1,298
2045	33	$0	$0	$1,337	$1,337
2046	34	$0	$0	$1,377	$1,377
2047	35	$0	$0	$1,418	$1,418
2048	36	$0	$0	$1,461	$1,461
2049	37	$0	$0	$1,505	$1,505
2050	38	$0	$0	$1,550	$1,550
2051	39	$0	$0	$1,596	$1,596
2052	40	$0	$0	$1,644	$1,644
2053	41	$0	$0	$1,693	$1,693
2054	42	$0	$0	$1,744	$1,744
2055	43	$0	$0	$1,797	$1,797
2056	44	$0	$0	$1,850	$1,850
2057	45	$0	$0	$1,906	$1,906
2058	46	$0	$0	$1,963	$1,963
2059	47	$0	$0	$2,022	$2,022
2060	48	$0	$0	$2,083	$2,083

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 1d – Bedford to Forest – Route 460 – 20" Water Line

	Enter values
Loan amount	$7,403,296
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 544,747.47
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 3,491,653.51

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 7,403,295.90	$ 544,747.47	$ -	$ 544,747.47	$ 248,615.63	$ 296,131.84	$ 7,154,680.27	$ 296,131.84
2	7/1/2013	$ 7,154,680.27	$ 544,747.47	$ -	$ 544,747.47	$ 258,560.26	$ 286,187.21	$ 6,896,120.01	$ 582,319.05
3	7/1/2014	$ 6,896,120.01	$ 544,747.47	$ -	$ 544,747.47	$ 268,902.67	$ 275,844.80	$ 6,627,217.34	$ 858,163.85
4	7/1/2015	$ 6,627,217.34	$ 544,747.47	$ -	$ 544,747.47	$ 279,658.78	$ 265,088.69	$ 6,347,558.56	$ 1,123,252.54
5	7/1/2016	$ 6,347,558.56	$ 544,747.47	$ -	$ 544,747.47	$ 290,845.13	$ 253,902.34	$ 6,056,713.43	$ 1,377,154.88
6	7/1/2017	$ 6,056,713.43	$ 544,747.47	$ -	$ 544,747.47	$ 302,478.93	$ 242,268.54	$ 5,754,234.50	$ 1,619,423.42
7	7/1/2018	$ 5,754,234.50	$ 544,747.47	$ -	$ 544,747.47	$ 314,578.09	$ 230,169.38	$ 5,439,656.41	$ 1,849,592.80
8	7/1/2019	$ 5,439,656.41	$ 544,747.47	$ -	$ 544,747.47	$ 327,161.21	$ 217,586.26	$ 5,112,495.19	$ 2,067,179.06
9	7/1/2020	$ 5,112,495.19	$ 544,747.47	$ -	$ 544,747.47	$ 340,247.66	$ 204,499.81	$ 4,772,247.53	$ 2,271,678.86
10	7/1/2021	$ 4,772,247.53	$ 544,747.47	$ -	$ 544,747.47	$ 353,857.57	$ 190,889.90	$ 4,418,389.96	$ 2,462,568.76
11	7/1/2022	$ 4,418,389.96	$ 544,747.47	$ -	$ 544,747.47	$ 368,011.87	$ 176,735.60	$ 4,050,378.09	$ 2,639,304.36
12	7/1/2023	$ 4,050,378.09	$ 544,747.47	$ -	$ 544,747.47	$ 382,732.35	$ 162,015.12	$ 3,667,645.74	$ 2,801,319.49
13	7/1/2024	$ 3,667,645.74	$ 544,747.47	$ -	$ 544,747.47	$ 398,041.64	$ 146,705.83	$ 3,269,604.10	$ 2,948,025.32
14	7/1/2025	$ 3,269,604.10	$ 544,747.47	$ -	$ 544,747.47	$ 413,963.31	$ 130,784.16	$ 2,855,640.79	$ 3,078,809.48
15	7/1/2026	$ 2,855,640.79	$ 544,747.47	$ -	$ 544,747.47	$ 430,521.84	$ 114,225.63	$ 2,425,118.95	$ 3,193,035.11
16	7/1/2027	$ 2,425,118.95	$ 544,747.47	$ -	$ 544,747.47	$ 447,742.71	$ 97,004.76	$ 1,977,376.24	$ 3,290,039.87
17	7/1/2028	$ 1,977,376.24	$ 544,747.47	$ -	$ 544,747.47	$ 465,652.42	$ 79,095.05	$ 1,511,723.82	$ 3,369,134.92
18	7/1/2029	$ 1,511,723.82	$ 544,747.47	$ -	$ 544,747.47	$ 484,278.52	$ 60,468.95	$ 1,027,445.30	$ 3,429,603.87
19	7/1/2030	$ 1,027,445.30	$ 544,747.47	$ -	$ 544,747.47	$ 503,649.66	$ 41,097.81	$ 523,795.64	$ 3,470,701.68
20	7/1/2031	$ 523,795.64	$ 544,747.47	$ -	$ 523,795.64	$ 502,843.82	$ 20,951.83	$ -	$ 3,491,653.51

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 2 – Whitehouse Road Loop – 18" Water Line – Built in Year 15

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
Mobilization (5%)	1	LS	$ 116,748.50	$ 116,748.50	
18" Waterline	22,100	LF	$ 73.00	$ 1,613,300.00	
18" Gate Valve & Box	23	EA	$ 2,200.00	$ 50,600.00	
Air Release Valve	4	EA	$ 3,000.00	$ 12,000.00	
Blow Off Valve	4	EA	$ 3,000.00	$ 12,000.00	
Road Bore Setup	10	LS	$ 5,000.00	$ 50,000.00	
Steel Casing Pipe	600	LF	$ 400.00	$ 240,000.00	
Creek/River Crossing	2	EA	$ 50,000.00	$ 100,000.00	
Concrete Encasement	200	LF	$ 50.00	$ 10,000.00	
Railroad Crossing	-	LS	$ 150,000.00	$ -	
Connect to Existing Water System	2	EA	$ 10,000.00	$ 20,000.00	
Asphalt Removal and Replacement	148	SY	$ 100.00	$ 14,800.00	
Upgrade High Point WTP	-	EA	$ 1,000,000.00	$ -	
Contingencies (10%)	1	LS	$ 212,270.00	$ 212,270.00	
Total Construction Cost					**$ 2,451,719**
B. PROJECT RELATED COST @ 30%					**$ 735,516**
Total Project Alternative A2 Phase 2 Estimated Loan Amount					**$ 3,187,234**
C. OPERATION & MAINTENANCE COST					
Line Maintenance	22,100	LF	$ 0.01	$ 221.00	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500.00	$ -	
Total Annual Operation & Maintenance Cost				**$ 221.00**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 2 – Whitehouse Road Loop – 18" Water Line – Built in Year 15

Construction Cost:		$2,451,719
Project Related Costs:	$	735,516
Total Loan:		$3,187,234

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0				$0
2013	1				$0
2014	2				$0
2015	3				$0
2016	4				$0
2017	5				$0
2018	6				$0
2019	7				$0
2020	8				$0
2021	9				$0
2022	10				$0
2023	11				$0
2024	12				$0
2025	13				$0
2026	14				$0
2027	15	$107,033	$127,489	$221	$234,743
2028	16	$111,314	$123,208	$228	$234,750
2029	17	$115,767	$118,755	$234	$234,757
2030	18	$120,397	$114,125	$241	$234,764
2031	19	$125,213	$109,309	$249	$234,771
2032	20	$130,222	$104,300	$256	$234,778
2033	21	$135,431	$99,091	$264	$234,786
2034	22	$140,848	$93,674	$272	$234,794
2035	23	$146,482	$88,040	$280	$234,802
2036	24	$152,341	$82,181	$288	$234,811
2037	25	$158,435	$76,087	$297	$234,819
2038	26	$164,772	$69,750	$306	$234,828
2039	27	$171,363	$63,159	$315	$234,837
2040	28	$178,218	$56,305	$325	$234,847
2041	29	$185,346	$49,176	$334	$234,857
2042	30	$192,760	$41,762	$344	$234,867
2043	31	$200,471	$34,052	$355	$234,877
2044	32	$208,489	$26,033	$365	$234,888
2045	33	$216,829	$17,693	$376	$234,898
2046	34	$216,482	$9,020	$388	$225,890
2047	35	$0	$0	$399	$399
2048	36	$0	$0	$411	$411
2049	37	$0	$0	$423	$423
2050	38	$0	$0	$436	$436
2051	39	$0	$0	$449	$449
2052	40	$0	$0	$463	$463
2053	41	$0	$0	$477	$477
2054	42	$0	$0	$491	$491
2055	43	$0	$0	$506	$506
2056	44	$0	$0	$521	$521
2057	45	$0	$0	$536	$536
2058	46	$0	$0	$553	$553
2059	47	$0	$0	$569	$569
2060	48	$0	$0	$586	$586

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 2 – Whitehouse Road Loop – 18" Water Line – Built in Year 15

	Enter values
Loan amount	$3,187,234
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2026
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 234,522.26
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 1,503,211.15

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2027	$ 3,187,234.05	$ 234,522.26	$ -	$ 234,522.26	$ 107,032.90	$ 127,489.36	$ 3,080,201.15	$ 127,489.36
2	7/1/2028	$ 3,080,201.15	$ 234,522.26	$ -	$ 234,522.26	$ 111,314.21	$ 123,208.05	$ 2,968,886.94	$ 250,697.41
3	7/1/2029	$ 2,968,886.94	$ 234,522.26	$ -	$ 234,522.26	$ 115,766.78	$ 118,755.48	$ 2,853,120.16	$ 369,452.89
4	7/1/2030	$ 2,853,120.16	$ 234,522.26	$ -	$ 234,522.26	$ 120,397.45	$ 114,124.81	$ 2,732,722.70	$ 483,577.69
5	7/1/2031	$ 2,732,722.70	$ 234,522.26	$ -	$ 234,522.26	$ 125,213.35	$ 109,308.91	$ 2,607,509.35	$ 592,886.60
6	7/1/2032	$ 2,607,509.35	$ 234,522.26	$ -	$ 234,522.26	$ 130,221.89	$ 104,300.37	$ 2,477,287.46	$ 697,186.97
7	7/1/2033	$ 2,477,287.46	$ 234,522.26	$ -	$ 234,522.26	$ 135,430.76	$ 99,091.50	$ 2,341,856.70	$ 796,278.47
8	7/1/2034	$ 2,341,856.70	$ 234,522.26	$ -	$ 234,522.26	$ 140,847.99	$ 93,674.27	$ 2,201,008.71	$ 889,952.74
9	7/1/2035	$ 2,201,008.71	$ 234,522.26	$ -	$ 234,522.26	$ 146,481.91	$ 88,040.35	$ 2,054,526.80	$ 977,993.09
10	7/1/2036	$ 2,054,526.80	$ 234,522.26	$ -	$ 234,522.26	$ 152,341.19	$ 82,181.07	$ 1,902,185.61	$ 1,060,174.16
11	7/1/2037	$ 1,902,185.61	$ 234,522.26	$ -	$ 234,522.26	$ 158,434.84	$ 76,087.42	$ 1,743,750.77	$ 1,136,261.59
12	7/1/2038	$ 1,743,750.77	$ 234,522.26	$ -	$ 234,522.26	$ 164,772.23	$ 69,750.03	$ 1,578,978.54	$ 1,206,011.62
13	7/1/2039	$ 1,578,978.54	$ 234,522.26	$ -	$ 234,522.26	$ 171,363.12	$ 63,159.14	$ 1,407,615.43	$ 1,269,170.76
14	7/1/2040	$ 1,407,615.43	$ 234,522.26	$ -	$ 234,522.26	$ 178,217.64	$ 56,304.62	$ 1,229,397.78	$ 1,325,475.37
15	7/1/2041	$ 1,229,397.78	$ 234,522.26	$ -	$ 234,522.26	$ 185,346.35	$ 49,175.91	$ 1,044,051.43	$ 1,374,651.29
16	7/1/2042	$ 1,044,051.43	$ 234,522.26	$ -	$ 234,522.26	$ 192,760.20	$ 41,762.06	$ 851,291.23	$ 1,416,413.34
17	7/1/2043	$ 851,291.23	$ 234,522.26	$ -	$ 234,522.26	$ 200,470.61	$ 34,051.65	$ 650,820.62	$ 1,450,464.99
18	7/1/2044	$ 650,820.62	$ 234,522.26	$ -	$ 234,522.26	$ 208,489.44	$ 26,032.82	$ 442,331.19	$ 1,476,497.82
19	7/1/2045	$ 442,331.19	$ 234,522.26	$ -	$ 234,522.26	$ 216,829.01	$ 17,693.25	$ 225,502.17	$ 1,494,191.07
20	7/1/2046	$ 225,502.17	$ 234,522.26	$ -	$ 225,502.17	$ 216,482.09	$ 9,020.09	$ -	$ 1,503,211.15

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Cost Estimate: A2, Phase 3 – Route 122 Pump Station – Built in Year 30

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
Mobilization (5%)	1	LS	$ 33,000	$ 33,000	
Pump Station (3000 gpm)	1	LS	$ 600,000	$ 600,000	
Contingencies (10%)	1	LS	$ 60,000	$ 60,000	
Total Construction Cost					**$ 693,000**
B. PROJECT RELATED COST @ 30%					**$ 207,900**
Total Project Alternative A2 Phase 3 Estimated Loan Amount					**$ 900,900**
C. OPERATION & MAINTENANCE COST					
Operations Labor (1 hr/day)	365	HR	$ 35	$ 12,775	
Maintenance Labor (8 hrs/month)	96	HR	$ 35	$ 3,360	
Pump Station Power	1	LS	$ 47,702	$ 47,702	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500	$ -	
Total Annual Operation & Maintenance Cost				**$ 63,837**	

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Annual Costs: A2, Phase 3 – Route 122 Pump Station – Built in Year 30

Construction Cost:	$693,000
Project Related Costs:	$207,900
Total Loan:	$900,900

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0				$0
2013	1				$0
2014	2				$0
2015	3				$0
2016	4				$0
2017	5				$0
2018	6				$0
2019	7				$0
2020	8				$0
2021	9				$0
2022	10				$0
2023	11				$0
2024	12				$0
2025	13				$0
2026	14				$0
2027	15				$0
2028	16				$0
2029	17				$0
2030	18				$0
2031	19				$0
2032	20				$0
2033	21				$0
2034	22				$0
2035	23				$0
2036	24				$0
2037	25				$0
2038	26				$0
2039	27				$0
2040	28				$0
2041	29				$0
2042	30	$38,017	$36,036	$63,837	$137,890
2043	31	$39,537	$34,515	$65,752	$139,805
2044	32	$41,119	$32,934	$67,725	$141,778
2045	33	$42,764	$31,289	$69,757	$143,809
2046	34	$44,474	$29,579	$71,849	$145,902
2047	35	$46,253	$27,800	$74,005	$148,058
2048	36	$48,103	$25,949	$76,225	$150,278
2049	37	$50,027	$24,025	$78,512	$152,565
2050	38	$52,028	$22,024	$80,867	$154,920
2051	39	$54,110	$19,943	$83,293	$157,346
2052	40	$56,274	$17,779	$85,792	$159,845
2053	41	$58,525	$15,528	$88,366	$162,418
2054	42	$60,866	$13,187	$91,017	$165,069
2055	43	$63,301	$10,752	$93,747	$167,800
2056	44	$65,833	$8,220	$96,560	$170,612
2057	45	$68,466	$5,587	$99,456	$173,509
2058	46	$68,356	$2,848	$102,440	$173,645
2059	47	$0	$0	$105,513	$105,513
2060	48	$0	$0	$108,679	$108,679

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – A2, Phase 3 – Route 122 Pump Station – Built in Year 30

	Enter values
Loan amount	$900,900
Annual interest rate	4.00 %
Loan period in years	17
Number of payments per year	1
Start date of loan	7/1/2041
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 74,052.65
Scheduled number of payments	17
Actual number of payments	17
Total early payments	$ -
Total interest	$ 357,995.03

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2042	$ 900,900.00	$ 74,052.65	$ -	$ 74,052.65	$ 38,016.65	$ 36,036.00	$ 862,883.35	$ 36,036.00
2	7/1/2043	$ 862,883.35	$ 74,052.65	$ -	$ 74,052.65	$ 39,537.31	$ 34,515.33	$ 823,346.04	$ 70,551.33
3	7/1/2044	$ 823,346.04	$ 74,052.65	$ -	$ 74,052.65	$ 41,118.81	$ 32,933.84	$ 782,227.23	$ 103,485.18
4	7/1/2045	$ 782,227.23	$ 74,052.65	$ -	$ 74,052.65	$ 42,763.56	$ 31,289.09	$ 739,463.67	$ 134,774.26
5	7/1/2046	$ 739,463.67	$ 74,052.65	$ -	$ 74,052.65	$ 44,474.10	$ 29,578.55	$ 694,989.57	$ 164,352.81
6	7/1/2047	$ 694,989.57	$ 74,052.65	$ -	$ 74,052.65	$ 46,253.07	$ 27,799.58	$ 648,736.50	$ 192,152.39
7	7/1/2048	$ 648,736.50	$ 74,052.65	$ -	$ 74,052.65	$ 48,103.19	$ 25,949.46	$ 600,633.31	$ 218,101.85
8	7/1/2049	$ 600,633.31	$ 74,052.65	$ -	$ 74,052.65	$ 50,027.32	$ 24,025.33	$ 550,606.00	$ 242,127.19
9	7/1/2050	$ 550,606.00	$ 74,052.65	$ -	$ 74,052.65	$ 52,028.41	$ 22,024.24	$ 498,577.59	$ 264,151.43
10	7/1/2051	$ 498,577.59	$ 74,052.65	$ -	$ 74,052.65	$ 54,109.54	$ 19,943.10	$ 444,468.05	$ 284,094.53
11	7/1/2052	$ 444,468.05	$ 74,052.65	$ -	$ 74,052.65	$ 56,273.93	$ 17,778.72	$ 388,194.12	$ 301,873.25
12	7/1/2053	$ 388,194.12	$ 74,052.65	$ -	$ 74,052.65	$ 58,524.88	$ 15,527.76	$ 329,669.23	$ 317,401.02
13	7/1/2054	$ 329,669.23	$ 74,052.65	$ -	$ 74,052.65	$ 60,865.88	$ 13,186.77	$ 268,803.36	$ 330,587.79
14	7/1/2055	$ 268,803.36	$ 74,052.65	$ -	$ 74,052.65	$ 63,300.51	$ 10,752.13	$ 205,502.84	$ 341,339.92
15	7/1/2056	$ 205,502.84	$ 74,052.65	$ -	$ 74,052.65	$ 65,832.53	$ 8,220.11	$ 139,670.31	$ 349,560.03
16	7/1/2057	$ 139,670.31	$ 74,052.65	$ -	$ 74,052.65	$ 68,465.84	$ 5,586.81	$ 71,204.47	$ 355,146.85
17	7/1/2058	$ 71,204.47	$ 74,052.65	$ -	$ 71,204.47	$ 68,356.29	$ 2,848.18	$ -	$ 357,995.03

ALTERNATIVE A2 – Construct WTP and water lines to connect Forest to SML
Pumping Cost Estimate: A2, Phase 3 – Route 122 Pump Station – Built in Year 30

2060 Projected Peak Demand	4,240,000	gpd
Flow Rate through PS (16 hrs/day)	4,240,000	gpd
	2,944	gpm
Head Gained through PS	112	ft
Density of Water	1.94	slug/ft^3
Gravity	32.2	ft/s^2
Water Power added	83	HP
	62	KW
Overall Efficiency of Pump	80	%
Total Power Needed	78	KW
Cost of Electricity	0.07	$/KW-hr
Pump Run Time	24	hrs/day
Total Cost	131	$/day
	47,702	$/year

ALTERNATIVE A2 – Construct WTP and water lines to connect Bedford to SML

Summary of Project Phase Annual & Present Value Costs

ALTERNATIVE B2 - Phase 1a - Expand Highpoint WTP to 1.0 MGD
ALTERNATIVE B2 - Phase 1b - Construct New 5.0 MGD WTP
ALTERNATIVE B2 - Phase 1c - LAKES TO BEDFORD - Route 122 24" Waterline
ALTERNATIVE B2 - Phase 2 - Route 122 Pump Station

Year	#	Phase 1a	Phase 1b	Phase 1c	Phase 2	Total Annual Costs	Annual Present Value	Total Present Value
2012	0	$ 225,690	$ 1,239,334	$ 821,311	$ 122,866	$ 2,409,201	$ 2,409,201	$ 2,409,201
2013	1	$ 231,582	$ 1,252,525	$ 821,333	$ 124,563	$ 2,430,003	$ 2,336,448	$ 4,745,649
2014	2	$ 237,651	$ 1,266,112	$ 821,355	$ 126,311	$ 2,451,428	$ 2,266,591	$ 7,012,239
2015	3	$ 243,902	$ 1,280,106	$ 821,377	$ 128,112	$ 2,473,497	$ 2,198,939	$ 9,211,178
2016	4	$ 250,340	$ 1,294,520	$ 821,401	$ 129,967	$ 2,496,227	$ 2,133,775	$ 11,344,952
2017	5	$ 256,971	$ 1,309,367	$ 821,425	$ 131,877	$ 2,519,639	$ 2,070,892	$ 13,415,844
2018	6	$ 263,802	$ 1,324,659	$ 821,449	$ 133,845	$ 2,543,754	$ 2,010,329	$ 15,426,173
2019	7	$ 270,837	$ 1,340,409	$ 821,475	$ 135,871	$ 2,568,592	$ 1,951,873	$ 17,378,046
2020	8	$ 278,084	$ 1,356,633	$ 821,501	$ 137,959	$ 2,594,176	$ 1,895,564	$ 19,273,611
2021	9	$ 285,547	$ 1,373,343	$ 821,528	$ 140,109	$ 2,620,526	$ 1,841,182	$ 21,114,792
2022	10	$ 293,235	$ 1,390,554	$ 821,556	$ 142,323	$ 2,647,668	$ 1,788,764	$ 22,903,557
2023	11	$ 301,153	$ 1,408,281	$ 821,584	$ 144,604	$ 2,675,623	$ 1,738,085	$ 24,641,642
2024	12	$ 309,309	$ 1,426,541	$ 821,614	$ 146,954	$ 2,704,418	$ 1,689,179	$ 26,330,821
2025	13	$ 317,710	$ 1,445,348	$ 821,644	$ 149,374	$ 2,734,076	$ 1,642,086	$ 27,972,907
2026	14	$ 326,363	$ 1,464,720	$ 821,675	$ 151,866	$ 2,764,624	$ 1,596,570	$ 29,569,477
2027	15	$ 335,275	$ 1,484,672	$ 821,708	$ 154,433	$ 2,796,088	$ 1,552,668	$ 31,122,145
2028	16	$ 344,454	$ 1,505,223	$ 821,741	$ 157,078	$ 2,828,496	$ 1,510,134	$ 32,632,279
2029	17	$ 353,909	$ 1,526,391	$ 821,775	$ 159,801	$ 2,861,876	$ 1,469,287	$ 34,101,566
2030	18	$ 363,648	$ 1,548,194	$ 821,810	$ 162,607	$ 2,896,258	$ 1,429,593	$ 35,531,159
2031	19	$ 372,552	$ 1,539,895	$ 790,285	$ 162,947	$ 2,865,679	$ 1,360,051	$ 36,891,210
2032	20	$ 354,720	$ 794,147	$ 1,282	$ 102,183	$ 1,252,332	$ 571,564	$ 37,462,775
2033	21	$ 365,362	$ 817,972	$ 1,321	$ 105,248	$ 1,289,902	$ 566,009	$ 38,028,784
2034	22	$ 376,323	$ 842,511	$ 1,360	$ 108,405	$ 1,328,599	$ 560,669	$ 38,589,453
2035	23	$ 387,612	$ 867,786	$ 1,401	$ 111,658	$ 1,368,457	$ 555,183	$ 39,144,636
2036	24	$ 399,241	$ 893,820	$ 1,443	$ 115,007	$ 1,409,511	$ 549,850	$ 39,694,486
2037	25	$ 411,218	$ 920,634	$ 1,487	$ 118,458	$ 1,451,796	$ 544,569	$ 40,239,055
2038	26	$ 423,555	$ 948,253	$ 1,531	$ 122,011	$ 1,495,350	$ 539,373	$ 40,778,428
2039	27	$ 436,261	$ 976,701	$ 1,577	$ 125,672	$ 1,540,211	$ 534,145	$ 41,312,573
2040	28	$ 449,349	$ 1,006,002	$ 1,624	$ 129,442	$ 1,586,417	$ 529,070	$ 41,841,643
2041	29	$ 462,829	$ 1,036,182	$ 1,673	$ 133,325	$ 1,634,010	$ 524,027	$ 42,365,670
2042	30	$ 476,714	$ 1,067,267	$ 1,723	$ 137,325	$ 1,683,030	$ 518,878	$ 42,884,548
2043	31	$ 491,016	$ 1,099,285	$ 1,775	$ 141,445	$ 1,733,521	$ 513,989	$ 43,398,537
2044	32	$ 505,746	$ 1,132,264	$ 1,828	$ 145,688	$ 1,785,526	$ 509,054	$ 43,907,590
2045	33	$ 520,919	$ 1,166,232	$ 1,883	$ 150,059	$ 1,839,092	$ 504,095	$ 44,411,685
2046	34	$ 536,546	$ 1,201,219	$ 1,940	$ 154,560	$ 1,894,265	$ 499,328	$ 44,911,013
2047	35	$ 552,643	$ 1,237,255	$ 1,998	$ 159,197	$ 1,951,093	$ 494,407	$ 45,405,420
2048	36	$ 569,222	$ 1,274,373	$ 2,058	$ 163,973	$ 2,009,626	$ 489,746	$ 45,895,166
2049	37	$ 586,299	$ 1,312,604	$ 2,120	$ 168,892	$ 2,069,914	$ 484,981	$ 46,380,147
2050	38	$ 603,887	$ 1,351,982	$ 2,183	$ 173,959	$ 2,132,012	$ 480,342	$ 46,860,489
2051	39	$ 622,004	$ 1,392,542	$ 2,249	$ 179,178	$ 2,195,972	$ 475,648	$ 47,336,137
2052	40	$ 640,664	$ 1,434,318	$ 2,316	$ 184,553	$ 2,261,851	$ 471,144	$ 47,807,281
2053	41	$ 659,884	$ 1,477,348	$ 2,386	$ 190,090	$ 2,329,707	$ 466,640	$ 48,273,921
2054	42	$ 679,681	$ 1,521,668	$ 2,457	$ 195,792	$ 2,399,598	$ 462,163	$ 48,736,083
2055	43	$ 700,071	$ 1,567,318	$ 2,531	$ 201,666	$ 2,471,586	$ 457,738	$ 49,193,821
2056	44	$ 721,073	$ 1,614,338	$ 2,607	$ 207,716	$ 2,545,734	$ 453,141	$ 49,646,962
2057	45	$ 742,705	$ 1,662,768	$ 2,685	$ 213,948	$ 2,622,106	$ 448,904	$ 50,095,866
2058	46	$ 764,987	$ 1,712,651	$ 2,765	$ 220,366	$ 2,700,769	$ 444,547	$ 50,540,413
2059	47	$ 787,936	$ 1,764,030	$ 2,848	$ 226,977	$ 2,781,792	$ 440,358	$ 50,980,770
2060	48	$ 811,574	$ 1,816,951	$ 2,934	$ 233,786	$ 2,865,246	$ 436,090	$ 51,416,861

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Cost Estimate: B2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$13,300	$13,300	
Raw Water Strainers	1	LS	$25,000	$25,000	
850 GPM Finish Water Pumps & VFD (Highpoint WTP)	2	EA	$100,000	$200,000	
Piping/Valve Upgrades (Highpoint WTP)	1	LS	$15,000	$15,000	
Electrical Upgrades (Highpoint WTP)	1	LS	$25,000	$25,000	
Contingency	10%	LS	$27,900	$27,900	
Total Construction Cost					**$ 306,200**
B. PROJECT RELATED COST @ 30%					**$ 91,860**
Total Project Alternative B2 Phase 1a Estimated Loan Amount					**$ 398,060**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	1	LS	$196,400	$196,400	
Line Maintenance	-	LF		$0	
Water Purchases ($2.50/1000 gal)	-	MGD		$0	
Total Annual Operation & Maintenance Cost				$196,400	

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Annual Costs: B2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

Construction Cost:		$306,200
Project Related Costs:	$	91,860
Total Loan:		$398,060

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$13,368	$15,922	$196,400	$225,690
2013	1	$13,902	$15,388	$202,292	$231,582
2014	2	$14,458	$14,832	$208,361	$237,651
2015	3	$15,037	$14,253	$214,612	$243,902
2016	4	$15,638	$13,652	$221,050	$250,340
2017	5	$16,264	$13,026	$227,681	$256,971
2018	6	$16,914	$12,376	$234,512	$263,802
2019	7	$17,591	$11,699	$241,547	$270,837
2020	8	$18,294	$10,996	$248,794	$278,084
2021	9	$19,026	$10,264	$256,257	$285,547
2022	10	$19,787	$9,503	$263,945	$293,235
2023	11	$20,579	$8,711	$271,864	$301,153
2024	12	$21,402	$7,888	$280,019	$309,309
2025	13	$22,258	$7,032	$288,420	$317,710
2026	14	$23,148	$6,142	$297,073	$326,363
2027	15	$24,074	$5,216	$305,985	$335,275
2028	16	$25,037	$4,253	$315,164	$344,454
2029	17	$26,039	$3,251	$324,619	$353,909
2030	18	$27,080	$2,210	$334,358	$363,648
2031	19	$27,037	$1,127	$344,389	$372,552
2032	20	$0	$0	$354,720	$354,720
2033	21	$0	$0	$365,362	$365,362
2034	22	$0	$0	$376,323	$376,323
2035	23	$0	$0	$387,612	$387,612
2036	24	$0	$0	$399,241	$399,241
2037	25	$0	$0	$411,218	$411,218
2038	26	$0	$0	$423,555	$423,555
2039	27	$0	$0	$436,261	$436,261
2040	28	$0	$0	$449,349	$449,349
2041	29	$0	$0	$462,829	$462,829
2042	30	$0	$0	$476,714	$476,714
2043	31	$0	$0	$491,016	$491,016
2044	32	$0	$0	$505,746	$505,746
2045	33	$0	$0	$520,919	$520,919
2046	34	$0	$0	$536,546	$536,546
2047	35	$0	$0	$552,643	$552,643
2048	36	$0	$0	$569,222	$569,222
2049	37	$0	$0	$586,299	$586,299
2050	38	$0	$0	$603,887	$603,887
2051	39	$0	$0	$622,004	$622,004
2052	40	$0	$0	$640,664	$640,664
2053	41	$0	$0	$659,884	$659,884
2054	42	$0	$0	$679,681	$679,681
2055	43	$0	$0	$700,071	$700,071
2056	44	$0	$0	$721,073	$721,073
2057	45	$0	$0	$742,705	$742,705
2058	46	$0	$0	$764,987	$764,987
2059	47	$0	$0	$787,936	$787,936
2060	48	$0	$0	$811,574	$811,574

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – B2, Phase 1a – Expand Highpoint WTP to 1.0 MGD

	Enter values
Loan amount	$398,060
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 29,289.95
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 187,739.03

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 398,060.00	$ 29,289.95	$ -	$ 29,289.95	$ 13,367.55	$ 15,922.40	$ 384,692.45	$ 15,922.40
2	7/1/2013	$ 384,692.45	$ 29,289.95	$ -	$ 29,289.95	$ 13,902.25	$ 15,387.70	$ 370,790.19	$ 31,310.10
3	7/1/2014	$ 370,790.19	$ 29,289.95	$ -	$ 29,289.95	$ 14,458.34	$ 14,831.61	$ 356,331.85	$ 46,141.71
4	7/1/2015	$ 356,331.85	$ 29,289.95	$ -	$ 29,289.95	$ 15,036.68	$ 14,253.27	$ 341,295.17	$ 60,394.98
5	7/1/2016	$ 341,295.17	$ 29,289.95	$ -	$ 29,289.95	$ 15,638.14	$ 13,651.81	$ 325,657.03	$ 74,046.79
6	7/1/2017	$ 325,657.03	$ 29,289.95	$ -	$ 29,289.95	$ 16,263.67	$ 13,026.28	$ 309,393.36	$ 87,073.07
7	7/1/2018	$ 309,393.36	$ 29,289.95	$ -	$ 29,289.95	$ 16,914.22	$ 12,375.73	$ 292,479.14	$ 99,448.80
8	7/1/2019	$ 292,479.14	$ 29,289.95	$ -	$ 29,289.95	$ 17,590.79	$ 11,699.17	$ 274,888.36	$ 111,147.97
9	7/1/2020	$ 274,888.36	$ 29,289.95	$ -	$ 29,289.95	$ 18,294.42	$ 10,995.53	$ 256,593.94	$ 122,143.50
10	7/1/2021	$ 256,593.94	$ 29,289.95	$ -	$ 29,289.95	$ 19,026.19	$ 10,263.76	$ 237,567.74	$ 132,407.26
11	7/1/2022	$ 237,567.74	$ 29,289.95	$ -	$ 29,289.95	$ 19,787.24	$ 9,502.71	$ 217,780.50	$ 141,909.97
12	7/1/2023	$ 217,780.50	$ 29,289.95	$ -	$ 29,289.95	$ 20,578.73	$ 8,711.22	$ 197,201.77	$ 150,621.19
13	7/1/2024	$ 197,201.77	$ 29,289.95	$ -	$ 29,289.95	$ 21,401.88	$ 7,888.07	$ 175,799.89	$ 158,509.26
14	7/1/2025	$ 175,799.89	$ 29,289.95	$ -	$ 29,289.95	$ 22,257.96	$ 7,032.00	$ 153,541.93	$ 165,541.26
15	7/1/2026	$ 153,541.93	$ 29,289.95	$ -	$ 29,289.95	$ 23,148.27	$ 6,141.68	$ 130,393.66	$ 171,682.93
16	7/1/2027	$ 130,393.66	$ 29,289.95	$ -	$ 29,289.95	$ 24,074.21	$ 5,215.75	$ 106,319.46	$ 176,898.68
17	7/1/2028	$ 106,319.46	$ 29,289.95	$ -	$ 29,289.95	$ 25,037.17	$ 4,252.78	$ 81,282.28	$ 181,151.46
18	7/1/2029	$ 81,282.28	$ 29,289.95	$ -	$ 29,289.95	$ 26,038.66	$ 3,251.29	$ 55,243.62	$ 184,402.75
19	7/1/2030	$ 55,243.62	$ 29,289.95	$ -	$ 29,289.95	$ 27,080.21	$ 2,209.74	$ 28,163.41	$ 186,612.49
20	7/1/2031	$ 28,163.41	$ 29,289.95	$ -	$ 28,163.41	$ 27,036.88	$ 1,126.54	$ -	$ 187,739.03

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Cost Estimate: B2, Phase 1b – Construct New 5.0 MGD WTP

Assumption: Equipment is procured by BCPSA directly.

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST					
General					
Mobilization @ 5% of Construction Cost	1	LS	$361,900	$361,900	
Raw Water Intake					
Intake Screen	1	EA	$67,500	$67,500	
Buoys	1	LS	$15,000	$15,000	
Intake Pipe	300	LF	$350	$105,000	
Site Work	1	LS	$10,000	$10,000	
Excavation	1	LS	$39,000	$39,000	
Intake Structure	1	EA	$75,000	$75,000	
Valve Box	1	EA	$5,000	$5,000	
Air System	1	LS	$10,000	$10,000	
CMU Building and Foundation/Slab (10'x10')	100	SF	$135	$13,500	
Raw Water Pumps	2	EA	$25,000	$50,000	
Piping and Valves	1	LS	$35,000	$35,000	
Electrical	1	LS	$25,000	$25,000	
Electrical Service	1	LS	$24,500	$24,500	
Yard Structures & Piping					
18" Raw Water Line	14,850	LF	$73	$1,084,100	
Raw Water Level Control/Chemical Injection Vault	1	LS	$25,000	$25,000	
Drain, Filtrate, & Misc. Yard Piping	1	LS	$50,000	$50,000	
Sanitary Sewer and Backwash Piping	1	LS	$50,000	$50,000	
Treatment Building					
Sitework & Grading	1	LS	$100,000	$100,000	
Pre-Engineered Metal Building and Foundation/Slab (120'x60')	7,200	SF	$65	$468,000	
Mechanical and HVAC	1	LS	$75,000	$75,000	
Piping/Plumbing	1	LS	$60,000	$60,000	
Building Electrical	1	LS	$300,000	$300,000	
Backup Generator					
800 KW Generator	1	LS	$400,000	$400,000	
Treatment Equipment					
Raw Water Strainers	1	LS	$125,000	$125,000	
Membrane Filter Skids (w/compressors, CIP, pumps)	1	LS	$1,400,000	$1,400,000	
Disinfection Equipment	1	LS	$100,000	$100,000	
pH Adjustment/Corrosion Control Equipment	1	LS	$75,000	$75,000	
Finish Water Pumps					
3500 GPM Finish Water Pumps & VFD	2	EA	$160,000	$320,000	
Electrical	1	LS	$100,000	$100,000	
Tanks					
Sitework & Grading	1	LS	$60,000	$60,000	
Raw Water Tank	100,000	GAL	$3.00	$300,000	
Clearwell Tank	435,000	GAL	$3.00	$1,305,000	
Piping	1	LS	$100,000	$100,000	
Instrumentation	1	LS	$40,000	$40,000	
Laboratory					
Analytical Equipment	1	LS	$25,000	$25,000	
Fume Hood/Safety Equipment	1	LS	$25,000	$25,000	
Lab Counters/Cabinets/Furnishings	400	SF	$65	$26,000	
Process Monitoring					
SCADA & Controls	1	LS	$150,000	$150,000	
Contingency	10%			$759,950	
Total Construction Cost					**$ 8,359,450**
B. PROJECT RELATED COST @ 30%					**$ 2,507,835**
Total Project Alternative B2 Phase 1b Estimated Loan Amount					**$ 10,867,285**
C. OPERATION & MAINTENANCE COST					
WTP Plant O&M	1	LS	$439,700	$439,700	
Line Maintenance	-	LF		$0	
Water Purchases ($2.50/1000 gal)	-	MGD		$0	
Total Annual Operation & Maintenance Cost				**$439,700**	

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Annual Costs: B2, Phase 1b – Construct New 5.0 MGD WTP

Construction Cost:		$8,359,450
Project Related Costs:	$	2,507,835
Total Loan:		$10,867,285

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$364,942	$434,691	$439,700	$1,239,334
2013	1	$379,540	$420,094	$452,891	$1,252,525
2014	2	$394,722	$404,912	$466,478	$1,266,112
2015	3	$410,511	$389,123	$480,472	$1,280,106
2016	4	$426,931	$372,703	$494,886	$1,294,520
2017	5	$444,008	$355,626	$509,733	$1,309,367
2018	6	$461,769	$337,865	$525,025	$1,324,659
2019	7	$480,239	$319,394	$540,776	$1,340,409
2020	8	$499,449	$300,185	$556,999	$1,356,633
2021	9	$519,427	$280,207	$573,709	$1,373,343
2022	10	$540,204	$259,430	$590,920	$1,390,554
2023	11	$561,812	$237,822	$608,648	$1,408,281
2024	12	$584,285	$215,349	$626,907	$1,426,541
2025	13	$607,656	$191,978	$645,714	$1,445,348
2026	14	$631,962	$167,672	$665,086	$1,464,720
2027	15	$657,241	$142,393	$685,038	$1,484,672
2028	16	$683,530	$116,103	$705,589	$1,505,223
2029	17	$710,872	$88,762	$726,757	$1,526,391
2030	18	$739,306	$60,327	$748,560	$1,548,194
2031	19	$738,124	$30,755	$771,017	$1,539,895
2032	20	$0	$0	$794,147	$794,147
2033	21	$0	$0	$817,972	$817,972
2034	22	$0	$0	$842,511	$842,511
2035	23	$0	$0	$867,786	$867,786
2036	24	$0	$0	$893,820	$893,820
2037	25	$0	$0	$920,634	$920,634
2038	26	$0	$0	$948,253	$948,253
2039	27	$0	$0	$976,701	$976,701
2040	28	$0	$0	$1,006,002	$1,006,002
2041	29	$0	$0	$1,036,182	$1,036,182
2042	30	$0	$0	$1,067,267	$1,067,267
2043	31	$0	$0	$1,099,285	$1,099,285
2044	32	$0	$0	$1,132,264	$1,132,264
2045	33	$0	$0	$1,166,232	$1,166,232
2046	34	$0	$0	$1,201,219	$1,201,219
2047	35	$0	$0	$1,237,255	$1,237,255
2048	36	$0	$0	$1,274,373	$1,274,373
2049	37	$0	$0	$1,312,604	$1,312,604
2050	38	$0	$0	$1,351,982	$1,351,982
2051	39	$0	$0	$1,392,542	$1,392,542
2052	40	$0	$0	$1,434,318	$1,434,318
2053	41	$0	$0	$1,477,348	$1,477,348
2054	42	$0	$0	$1,521,668	$1,521,668
2055	43	$0	$0	$1,567,318	$1,567,318
2056	44	$0	$0	$1,614,338	$1,614,338
2057	45	$0	$0	$1,662,768	$1,662,768
2058	46	$0	$0	$1,712,651	$1,712,651
2059	47	$0	$0	$1,764,030	$1,764,030
2060	48	$0	$0	$1,816,951	$1,816,951

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – B2, Phase 1b – Construct New 5.0 MGD WTP

	Enter values
Loan amount	$10,867,285
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 799,633.85
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 5,125,392.03

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 10,867,285.00	$ 799,633.85	$ -	$ 799,633.85	$ 364,942.45	$ 434,691.40	$ 10,502,342.55	$ 434,691.40
2	7/1/2013	$ 10,502,342.55	$ 799,633.85	$ -	$ 799,633.85	$ 379,540.15	$ 420,093.70	$ 10,122,802.40	$ 854,785.10
3	7/1/2014	$ 10,122,802.40	$ 799,633.85	$ -	$ 799,633.85	$ 394,721.76	$ 404,912.10	$ 9,728,080.64	$ 1,259,697.20
4	7/1/2015	$ 9,728,080.64	$ 799,633.85	$ -	$ 799,633.85	$ 410,510.63	$ 389,123.23	$ 9,317,570.02	$ 1,648,820.42
5	7/1/2016	$ 9,317,570.02	$ 799,633.85	$ -	$ 799,633.85	$ 426,931.05	$ 372,702.80	$ 8,890,638.97	$ 2,021,523.22
6	7/1/2017	$ 8,890,638.97	$ 799,633.85	$ -	$ 799,633.85	$ 444,008.29	$ 355,625.56	$ 8,446,630.67	$ 2,377,148.78
7	7/1/2018	$ 8,446,630.67	$ 799,633.85	$ -	$ 799,633.85	$ 461,768.62	$ 337,865.23	$ 7,984,862.05	$ 2,715,014.01
8	7/1/2019	$ 7,984,862.05	$ 799,633.85	$ -	$ 799,633.85	$ 480,239.37	$ 319,394.48	$ 7,504,622.68	$ 3,034,408.49
9	7/1/2020	$ 7,504,622.68	$ 799,633.85	$ -	$ 799,633.85	$ 499,448.94	$ 300,184.91	$ 7,005,173.73	$ 3,334,593.40
10	7/1/2021	$ 7,005,173.73	$ 799,633.85	$ -	$ 799,633.85	$ 519,426.90	$ 280,206.95	$ 6,485,746.83	$ 3,614,800.35
11	7/1/2022	$ 6,485,746.83	$ 799,633.85	$ -	$ 799,633.85	$ 540,203.98	$ 259,429.87	$ 5,945,542.85	$ 3,874,230.22
12	7/1/2023	$ 5,945,542.85	$ 799,633.85	$ -	$ 799,633.85	$ 561,812.14	$ 237,821.71	$ 5,383,730.72	$ 4,112,051.94
13	7/1/2024	$ 5,383,730.72	$ 799,633.85	$ -	$ 799,633.85	$ 584,284.62	$ 215,349.23	$ 4,799,446.09	$ 4,327,401.16
14	7/1/2025	$ 4,799,446.09	$ 799,633.85	$ -	$ 799,633.85	$ 607,656.01	$ 191,977.84	$ 4,191,790.09	$ 4,519,379.01
15	7/1/2026	$ 4,191,790.09	$ 799,633.85	$ -	$ 799,633.85	$ 631,962.25	$ 167,671.60	$ 3,559,827.84	$ 4,687,050.61
16	7/1/2027	$ 3,559,827.84	$ 799,633.85	$ -	$ 799,633.85	$ 657,240.74	$ 142,393.11	$ 2,902,587.10	$ 4,829,443.73
17	7/1/2028	$ 2,902,587.10	$ 799,633.85	$ -	$ 799,633.85	$ 683,530.37	$ 116,103.48	$ 2,219,056.73	$ 4,945,547.21
18	7/1/2029	$ 2,219,056.73	$ 799,633.85	$ -	$ 799,633.85	$ 710,871.58	$ 88,762.27	$ 1,508,185.15	$ 5,034,309.48
19	7/1/2030	$ 1,508,185.15	$ 799,633.85	$ -	$ 799,633.85	$ 739,306.45	$ 60,327.41	$ 768,878.70	$ 5,094,636.88
20	7/1/2031	$ 768,878.70	$ 799,633.85	$ -	$ 768,878.70	$ 738,123.56	$ 30,755.15	$ -	$ 5,125,392.03

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Cost Estimate: B2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
B1. CONSTRUCTION COST - Route 122					
Mobilization (5%)	1	LS	$ 408,507.00	$ 408,507.00	
24" Waterline	71,000	LF	$ 85.00	$ 6,035,000.00	
24" Gate Valve & Box	71	EA	$ 3,000.00	$ 213,000.00	
Air Release Valve	12	EA	$ 3,000.00	$ 36,000.00	
Blow Off Valve	12	EA	$ 3,000.00	$ 36,000.00	
Road Bore Setup	25	LS	$ 5,000.00	$ 125,000.00	
Steel Casing Pipe	1,500	LF	$ 400.00	$ 600,000.00	
Creek/River Crossing	3	EA	$ 50,000.00	$ 150,000.00	
Concrete Encasement	300	LF	$ 50.00	$ 15,000.00	
Railroad Crossing	1	LS	$ 150,000.00	$ 150,000.00	
Connect to Existing Water System	2	EA	$ 10,000.00	$ 20,000.00	
Asphalt Removal and Replacement	474	SY	$ 100.00	$ 47,400.00	
Contingencies (10%)	1	LS	$ 742,740.00	$ 742,740.00	
Total Construction Cost Alternative B2 Phase 1c					**$ 8,578,647**
B. PROJECT RELATED COST @ 30%					**$ 2,573,594**
Total Project Alternative B2 Phase 1c Estimated Loan Amount					**$ 11,152,241**
C. OPERATION & MAINTENANCE COST					
1 MGD WTP Plant O&M	-	LS	$ 196,400.00	$ -	
5 MGD WTP Plant O&M	-	LS	$ 439,700.00	$ -	
Line Maintenance	71,000	LF	$ 0.01	$ 710.00	
PS Operations Labor (1 hr/day)	-	HR	$ 35.00	$ -	
PS Maintenance Labor (8 hrs/month)	-	HR	$ 35.00	$ -	
PS Power	-	LS	40,441	$ -	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500.00	$ -	
Total Annual Operation & Maintenance Cost				**$ 710.00**	

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Annual Costs: B2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

Construction Cost:		$8,578,647
Project Related Costs:	$	2,573,594
Total Loan:		$11,152,241

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$374,512	$446,090	$710	$821,311
2013	1	$389,492	$431,109	$731	$821,333
2014	2	$405,072	$415,529	$753	$821,355
2015	3	$421,275	$399,327	$776	$821,377
2016	4	$438,126	$382,476	$799	$821,401
2017	5	$455,651	$364,951	$823	$821,425
2018	6	$473,877	$346,725	$848	$821,449
2019	7	$492,832	$327,769	$873	$821,475
2020	8	$512,545	$308,056	$899	$821,501
2021	9	$533,047	$287,554	$926	$821,528
2022	10	$554,369	$266,233	$954	$821,556
2023	11	$576,544	$244,058	$983	$821,584
2024	12	$599,605	$220,996	$1,012	$821,614
2025	13	$623,590	$197,012	$1,043	$821,644
2026	14	$648,533	$172,068	$1,074	$821,675
2027	15	$674,475	$146,127	$1,106	$821,708
2028	16	$701,454	$119,148	$1,139	$821,741
2029	17	$729,512	$91,090	$1,174	$821,775
2030	18	$758,692	$61,909	$1,209	$821,810
2031	19	$757,478	$31,562	$1,245	$790,285
2032	20	$0	$0	$1,282	$1,282
2033	21	$0	$0	$1,321	$1,321
2034	22	$0	$0	$1,360	$1,360
2035	23	$0	$0	$1,401	$1,401
2036	24	$0	$0	$1,443	$1,443
2037	25	$0	$0	$1,487	$1,487
2038	26	$0	$0	$1,531	$1,531
2039	27	$0	$0	$1,577	$1,577
2040	28	$0	$0	$1,624	$1,624
2041	29	$0	$0	$1,673	$1,673
2042	30	$0	$0	$1,723	$1,723
2043	31	$0	$0	$1,775	$1,775
2044	32	$0	$0	$1,828	$1,828
2045	33	$0	$0	$1,883	$1,883
2046	34	$0	$0	$1,940	$1,940
2047	35	$0	$0	$1,998	$1,998
2048	36	$0	$0	$2,058	$2,058
2049	37	$0	$0	$2,120	$2,120
2050	38	$0	$0	$2,183	$2,183
2051	39	$0	$0	$2,249	$2,249
2052	40	$0	$0	$2,316	$2,316
2053	41	$0	$0	$2,386	$2,386
2054	42	$0	$0	$2,457	$2,457
2055	43	$0	$0	$2,531	$2,531
2056	44	$0	$0	$2,607	$2,607
2057	45	$0	$0	$2,685	$2,685
2058	46	$0	$0	$2,765	$2,765
2059	47	$0	$0	$2,848	$2,848
2060	48	$0	$0	$2,934	$2,934

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – B2, Phase 1c – Lakes to Bedford – Route 122 – 24" Water Line

	Enter values
Loan amount	$11,152,241
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 820,601.42
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 5,259,787.30

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 11,152,241.10	$ 820,601.42	$ -	$ 820,601.42	$ 374,511.78	$ 446,089.64	$ 10,777,729.32	$ 446,089.64
2	7/1/2013	$ 10,777,729.32	$ 820,601.42	$ -	$ 820,601.42	$ 389,492.25	$ 431,109.17	$ 10,388,237.08	$ 877,198.82
3	7/1/2014	$ 10,388,237.08	$ 820,601.42	$ -	$ 820,601.42	$ 405,071.94	$ 415,529.48	$ 9,983,165.14	$ 1,292,728.30
4	7/1/2015	$ 9,983,165.14	$ 820,601.42	$ -	$ 820,601.42	$ 421,274.81	$ 399,326.61	$ 9,561,890.32	$ 1,692,054.91
5	7/1/2016	$ 9,561,890.32	$ 820,601.42	$ -	$ 820,601.42	$ 438,125.81	$ 382,475.61	$ 9,123,764.52	$ 2,074,530.52
6	7/1/2017	$ 9,123,764.52	$ 820,601.42	$ -	$ 820,601.42	$ 455,650.84	$ 364,950.58	$ 8,668,113.68	$ 2,439,481.10
7	7/1/2018	$ 8,668,113.68	$ 820,601.42	$ -	$ 820,601.42	$ 473,876.87	$ 346,724.55	$ 8,194,236.80	$ 2,786,205.65
8	7/1/2019	$ 8,194,236.80	$ 820,601.42	$ -	$ 820,601.42	$ 492,831.95	$ 327,769.47	$ 7,701,404.86	$ 3,113,975.12
9	7/1/2020	$ 7,701,404.86	$ 820,601.42	$ -	$ 820,601.42	$ 512,545.23	$ 308,056.19	$ 7,188,859.63	$ 3,422,031.31
10	7/1/2021	$ 7,188,859.63	$ 820,601.42	$ -	$ 820,601.42	$ 533,047.03	$ 287,554.39	$ 6,655,812.60	$ 3,709,585.70
11	7/1/2022	$ 6,655,812.60	$ 820,601.42	$ -	$ 820,601.42	$ 554,368.92	$ 266,232.50	$ 6,101,443.68	$ 3,975,818.20
12	7/1/2023	$ 6,101,443.68	$ 820,601.42	$ -	$ 820,601.42	$ 576,543.67	$ 244,057.75	$ 5,524,900.01	$ 4,219,875.95
13	7/1/2024	$ 5,524,900.01	$ 820,601.42	$ -	$ 820,601.42	$ 599,605.42	$ 220,996.00	$ 4,925,294.59	$ 4,440,871.95
14	7/1/2025	$ 4,925,294.59	$ 820,601.42	$ -	$ 820,601.42	$ 623,589.64	$ 197,011.78	$ 4,301,704.95	$ 4,637,883.73
15	7/1/2026	$ 4,301,704.95	$ 820,601.42	$ -	$ 820,601.42	$ 648,533.22	$ 172,068.20	$ 3,653,171.73	$ 4,809,951.93
16	7/1/2027	$ 3,653,171.73	$ 820,601.42	$ -	$ 820,601.42	$ 674,474.55	$ 146,126.87	$ 2,978,697.18	$ 4,956,078.80
17	7/1/2028	$ 2,978,697.18	$ 820,601.42	$ -	$ 820,601.42	$ 701,453.53	$ 119,147.89	$ 2,277,243.64	$ 5,075,226.69
18	7/1/2029	$ 2,277,243.64	$ 820,601.42	$ -	$ 820,601.42	$ 729,511.67	$ 91,089.75	$ 1,547,731.97	$ 5,166,316.43
19	7/1/2030	$ 1,547,731.97	$ 820,601.42	$ -	$ 820,601.42	$ 758,692.14	$ 61,909.28	$ 789,039.83	$ 5,228,225.71
20	7/1/2031	$ 789,039.83	$ 820,601.42	$ -	$ 789,039.83	$ 757,478.23	$ 31,561.59	$ -	$ 5,259,787.30

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Cost Estimate: B2, Phase 2 – Route 122 Pump Station

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
B2. CONSTRUCTION COST - Route 122 Pump Station					
Mobilization (5%)	1	LS	$ 33,000.00	$ 33,000.00	
Pump Station (3000 gpm)	1	LS	$ 600,000.00	$ 600,000.00	
Contingencies (10%)	1	LS	$ 60,000.00	$ 60,000.00	
Total Construction Cost Alternative B2, Phase 2					**$ 693,000**
B. PROJECT RELATED COST @ 30%					**$ 207,900**
Total Project Alternative B2 Phase 2 Estimated Loan Amount					**$ 900,900**
C. OPERATION & MAINTENANCE COST					
1 MGD WTP Plant O&M	-	LS	$ 196,400.00	$ -	
5 MGD WTP Plant O&M	-	LS	$ 439,700.00	$ -	
Line Maintenance	-	LF	$ 0.01	$ -	
PS Operations Labor (1 hr/day)	365	HR	$ 35.00	$ 12,775.00	
PS Maintenance Labor (8 hrs/month)	96	HR	$ 35.00	$ 3,360.00	
PS Power	1	LS	40,441	$ 40,441.00	
Water Purchases ($2.50/1000 gal)	-	MGD	$ 912,500.00	$ -	
Total Annual Operation & Maintenance Cost				**$ 56,576.00**	

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Annual Costs: B2, Phase 2 – Route 122 Pump Station

Construction Cost:	$	693,000
Project Related Costs:	$	207,900
Total Loan:		$900,900

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	ANNUAL TOTALS
2012	0	$30,254	$36,036	$56,576	$122,866
2013	1	$31,464	$34,826	$58,273	$124,563
2014	2	$32,723	$33,567	$60,021	$126,311
2015	3	$34,031	$32,258	$61,822	$128,112
2016	4	$35,393	$30,897	$63,677	$129,967
2017	5	$36,808	$29,481	$65,587	$131,877
2018	6	$38,281	$28,009	$67,555	$133,845
2019	7	$39,812	$26,478	$69,581	$135,871
2020	8	$41,404	$24,885	$71,669	$137,959
2021	9	$43,061	$23,229	$73,819	$140,109
2022	10	$44,783	$21,507	$76,033	$142,323
2023	11	$46,574	$19,715	$78,314	$144,604
2024	12	$48,437	$17,852	$80,664	$146,954
2025	13	$50,375	$15,915	$83,084	$149,374
2026	14	$52,390	$13,900	$85,576	$151,866
2027	15	$54,485	$11,804	$88,144	$154,433
2028	16	$56,665	$9,625	$90,788	$157,078
2029	17	$58,931	$7,358	$93,512	$159,801
2030	18	$61,289	$5,001	$96,317	$162,607
2031	19	$61,191	$2,550	$99,206	$162,947
2032	20	$0	$0	$102,183	$102,183
2033	21	$0	$0	$105,248	$105,248
2034	22	$0	$0	$108,405	$108,405
2035	23	$0	$0	$111,658	$111,658
2036	24	$0	$0	$115,007	$115,007
2037	25	$0	$0	$118,458	$118,458
2038	26	$0	$0	$122,011	$122,011
2039	27	$0	$0	$125,672	$125,672
2040	28	$0	$0	$129,442	$129,442
2041	29	$0	$0	$133,325	$133,325
2042	30	$0	$0	$137,325	$137,325
2043	31	$0	$0	$141,445	$141,445
2044	32	$0	$0	$145,688	$145,688
2045	33	$0	$0	$150,059	$150,059
2046	34	$0	$0	$154,560	$154,560
2047	35	$0	$0	$159,197	$159,197
2048	36	$0	$0	$163,973	$163,973
2049	37	$0	$0	$168,892	$168,892
2050	38	$0	$0	$173,959	$173,959
2051	39	$0	$0	$179,178	$179,178
2052	40	$0	$0	$184,553	$184,553
2053	41	$0	$0	$190,090	$190,090
2054	42	$0	$0	$195,792	$195,792
2055	43	$0	$0	$201,666	$201,666
2056	44	$0	$0	$207,716	$207,716
2057	45	$0	$0	$213,948	$213,948
2058	46	$0	$0	$220,366	$220,366
2059	47	$0	$0	$226,977	$226,977
2060	48	$0	$0	$233,786	$233,786

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – B2, Phase 2 – Route 122 Pump Station

	Enter values
Loan amount	$900,900
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

	Loan summary
Scheduled payment	$ 66,289.80
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 424,895.98

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 900,900.00	$ 66,289.80	$ -	$ 66,289.80	$ 30,253.80	$ 36,036.00	$ 870,646.20	$ 36,036.00
2	7/1/2013	$ 870,646.20	$ 66,289.80	$ -	$ 66,289.80	$ 31,463.95	$ 34,825.85	$ 839,182.25	$ 70,861.85
3	7/1/2014	$ 839,182.25	$ 66,289.80	$ -	$ 66,289.80	$ 32,722.51	$ 33,567.29	$ 806,459.74	$ 104,429.14
4	7/1/2015	$ 806,459.74	$ 66,289.80	$ -	$ 66,289.80	$ 34,031.41	$ 32,258.39	$ 772,428.33	$ 136,687.53
5	7/1/2016	$ 772,428.33	$ 66,289.80	$ -	$ 66,289.80	$ 35,392.67	$ 30,897.13	$ 737,035.67	$ 167,584.66
6	7/1/2017	$ 737,035.67	$ 66,289.80	$ -	$ 66,289.80	$ 36,808.37	$ 29,481.43	$ 700,227.29	$ 197,066.09
7	7/1/2018	$ 700,227.29	$ 66,289.80	$ -	$ 66,289.80	$ 38,280.71	$ 28,009.09	$ 661,946.59	$ 225,075.18
8	7/1/2019	$ 661,946.59	$ 66,289.80	$ -	$ 66,289.80	$ 39,811.94	$ 26,477.86	$ 622,134.65	$ 251,553.04
9	7/1/2020	$ 622,134.65	$ 66,289.80	$ -	$ 66,289.80	$ 41,404.41	$ 24,885.39	$ 580,730.24	$ 276,438.43
10	7/1/2021	$ 580,730.24	$ 66,289.80	$ -	$ 66,289.80	$ 43,060.59	$ 23,229.21	$ 537,669.65	$ 299,667.64
11	7/1/2022	$ 537,669.65	$ 66,289.80	$ -	$ 66,289.80	$ 44,783.01	$ 21,506.79	$ 492,886.64	$ 321,174.42
12	7/1/2023	$ 492,886.64	$ 66,289.80	$ -	$ 66,289.80	$ 46,574.33	$ 19,715.47	$ 446,312.30	$ 340,889.89
13	7/1/2024	$ 446,312.30	$ 66,289.80	$ -	$ 66,289.80	$ 48,437.31	$ 17,852.49	$ 397,875.00	$ 358,742.38
14	7/1/2025	$ 397,875.00	$ 66,289.80	$ -	$ 66,289.80	$ 50,374.80	$ 15,915.00	$ 347,500.20	$ 374,657.38
15	7/1/2026	$ 347,500.20	$ 66,289.80	$ -	$ 66,289.80	$ 52,389.79	$ 13,900.01	$ 295,110.41	$ 388,557.39
16	7/1/2027	$ 295,110.41	$ 66,289.80	$ -	$ 66,289.80	$ 54,485.38	$ 11,804.42	$ 240,625.02	$ 400,361.81
17	7/1/2028	$ 240,625.02	$ 66,289.80	$ -	$ 66,289.80	$ 56,664.80	$ 9,625.00	$ 183,960.23	$ 409,986.81
18	7/1/2029	$ 183,960.23	$ 66,289.80	$ -	$ 66,289.80	$ 58,931.39	$ 7,358.41	$ 125,028.84	$ 417,345.22
19	7/1/2030	$ 125,028.84	$ 66,289.80	$ -	$ 66,289.80	$ 61,288.65	$ 5,001.15	$ 63,740.19	$ 422,346.37
20	7/1/2031	$ 63,740.19	$ 66,289.80	$ -	$ 63,740.19	$ 61,190.58	$ 2,549.61	$ -	$ 424,895.98

ALTERNATIVE B2 – Construct WTP and water lines to connect Bedford to SML
Pumping Cost Estimate: B2, Phase 2 – Route 122 Pump Station

2060 Projected Peak Demand	3,170,000	gpd
Flow Rate through PS	3,170,000	gpd
	2,201	gpm
Head Gained through PS	127	ft
Density of Water	1.94	slug/ft^3
Gravity	32.2	ft/s^2
Water Power added	71	HP
	53	KW
Overall Efficiency of Pump	80	%
Total Power Needed	66	KW
Cost of Electricity	0.07	$/KW-hr
Pump Run Time	24	hrs/day
Total Cost	111	$/day
	40,441	$/year

ALTERNATIVE B3 – Construct water line from Bedford to Forest & purchase from Lynchburg
Cost Estimate: Route 460 Water Line
Cost Estimate: Route 460 Pump Station

	QUANTITY	UNITS	UNIT COST	COST	TOTALS
A. CONSTRUCTION COST - Route 460					
Mobilization (5%)	1	LS	$ 297,711.00	$ 297,711.00	
16" Waterline	4,000	LF	$ 70.00	$ 280,000.00	
16" Gate Valve & Box	5	EA	$ 2,000.00	$ 9,600.00	
20" Waterline	50,400	LF	$ 75.00	$ 3,780,000.00	
20" Gate Valve & Box	61	EA	$ 2,500.00	$ 153,000.00	
Air Release Valve	10	EA	$ 3,000.00	$ 30,000.00	
Blow Off Valve	10	EA	$ 3,000.00	$ 30,000.00	
Road Bore Setup	20	LS	$ 5,000.00	$ 100,000.00	
Route 460 Crossing	1	LS	$ 150,000.00	$ 150,000.00	
Steel Casing Pipe	1,200	LF	$ 400.00	$ 480,000.00	
Creek/River Crossing	2	EA	$ 50,000.00	$ 100,000.00	
Concrete Encasement	200	LF	$ 50.00	$ 10,000.00	
Connect to Existing Water System	2	EA	$ 10,000.00	$ 20,000.00	
Asphalt Removal and Replacement	336	SY	$ 100.00	$ 33,600.00	
Pump Station (3000 gpm)	1	LS	$ 500,000.00	$ 500,000.00	
Contingencies (10%)	1	LS	$ 567,620.00	$ 567,620.00	
Subtotal - Construction Cost					**$ 6,541,531**
B. PROJECT RELATED COST @ 30%					**$ 1,962,459**
Total Project Alternative B2 Phase 3 Estimated Loan Amount					**$ 8,503,990**
C. OPERATION & MAINTENANCE COST					
PS Operations Labor (1 hr/day)	365	HR	$ 35.00	$ 12,775.00	
PS Maintenance Labor (8 hrs/month)	96	HR	$ 35.00	$ 3,360.00	
PS Power	1	LS	93,937	$ 93,937.09	
Line Maintenance	54,400	LF	$ 0.01	$ 544.00	
Total Annual Operation & Maintenance Cost				**$ 110,616.09**	

ALTERNATIVE B3 – Construct water line from Bedford to Forest & purchase from Lynchburg
Annual Costs: Route 460 Water Line
Annual Costs: Route 460 Pump Station

Construction Cost:		$6,541,531
Project Related Costs:	$	1,962,459
Total Loan:		$8,503,990

Year	#	A. DEBT SERVICE (PRINCIPLE ONLY)	B. INTEREST ON DEBT SERVICE	*C. OPERATION & MAINTENANCE COST	D. WATER PURCHASED	TOTAL ANNUAL COSTS	ANNUAL PRESENT VALUE	TOTAL PRESENT VALUE
2012	0	$285,579	$340,160	$110,616	$899,543	$1,635,897	$ 1,635,897	$ 1,635,897
2013	1	$297,002	$328,736	$113,935	$951,435	$1,691,109	$ 1,626,001	$ 3,261,898
2014	2	$308,882	$316,856	$117,353	$1,005,632	$1,748,724	$ 1,616,870	$ 4,878,768
2015	3	$321,237	$304,501	$120,873	$1,062,225	$1,808,837	$ 1,608,056	$ 6,486,823
2016	4	$334,087	$291,652	$124,499	$1,121,308	$1,871,546	$ 1,599,797	$ 8,086,621
2017	5	$347,450	$278,288	$128,234	$1,182,980	$1,936,953	$ 1,591,981	$ 9,678,602
2018	6	$361,348	$264,390	$132,081	$1,247,343	$2,005,163	$ 1,584,680	$ 11,263,282
2019	7	$375,802	$249,936	$136,044	$1,314,503	$2,076,285	$ 1,577,769	$ 12,841,051
2020	8	$390,834	$234,904	$140,125	$1,384,570	$2,150,434	$ 1,571,322	$ 14,412,373
2021	9	$406,468	$219,271	$144,329	$1,466,493	$2,236,560	$ 1,571,407	$ 15,983,780
2022	10	$422,727	$203,012	$148,659	$1,552,084	$2,326,482	$ 1,571,771	$ 17,555,551
2023	11	$439,636	$186,103	$153,119	$1,641,492	$2,420,349	$ 1,572,259	$ 19,127,810
2024	12	$457,221	$168,518	$157,712	$1,734,867	$2,518,317	$ 1,572,941	$ 20,700,751
2025	13	$475,510	$150,229	$162,443	$1,832,367	$2,620,549	$ 1,573,901	$ 22,274,652
2026	14	$494,530	$131,208	$167,317	$1,934,155	$2,727,211	$ 1,574,964	$ 23,849,616
2027	15	$514,311	$111,427	$172,336	$2,040,402	$2,838,477	$ 1,576,206	$ 25,425,823
2028	16	$534,884	$90,855	$177,506	$2,151,283	$2,954,528	$ 1,577,422	$ 27,003,245
2029	17	$556,279	$69,459	$182,832	$2,266,981	$3,075,551	$ 1,578,988	$ 28,582,233
2030	18	$578,530	$47,208	$188,316	$2,387,684	$3,201,739	$ 1,580,378	$ 30,162,611
2031	19	$577,605	$24,067	$193,966	$2,498,324	$3,293,962	$ 1,563,314	$ 31,725,925
2032	20	$0	$0	$199,785	$2,613,454	$2,813,239	$ 1,283,962	$ 33,009,887
2033	21	$0	$0	$205,779	$2,733,243	$2,939,021	$ 1,289,643	$ 34,299,530
2034	22	$0	$0	$211,952	$2,857,867	$3,069,819	$ 1,295,464	$ 35,594,994
2035	23	$0	$0	$218,310	$2,987,509	$3,205,820	$ 1,300,601	$ 36,895,595
2036	24	$0	$0	$224,860	$3,122,358	$3,347,217	$ 1,305,749	$ 38,201,344
2037	25	$0	$0	$231,606	$3,262,608	$3,494,214	$ 1,310,679	$ 39,512,023
2038	26	$0	$0	$238,554	$3,408,463	$3,647,017	$ 1,315,479	$ 40,827,503
2039	27	$0	$0	$245,710	$3,560,134	$3,805,844	$ 1,319,867	$ 42,147,369
2040	28	$0	$0	$253,082	$3,717,837	$3,970,918	$ 1,324,301	$ 43,471,671
2041	29	$0	$0	$260,674	$3,890,915	$4,151,589	$ 1,331,415	$ 44,803,085
2042	30	$0	$0	$268,494	$4,071,033	$4,339,527	$ 1,337,876	$ 46,140,961
2043	31	$0	$0	$276,549	$4,258,455	$4,535,004	$ 1,344,629	$ 47,485,590
2044	32	$0	$0	$284,846	$4,453,459	$4,738,304	$ 1,350,891	$ 48,836,481
2045	33	$0	$0	$293,391	$4,656,330	$4,949,721	$ 1,356,719	$ 50,193,199
2046	34	$0	$0	$302,193	$4,867,366	$5,169,559	$ 1,362,696	$ 51,555,895
2047	35	$0	$0	$311,258	$5,086,873	$5,398,132	$ 1,367,887	$ 52,923,781
2048	36	$0	$0	$320,596	$5,315,170	$5,635,766	$ 1,373,436	$ 54,297,218
2049	37	$0	$0	$330,214	$5,552,587	$5,882,801	$ 1,378,340	$ 55,675,558
2050	38	$0	$0	$340,121	$5,799,464	$6,139,585	$ 1,383,248	$ 57,058,806
2051	39	$0	$0	$350,324	$6,071,474	$6,421,798	$ 1,390,962	$ 58,449,768
2052	40	$0	$0	$360,834	$6,354,585	$6,715,419	$ 1,398,822	$ 59,848,590
2053	41	$0	$0	$371,659	$6,649,218	$7,020,877	$ 1,406,282	$ 61,254,871
2054	42	$0	$0	$382,809	$6,955,810	$7,338,619	$ 1,413,418	$ 62,668,289
2055	43	$0	$0	$394,293	$7,274,813	$7,669,106	$ 1,420,318	$ 64,088,608
2056	44	$0	$0	$406,122	$7,606,697	$8,012,818	$ 1,426,282	$ 65,514,889
2057	45	$0	$0	$418,305	$7,951,945	$8,370,251	$ 1,432,987	$ 66,947,876
2058	46	$0	$0	$430,854	$8,311,063	$8,741,918	$ 1,438,920	$ 68,386,796
2059	47	$0	$0	$443,780	$8,684,571	$9,128,351	$ 1,445,018	$ 69,831,814
2060	48	$0	$0	$457,094	$9,073,010	$9,530,103	$ 1,450,482	$ 71,282,296

*Operation & Mobilization costs are calculated using a 3% per year rate of increase.

Loan Amortization Schedule – B3 – Construct water line from Bedford to Forest & purchase from Lynchburg

	Enter values
Loan amount	$8,503,990
Annual interest rate	4.00 %
Loan period in years	20
Number of payments per year	1
Start date of loan	7/1/2011
Optional extra payments	

Lender name:

Loan summary	
Scheduled payment	$ 625,738.49
Scheduled number of payments	20
Actual number of payments	20
Total early payments	$ -
Total interest	$ 4,010,779.52

Pmt. No.	Payment Date	Beginning Balance	Scheduled Payment	Extra Payment	Total Payment	Principal	Interest	Ending Balance	Cumulative Interest
1	7/1/2012	$ 8,503,990.30	$ 625,738.49	$ -	$ 625,738.49	$ 285,578.88	$ 340,159.61	$ 8,218,411.42	$ 340,159.61
2	7/1/2013	$ 8,218,411.42	$ 625,738.49	$ -	$ 625,738.49	$ 297,002.03	$ 328,736.46	$ 7,921,409.39	$ 668,896.07
3	7/1/2014	$ 7,921,409.39	$ 625,738.49	$ -	$ 625,738.49	$ 308,882.12	$ 316,856.38	$ 7,612,527.27	$ 985,752.44
4	7/1/2015	$ 7,612,527.27	$ 625,738.49	$ -	$ 625,738.49	$ 321,237.40	$ 304,501.09	$ 7,291,289.87	$ 1,290,253.54
5	7/1/2016	$ 7,291,289.87	$ 625,738.49	$ -	$ 625,738.49	$ 334,086.90	$ 291,651.59	$ 6,957,202.97	$ 1,581,905.13
6	7/1/2017	$ 6,957,202.97	$ 625,738.49	$ -	$ 625,738.49	$ 347,450.37	$ 278,288.12	$ 6,609,752.60	$ 1,860,193.25
7	7/1/2018	$ 6,609,752.60	$ 625,738.49	$ -	$ 625,738.49	$ 361,348.39	$ 264,390.10	$ 6,248,404.22	$ 2,124,583.35
8	7/1/2019	$ 6,248,404.22	$ 625,738.49	$ -	$ 625,738.49	$ 375,802.32	$ 249,936.17	$ 5,872,601.89	$ 2,374,519.52
9	7/1/2020	$ 5,872,601.89	$ 625,738.49	$ -	$ 625,738.49	$ 390,834.42	$ 234,904.08	$ 5,481,767.48	$ 2,609,423.60
10	7/1/2021	$ 5,481,767.48	$ 625,738.49	$ -	$ 625,738.49	$ 406,467.79	$ 219,270.70	$ 5,075,299.69	$ 2,828,694.30
11	7/1/2022	$ 5,075,299.69	$ 625,738.49	$ -	$ 625,738.49	$ 422,726.50	$ 203,011.99	$ 4,652,573.18	$ 3,031,706.28
12	7/1/2023	$ 4,652,573.18	$ 625,738.49	$ -	$ 625,738.49	$ 439,635.56	$ 186,102.93	$ 4,212,937.62	$ 3,217,809.21
13	7/1/2024	$ 4,212,937.62	$ 625,738.49	$ -	$ 625,738.49	$ 457,220.99	$ 168,517.50	$ 3,755,716.63	$ 3,386,326.72
14	7/1/2025	$ 3,755,716.63	$ 625,738.49	$ -	$ 625,738.49	$ 475,509.83	$ 150,228.67	$ 3,280,206.81	$ 3,536,555.38
15	7/1/2026	$ 3,280,206.81	$ 625,738.49	$ -	$ 625,738.49	$ 494,530.22	$ 131,208.27	$ 2,785,676.59	$ 3,667,763.65
16	7/1/2027	$ 2,785,676.59	$ 625,738.49	$ -	$ 625,738.49	$ 514,311.43	$ 111,427.06	$ 2,271,365.16	$ 3,779,190.72
17	7/1/2028	$ 2,271,365.16	$ 625,738.49	$ -	$ 625,738.49	$ 534,883.88	$ 90,854.61	$ 1,736,481.28	$ 3,870,045.32
18	7/1/2029	$ 1,736,481.28	$ 625,738.49	$ -	$ 625,738.49	$ 556,279.24	$ 69,459.25	$ 1,180,202.04	$ 3,939,504.57
19	7/1/2030	$ 1,180,202.04	$ 625,738.49	$ -	$ 625,738.49	$ 578,530.41	$ 47,208.08	$ 601,671.63	$ 3,986,712.66
20	7/1/2031	$ 601,671.63	$ 625,738.49	$ -	$ 601,671.63	$ 577,604.76	$ 24,066.87	$ -	$ 4,010,779.52

ALTERNATIVE B3 – Construct water line from Bedford to Forest & purchase from Lynchburg
Pumping Cost Estimate: B3, Phase 3 – Route 122 Pump Station – Built in Year 30

2030 Projected Water Use	3,170,000	gpd
Flow Rate through PS	3,170,000	gpd
	2,201	gpm
Head Gained through PS	295	ft
Density of Water	1.94	slug/ft^3
Gravity	32.2	ft/s^2
Water Power added	164	HP
	123	KW
Overall Efficiency of Pump	80	%
Total Power Needed	153	KW
Cost of Electricity	0.07	$/KW-hr
Pump Run Time	24	hrs/day
Total Cost	257	$/day
	93,937	$/year

ALTERNATIVE B3 – Construct water line from Bedford to Forest & purchase from Lynchburg
Cost Estimate: Present Value of Water Purchased

YEAR	#	*PURCHASED WATER COST (per 1000gal)	AVERAGE WATER USAGE MGD	PROJECTED ANNUAL COST	ANNUAL PRESENT VALUE	TOTAL PRESENT VALUE
2012	0	$2.65	0.93	$899,543	$899,543	$899,543
2013	1	$2.73	0.96	$951,435	$914,805	$1,814,348
2014	2	$2.81	0.98	$1,005,632	$929,808	$2,744,155
2015	3	$2.90	1.01	$1,062,225	$944,318	$3,688,473
2016	4	$2.98	1.03	$1,121,308	$958,494	$4,646,967
2017	5	$3.07	1.06	$1,182,980	$972,291	$5,619,258
2018	6	$3.16	1.08	$1,247,343	$985,775	$6,605,033
2019	7	$3.26	1.11	$1,314,503	$998,891	$7,603,924
2020	8	$3.36	1.13	$1,384,570	$1,011,705	$8,615,630
2021	9	$3.46	1.16	$1,466,493	$1,030,358	$9,645,987
2022	10	$3.56	1.19	$1,552,084	$1,048,588	$10,694,576
2023	11	$3.67	1.23	$1,641,492	$1,066,313	$11,760,889
2024	12	$3.78	1.26	$1,734,867	$1,083,598	$12,844,486
2025	13	$3.89	1.29	$1,832,367	$1,100,519	$13,945,006
2026	14	$4.01	1.32	$1,934,155	$1,116,975	$15,061,980
2027	15	$4.13	1.35	$2,040,402	$1,133,035	$16,195,016
2028	16	$4.25	1.39	$2,151,283	$1,148,570	$17,343,586
2029	17	$4.38	1.42	$2,266,981	$1,163,868	$18,507,453
2030	18	$4.51	1.45	$2,387,684	$1,178,561	$19,686,014
2031	19	$4.65	1.47	$2,498,324	$1,185,705	$20,871,719
2032	20	$4.79	1.50	$2,613,454	$1,192,780	$22,064,499
2033	21	$4.93	1.52	$2,733,243	$1,199,347	$23,263,846
2034	22	$5.08	1.54	$2,857,867	$1,206,020	$24,469,866
2035	23	$5.23	1.57	$2,987,509	$1,212,032	$25,681,898
2036	24	$5.39	1.59	$3,122,358	$1,218,032	$26,899,930
2037	25	$5.55	1.61	$3,262,608	$1,223,804	$28,123,734
2038	26	$5.71	1.63	$3,408,463	$1,229,433	$29,353,167
2039	27	$5.89	1.66	$3,560,134	$1,234,654	$30,587,822
2040	28	$6.06	1.68	$3,717,837	$1,239,899	$31,827,720
2041	29	$6.24	1.71	$3,890,915	$1,247,817	$33,075,537
2042	30	$6.43	1.73	$4,071,033	$1,255,099	$34,330,636
2043	31	$6.63	1.76	$4,258,455	$1,262,632	$35,593,268
2044	32	$6.82	1.79	$4,453,459	$1,269,681	$36,862,949
2045	33	$7.03	1.82	$4,656,330	$1,276,300	$38,139,249
2046	34	$7.24	1.84	$4,867,366	$1,283,038	$39,422,287
2047	35	$7.46	1.87	$5,086,873	$1,289,014	$40,711,300
2048	36	$7.68	1.90	$5,315,170	$1,295,307	$42,006,607
2049	37	$7.91	1.92	$5,552,587	$1,300,971	$43,307,578
2050	38	$8.15	1.95	$5,799,464	$1,306,619	$44,614,198
2051	39	$8.39	1.98	$6,071,474	$1,315,081	$45,929,279
2052	40	$8.64	2.01	$6,354,585	$1,323,660	$47,252,939
2053	41	$8.90	2.05	$6,649,218	$1,331,838	$48,584,777
2054	42	$9.17	2.08	$6,955,810	$1,339,689	$49,924,466
2055	43	$9.45	2.11	$7,274,813	$1,347,295	$51,271,762
2056	44	$9.73	2.14	$7,606,697	$1,353,992	$52,625,754
2057	45	$10.02	2.17	$7,951,945	$1,361,373	$53,987,127
2058	46	$10.32	2.21	$8,311,063	$1,368,001	$55,355,128
2059	47	$10.63	2.24	$8,684,571	$1,374,768	$56,729,896
2060	48	$10.95	2.27	$9,073,010	$1,380,912	$58,110,808

*Water purchase costs are calculated using a 3% per year rate of increase. This is based on an interpretation of the *Water Utility Cost of Service Study* dated June 2006 prepared by Black & Veatch Corporation for the City of Lynchburg.

APPENDIX C

Design Calculations

FLOW vs HEAD ANALYSIS

Alternative A2 - Lakes to Forest
460 Bypass Alignment
No White House Road Loop

Lakes Demand (MGD)	Forest Demand (MGD)	Total Demand (MGD)	Excess Head (ft)	Minumum Required Head (ft)	Minimum Required Water Power (Hp)	Minimum Required Wire to Water Power (Hp)	Estimated Year for Peak Demand
0.26	1.50	1.76	98	--	--	--	
0.32	1.68	2.00	87	--	--	--	
0.59	1.91	2.50	68	--	--	--	
0.78	2.22	3.00	43	--	--	--	
0.97	2.50	3.47	--	--	--	--	2015
0.98	2.52	3.50	--	3	1	2	
1.18	2.82	4.00	--	19	9	15	
1.23	3.27	4.50	--	66	38	63	
1.24	3.76	5.00	--	126	84	139	
1.21	4.24	5.45	--	195	146	243	

Alternative A2 - Lakes to Forest
460 Bypass Alignment
White House Road Loop Constructed

Lakes Demand (MGD)	Forest Demand (MGD)	Total Demand (MGD)	Excess Head (ft)	Minumum Required Head (ft)	Minimum Required Water Power (Hp)	Minimum Required Wire to Water Power (Hp)	Estimated Year for Peak Demand
0.26	1.50	1.76	109	--	--	--	
0.32	1.68	2.00	100	--	--	--	
0.59	1.91	2.50	87	--	--	--	
0.78	2.22	3.00	69	--	--	--	
0.98	2.52	3.50	48	--	--	--	
1.18	2.82	4.00	26	--	--	--	
1.22	3.13	4.35	--	--	--	--	2030
1.23	3.27	4.50	--	11	6	10	
1.24	3.76	5.00	--	57	38	63	
1.21	4.24	5.45	--	112	84	139	

FLOW vs HEAD ANALYSIS

Alternative B2 - Lakes to City of Bedford
460 Bypass Alignment
No White House Road Loop

Year	City of Bedford Demand (MGD)	Minumum Required Head (ft)	Minimum Required Water Power (Hp)	Minimum Required Wire to Water Power (Hp)
2012	1.79	15	5	8
2020	2.15	33	13	21
2030	2.56	51	23	38
2040	2.97	70	37	61
2050	3.45	96	58	97
2060	4.00	127	89	149

FLOW vs HEAD ANALYSIS

Alternative B3 - Forest to City of Bedford

Year	City of Bedford Demand (MGD)	Minumum Required Head (ft)	Minimum Required Water Power (Hp)	Minimum Required Wire to Water Power (Hp)
2012	1.79	168	53	88
2020	2.15	184	70	116
2030	2.56	204	92	153
2040	2.97	226	118	197
2050	3.45	256	156	259
2060	4.00	295	208	346

Lakes Water System Projected Demands

Year	Rate of Growth (% / year)	Average Daily Demand (MGD)	Monthly Peak Factor	Peak Monthly Demand (MGD)	Daily Peak Factor	Peak Daily Demand (MGD)
2012	8	0.30	2.68	0.80	2.00	0.60
2020	8	0.56	2.46	1.37	2.00	1.11
2030	1.5	0.64	2.20	1.42	2.00	1.29
2040	1.5	0.75	1.93	1.44	2.00	1.50
2050	1.5	0.87	1.67	1.45	2.00	1.74
2060	1.5	1.01	1.44	1.45	2.00	2.01

Forest Water System Projected Demands

Year	Rate of Growth (% / year)	Average Daily Demand (MGD)	Monthly Peak Factor	Peak Monthly Demand (MGD)	Daily Peak Factor	Peak Daily Demand (MGD)
2012	3.4	1.60	1.40	2.24	2.00	3.20
2020	3.4	2.09	1.40	2.92	2.00	4.18
2030	1.1	2.33	1.40	3.26	2.00	4.66
2040	1.1	2.60	1.40	3.64	2.00	5.20
2050	1.1	2.90	1.40	4.06	2.00	5.80
2060	1.1	3.24	1.40	4.53	2.00	6.47

Total Lakes + Forest System Projected Demands

Year		Average Daily Demand (MGD)	Monthly Peak Factor	Peak Monthly Demand (MGD)	Daily Peak Factor	Peak Daily Demand (MGD)
2012		1.90		3.04		3.80
2020		2.64		4.29		5.29
2030		2.97		4.26		5.95
2040		3.35		5.08		6.69
2050		3.77		5.51		7.54
2060		4.24		5.98		8.48

Total City of Bedford System Projected Demands

Year	Rate of Growth (% / year)	Average Daily Demand (MGD)	Monthly Peak Factor	Peak Monthly Demand (MGD)	Daily Peak Factor	Peak Daily Demand (MGD)
2012	2.5	0.93	1.40	1.30	2.00	1.86
2020	2.5	1.13	1.40	1.59	2.00	2.27
2030	2.5	1.45	1.40	2.03	2.00	2.90
2040	1.5	1.68	1.40	2.36	2.00	3.37
2050	1.5	1.95	1.40	2.74	2.00	3.91
2060	1.5	2.27	1.40	3.17	2.00	4.53

Total Lakes + City of Bedford System Projected Demands

Year		Average Daily Demand (MGD)	Monthly Peak Factor	Peak Monthly Demand (MGD)	Daily Peak Factor	Peak Daily Demand (MGD)
2012		1.23		2.10		2.46
2020		1.69		2.95		3.38
2030		2.09		3.45		4.19
2040		2.43		3.80		4.86
2050		2.82		4.18		5.64
2060		3.27		4.62		6.55

APPENDIX D

Project Planning Factors

PROJECT PLANNING FACTORS
Bedford County PSA - Lakes-Bedford-Forest Water Supply Evaluation
Alternative A2 - Lakes to Forest
2010 - 1 MGD High Point Upgrade and New 5 MGD WTP / 24" Waterline from Lakes to City / 20" Waterline from City to Forest
2015 - 18" Waterline Along Whitehouse Road
2030 - Route 122 Pump Station
(0% grant and 4% 20-year loan)
JN 28714

	Year 0 2012	15 2027	30 2042	48 2060
PROJECT COST				
Construction	$22,939,140	$2,451,718	$693,000	
Land & Rights	$917,566	$98,069	$14,744	
Legal Fees	$802,870	$73,552	$8,808	
Administration	$688,174	$39,034	$5,872	
Engineering:				
Permitting	$917,566	$88,069	$5,224	
Preliminary Engineering Report	$60,000	$40,000	$35,000	
Environmental Report	$4,500	$4,500	$4,500	
Basic	$1,835,131	$213,545	$90,783	
Inspection	$514,000	$87,036	$22,308	
Additional	$1,141,935	$91,712	$20,661	
Interest During Construction				
Subtotal	**$29,820,882**	**$3,187,234**	**$900,900**	
TOTAL PROJECT COST (Less O&M)				**$33,909,015**

Loan Amount		100.00%	$29,820,882	$3,187,234	$900,900	$33,909,015
Connection Fees						
Grant Amount		0.00%	$0	$0	$0	$0
	TOTAL PROJECT COST		$29,820,882	$3,187,234	$900,900	$33,909,015
Annual Debt Service						
Interest Rate	4 %					
Term	20 years					
Annual Payment (excluding reserve)			**$2,194,273**	**$234,522**	**$66,290**	**$2,495,085**

Revenue

EXISTING WATER RATE SCHEDULE

Forest					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Lake					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Stewartsville					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Franklin County					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$3.25	Per 1,000 gal

Use and Income

	Existing	+	New	=	Total		Gal./Month	Monthly Revenue
Forest	7085		0		7085	users	42,263,763	$282,169
Lake	1223		0		1223	users	4,713,992	$35,800
Stewartsville	142		0		142	users	647,711	$4,659
Franklin County	2225		0		2225	users	2,916,666	$31,729

TOTAL MONTHLY INCOME FROM WATER SALES			$354,356
TOTAL ANNUAL WATER INCOME	x 12 mo/ yr		**$4,252,278**
OTHER INCOME:	Connections	Facility Fee	
Connection Fees	70	$2,250	$157,500
TOTAL OTHER INCOME			**$157,500**
TOTAL WATER SYSTEM INCOME			**$4,409,778**

EXPENSES: **Annual Increase** **3%**

	FY 09/10 Budget (Water Allocation, 74%)	Proposed Improvements 2012	2027	2042	2060
SALARIES					
Administration Team Salaries	$ 256,172	$ 271,773	$ 423,413	$ 659,664	$ 1,123,034
Administration Team Overtime	$ -	$ -	$ -	$ -	$ -
Customer Service Salaries	$ 109,175	$ 115,823	$ 180,449	$ 281,134	$ 478,612
Customer Service Overtime	$ -	$ -	$ -	$ -	$ -
Engineering Salaries	$ 223,090	$ 236,676	$ 368,734	$ 574,476	$ 978,006
Engineering Overtime	$ -	$ -	$ -	$ -	$ -
Maintenance Salaries	$ 194,916	$ 206,786	$ 322,166	$ 501,925	$ 854,493
Maintenance on call Stipend	$ 3,867	$ 4,102	$ 6,391	$ 9,957	$ 16,951
Maintenance Overtime	$ 20,567	$ 21,820	$ 33,994	$ 52,962	$ 90,164
Operations Salaries	$ 226,897	$ 240,715	$ 375,026	$ 584,278	$ 994,694
Operations On Call Stipend	$ 1,933	$ 2,051	$ 3,196	$ 4,979	$ 8,476
Operations OT	$ 7,390	$ 7,840	$ 12,215	$ 19,030	$ 32,398
	$ 1,044,007	**$ 1,107,587**	**$ 1,725,584**	**$ 2,688,404**	**$ 4,576,828**
GENERAL OFFICE EXPENSES					
Board & Committee Meetings	$ 372	$ 394	$ 615	$ 957	$ 1,630
Supplies	$ 4,090	$ 4,339	$ 6,760	$ 10,532	$ 17,929
Public Outreach Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Building Maintenance Expense	$ 10,827	$ 11,486	$ 17,895	$ 27,880	$ 47,464
Postage & Shipping Expense	$ 6,246	$ 6,627	$ 10,324	$ 16,085	$ 27,383
Commercial Phone Charges	$ 7,414	$ 7,865	$ 12,254	$ 19,091	$ 32,501
Cellular Phone Service	$ 9,557	$ 10,139	$ 15,796	$ 24,609	$ 41,896
Building Power & Utilities	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Building Fuel Costs	$ 4,462	$ 4,733	$ 7,374	$ 11,489	$ 19,559
Employee Bond	$ 352	$ 373	$ 581	$ 906	$ 1,542
Building Insurance	$ 1,713	$ 1,817	$ 2,831	$ 4,410	$ 7,507
Advertising	$ 3,718	$ 3,944	$ 6,145	$ 9,574	$ 16,299
Bank Service Charges	$ 4,194	$ 4,449	$ 6,932	$ 10,800	$ 18,386
Accounting Services	$ 12,269	$ 13,017	$ 20,279	$ 31,595	$ 53,788
Legal Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Board of Directors Fees	$ 11,600	$ 12,307	$ 19,173	$ 29,871	$ 50,854
	$ 112,505	**$ 119,357**	**$ 185,954**	**$ 289,710**	**$ 493,212**
EMPLOYEE BENEFITS AND RELATED EXPENSES					
Payroll Taxes	$ 79,423	$ 84,260	$ 131,274	$ 204,520	$ 348,182
Payroll Taxes (for Board of Directors)	$ 887	$ 941	$ 1,467	$ 2,285	$ 3,890
VRS Retirement & Life	$ 106,884	$ 113,394	$ 176,664	$ 275,236	$ 468,571
Health Insurance	$ 144,170	$ 152,950	$ 238,292	$ 371,251	$ 632,029
Workers Compensation Ins.	$ 12,781	$ 13,559	$ 21,124	$ 32,911	$ 56,029
Employee Vaccinations	$ -	$ -	$ -	$ -	$ -
Mileage Reimbursements	$ -	$ -	$ -	$ -	$ -
Meetings	$ 2,023	$ 2,146	$ 3,343	$ 5,208	$ 8,867
Professional Dues	$ 3,329	$ 3,532	$ 5,502	$ 8,573	$ 14,594
Training & Education	$ 5,737	$ 6,086	$ 9,482	$ 14,773	$ 25,150
Continuing education	$ -	$ -	$ -	$ -	$ -
Clothing & Uniforms	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,658
Employee & Incentive Fund	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
	$ 361,265	**$ 383,266**	**$ 597,116**	**$ 930,287**	**$ 1,583,751**
BILLING COSTS					
Bad Debt Water	$ 5,949	$ 6,311	$ 9,832	$ 15,319	$ 26,079
Bad Debt Penalty & Misc Charges	$ 1,171	$ 1,242	$ 1,936	$ 3,016	$ 5,134
Bill Processing Services	$ 20,677	$ 21,937	$ 34,176	$ 53,246	$ 90,647
Meter Testing	$ 8,923	$ 9,467	$ 14,749	$ 22,978	$ 39,118
	$ 36,720	**$ 38,957**	**$ 60,693**	**$ 94,558**	**$ 160,979**
NETWORK COSTS					
Network Contracted Services	$ 19,407	$ 20,588	$ 32,076	$ 49,974	$ 85,077
Continuing Software Support	$ 55,153	$ 58,512	$ 91,160	$ 142,024	$ 241,786
Internet & WAN Communications	$ 6,915	$ 7,337	$ 11,430	$ 17,808	$ 30,317
Cell Tower Consulting Services	$ 4,015	$ 4,260	$ 6,637	$ 10,340	$ 17,603
	$ 85,491	**$ 90,697**	**$ 141,303**	**$ 220,146**	**$ 374,783**
TEAM SUPPLIES AND VEHICLES					
Administration Supplies	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
Customer Service Supplies	$ 283	$ 300	$ 467	$ 728	$ 1,239
Engineering Supplies	$ 4,137	$ 4,389	$ 6,838	$ 10,654	$ 18,138
Locating Notification Tickets	$ 3,792	$ 4,023	$ 6,268	$ 9,766	$ 16,625
Contruction Testing	$ 4,082	$ 4,331	$ 6,748	$ 10,512	$ 17,897
Operations Supplies	$ 744	$ 789	$ 1,229	$ 1,915	$ 3,260
Maintenance Supplies	$ 1,155	$ 1,225	$ 1,909	$ 2,974	$ 5,063
Vehicle & Equipment Supplies	$ 1,487	$ 1,578	$ 2,458	$ 3,830	$ 6,520
Vehicle & Equipment Repairs	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Vehicle & Equipment Fuel	$ 44,616	$ 47,333	$ 73,743	$ 114,890	$ 195,592
Vehicle & Equipment Insurance	$ 11,209	$ 11,892	$ 18,527	$ 28,864	$ 49,139
	$ 87,121	**$ 92,426**	**$ 143,997**	**$ 224,343**	**$ 381,930**

WATER OPERATIONS COSTS	FY 09/10 Budget	Proposed Improvements 2012	2027	2042	2058
Forest System					
Forest Water Supplies	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Meter Installations	$ 65,000	$ 68,959	$ 107,435	$ 167,380	$ 284,954
Forest Water Contracted Services	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Power	$ 9,000	$ 9,548	$ 14,876	$ 23,176	$ 39,455
Forest Water Property Insurance	$ 8,895	$ 9,437	$ 14,702	$ 22,905	$ 38,995
Forest Water Sampling & Testing	$ 17,500	$ 18,566	$ 28,925	$ 45,064	$ 76,718
Forest Water Purchased	$ 1,575,318	$ -	$ -	$ -	$ -
Forest Water VDH Fees	$ 14,104	$ 14,963	$ 23,312	$ 36,319	$ 61,831
	$ 1,739,817	**$ 174,517**	**$ 271,892**	**$ 423,599**	**$ 721,148**
Well Systems					
Well System Supplies	$ 8,000	$ 8,487	$ 13,223	$ 20,601	$ 35,071
Well Systems Meter Installations	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems Contracted Services	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Well Systems Power	$ 7,800	$ 8,275	$ 12,892	$ 20,086	$ 34,194
Well Systems Property Insurance	$ 2,332	$ 2,474	$ 3,854	$ 6,005	$ 10,223
Well Systems Sampling & Testing	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems VDH Fees	$ 443	$ 470	$ 732	$ 1,141	$ 1,942
	$ 26,575	**$ 28,193**	**$ 43,924**	**$ 68,433**	**$ 116,502**
Lakes System					
SML Central System Supplies	$ 12,000	$ 80,000	$ 124,637	$ 194,181	$ 330,580
SML Central System Meter Installations	$ 35,000	$ 37,132	$ 57,850	$ 90,128	$ 153,437
SML Central System Contracted Services	$ 8,000	$ 17,360	$ 27,046	$ 42,137	$ 71,736
SML Central System Sampling & Testing	$ 1,500	$ 1,591	$ 2,479	$ 3,863	$ 6,576
SML Central System VDH Fees	$ 1,661	$ 1,762	$ 2,745	$ 4,277	$ 7,282
SML Treatment Supplies	$ 16,000	$ 16,974	$ 26,446	$ 41,201	$ 70,142
SML Treatment Contracted Services	$ 14,100	$ 14,959	$ 23,305	$ 36,309	$ 61,813
SML Treatment Phone	$ 260	$ 276	$ 430	$ 670	$ 1,140
SML Treatment Power	$ 60,000	$ 130,000	$ 202,536	$ 315,544	$ 537,193
SML Treatment Propane	$ 4,000	$ 4,244	$ 6,611	$ 10,300	$ 17,536
SML Treatment Property Insurance	$ 3,391	$ 3,598	$ 5,605	$ 8,732	$ 14,866
SML Treatment Sampling & testing	$ 4,000	$ 43,452	$ 67,697	$ 105,469	$ 179,555
SML Treatment Raw Water Fee	$ 2,200	$ 2,334	$ 3,636	$ 5,665	$ 9,645
SML Treatment Road Maintenance Fee	$ 900	$ 955	$ 1,488	$ 2,318	$ 3,946
	$ 163,012	**$ 354,636**	**$ 552,511**	**$ 860,794**	**$ 1,465,445**
Center System				$ 636,100	
Center Water Supplies	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Center Water Meter Installations	$ 500	$ 530	$ 826	$ 1,288	$ 2,192
Center Water Contracted Services	$ 4,400	$ 4,668	$ 7,273	$ 11,330	$ 19,289
Center Water Power	$ 2,800	$ 2,971	$ 4,628	$ 7,210	$ 12,275
Center Water Property Insurance	$ 207	$ 220	$ 342	$ 533	$ 907
Center Water Sampling & testing	$ 800	$ 849	$ 1,322	$ 2,060	$ 3,507
Center Water VDH Fees	$ 107	$ 114	$ 177	$ 276	$ 469
	$ 11,814	**$ 12,533**	**$ 19,527**	**$ 30,422**	**$ 51,791**
Stewartsville System					
Stewartsville Water Supplies	$ 2,000	$ 2,122	$ 3,306	$ 5,150	$ 8,768
Stewartsville Water Meter Installations	$ 10,000	$ 10,609	$ 16,528	$ 25,751	$ 43,839
Stewartsville Water Contracted Services	$ 4,500	$ 4,774	$ 7,438	$ 11,588	$ 19,728
Stewartsville Water Communications	$ 330	$ 350	$ 545	$ 850	$ 1,447
Stewartsville Water Power	$ 450	$ 477	$ 744	$ 1,159	$ 1,973
Stewartsville Water Property Insurance	$ 505	$ 536	$ 835	$ 1,300	$ 2,214
Stewartsville Water Sampling & testing	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,659
Stewartsville Water Purchased	$ 86,344	$ 91,602	$ 142,713	$ 222,343	$ 378,524
Stewartsville Water VDH Fees	$ 178	$ 189	$ 294	$ 458	$ 780
	$ 108,107	**$ 114,691**	**$ 178,684**	**$ 278,384**	**$ 473,931**
New System O&M					
WTP Plant O&M		Included in Lakes System O&M			
WTP Power Equipment		Included in Lakes System O&M			
WTP Power Building		Included in Lakes System O&M			
Line Maintenance	**$ -**	$ 1,214	$ 1,435	$ 2,236	$ 3,806
Operations Labor	**$ -**	$ -	$ -	$ 12,775	$ 21,749
Maintenance Labor	**$ -**	$ -	$ -	$ 3,360	$ 5,720
Pump Station Power	**$ -**	$ -	$ -	$ 47,702	$ 81,209
	$ -	**$ 1,214**	**$ 1,435**	**$ 66,073**	**$ 112,484**
Total Water Operations Cost	**$ 3,776,434**	**$ 2,518,074**	**$ 3,922,621**	**$ 6,175,153**	**$ 10,512,785**
EXISTING DEBT SERVICE					
2002A	$ 1,080,675	$ 1,080,675	$ 1,080,675	$ -	$ -
2005 Spring	$ 968,012	$ 968,012	$ 968,012	$ -	$ -
Suntrust	$ 74,543	$ 74,543	$ -	$ -	$ -
County Contribution	$ (2,000,000)	$ (2,000,000)	$ (2,000,000)	$ -	$ -
PROPOSED DEBT SERVICE					
Loan @ 4 % for 20 Years					
Initial Improvements		$ 2,194,273	$ 2,194,273	$ -	$ -
Year 15 Improvements			$ 234,522	$ 234,522	$ -
Year 30 Improvements				$ 66,290	$ 66,290
Total Debt Service	**$ 123,230**	**$ 2,317,503**	**$ 2,477,482**	**$ 300,812**	**$ 66,290**
DEBT RESERVE					
Existing	$ -		$ -	$ -	$ -
O&M Reserve (5% of Operations Cost)		$ 125,904	$ 196,131	$ 308,758	$ 525,639
Short Lived Assets	$ -	$ 75,558	$ 75,558	$ 75,558	$ 75,558
Proposed Project @ 10%	$ -	$ 219,427	$ 242,879	$ 30,081	$ 6,629
Total Debt Reserve	**$ -**	**$ 420,889**	**$ 514,569**	**$ 414,397**	**$ 607,826**
TOTAL ANNUAL EXPENSES	**$ 3,899,664**	**$ 5,256,466**	**$ 6,914,672**	**$ 6,890,362**	**$ 11,186,901**
ANNUAL OPERATING BALANCE	**$ 4,409,778**	**$ 4,678,333**	**$ 5,423,471**	**$ 8,449,591**	**$ 19,332,052**
BCPSA Subsidy	**$ -**		**$ -**	**$ -**	**$ -**
TOTAL	$ 510,114	$ (578,133)	$ (1,491,201)	$ 1,559,228	$ 8,145,151
Accumulating Balance	**$ 510,114**	**$ (68,019)**	**$ (1,559,220)**	**$ 8**	**$ 8,145,159**

PROJECT PLANNING FACTORS
Bedford County PSA - Lakes-Bedford-Forest Water Supply Evaluation
Alternative B2 - Lakes to Bedford
24" Waterline from Lakes to City / Route 122 Pump Station / 1 MGD High Point Upgrade and New 5 MGD WTP
(0% grant and 4% 20-year loan)
JN 28714

PROJECT COST

		2012
Construction		$17,937,297
Land & Rights		$448,432
Legal Fees		$538,119
Administration		$306,587
Engineering:		
Permitting		$538,119
Preliminary Engineering Report		$60,000
Environmental Report		$4,500
Basic		$1,442,159
Inspection		$782,264
Additional		$1,261,009
Interest During Construction		$0
	Subtotal	$23,318,486
	TOTAL PROJECT COST	**$23,318,486**

Loan Amount	100.00%		$23,318,486
Connection Fees			$0
Grant Amount	0.00%		$0
	TOTAL PROJECT COST		$23,318,486

Annual Debt Service

Interest Rate	4 %	
Term	20 years	
Annual Payment (excluding reserve)		$1,715,815

Revenue

EXISTING WATER RATE SCHEDULE

Forest					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Lake					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Stewartsville					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
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TOTAL ANNUAL WATER INCOME x 12 mo/ yr **$4,252,278**

OTHER INCOME:

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Connection Fees	70	$2,250	$157,500

TOTAL OTHER INCOME **$157,500**

TOTAL WATER SYSTEM INCOME **$4,409,778**

EXPENSES: **Annual Increase** **3%**

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Cellular Phone Service	$ 9,557	$ 10,139	$ 15,796	$ 24,609	$ 41,896
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Bank Service Charges	$ 4,194	$ 4,449	$ 6,932	$ 10,800	$ 18,386
Accounting Services	$ 12,269	$ 13,017	$ 20,279	$ 31,595	$ 53,788
Legal Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Board of Directors Fees	$ 11,600	$ 12,307	$ 19,173	$ 29,871	$ 50,854
	$ 112,505	**$ 119,357**	**$ 185,954**	**$ 289,710**	**$ 493,212**
EMPLOYEE BENEFITS AND RELATED EXPENSES					
Payroll Taxes	$ 79,423	$ 84,260	$ 131,274	$ 204,520	$ 348,182
Payroll Taxes (for Board of Directors)	$ 887	$ 941	$ 1,467	$ 2,285	$ 3,890
VRS Retirement & Life	$ 106,884	$ 113,394	$ 176,664	$ 275,236	$ 468,571
Health Insurance	$ 144,170	$ 152,950	$ 238,292	$ 371,251	$ 632,029
Workers Compensation Ins.	$ 12,781	$ 13,559	$ 21,124	$ 32,911	$ 56,029
Employee Vaccinations	$ -	$ -	$ -	$ -	$ -
Mileage Reimbursements	$ -	$ -	$ -	$ -	$ -
Meetings	$ 2,023	$ 2,146	$ 3,343	$ 5,208	$ 8,867
Professional Dues	$ 3,329	$ 3,532	$ 5,502	$ 8,573	$ 14,594
Training & Education	$ 5,737	$ 6,086	$ 9,482	$ 14,773	$ 25,150
Continuing education	$ -	$ -	$ -	$ -	$ -
Clothing & Uniforms	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,658
Employee & Incentive Fund	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
	$ 361,265	**$ 383,266**	**$ 597,116**	**$ 930,287**	**$ 1,583,751**
BILLING COSTS				$ -	$ -
Bad Debt Water	$ 5,949	$ 6,311	$ 9,832	$ 15,319	$ 26,079
Bad Debt Penalty & Misc Charges	$ 1,171	$ 1,242	$ 1,936	$ 3,016	$ 5,134
Bill Processing Services	$ 20,677	$ 21,937	$ 34,176	$ 53,246	$ 90,647
Meter Testing	$ 8,923	$ 9,467	$ 14,749	$ 22,978	$ 39,118
	$ 36,720	**$ 38,957**	**$ 60,693**	**$ 94,558**	**$ 160,979**
NETWORK COSTS					
Network Contracted Services	$ 19,407	$ 20,588	$ 32,076	$ 49,974	$ 85,077
Continuing Software Support	$ 55,153	$ 58,512	$ 91,160	$ 142,024	$ 241,786
Internet & WAN Communications	$ 6,915	$ 7,337	$ 11,430	$ 17,808	$ 30,317
Cell Tower Consulting Services	$ 4,015	$ 4,260	$ 6,637	$ 10,340	$ 17,603
	$ 85,491	**$ 90,697**	**$ 141,303**	**$ 220,146**	**$ 374,783**
TEAM SUPPLIES AND VEHICLES					
Administration Supplies	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
Customer Service Supplies	$ 283	$ 300	$ 467	$ 728	$ 1,239
Engineering Supplies	$ 4,137	$ 4,389	$ 6,838	$ 10,654	$ 18,138
Locating Notification Tickets	$ 3,792	$ 4,023	$ 6,268	$ 9,766	$ 16,625
Contruction Testing	$ 4,082	$ 4,331	$ 6,748	$ 10,512	$ 17,897
Operations Supplies	$ 744	$ 789	$ 1,229	$ 1,915	$ 3,260
Maintenance Supplies	$ 1,155	$ 1,225	$ 1,909	$ 2,974	$ 5,063
Vehicle & Equipment Supplies	$ 1,487	$ 1,578	$ 2,458	$ 3,830	$ 6,520
Vehicle & Equipment Repairs	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Vehicle & Equipment Fuel	$ 44,616	$ 47,333	$ 73,743	$ 114,890	$ 195,592
Vehicle & Equipment Insurance	$ 11,209	$ 11,892	$ 18,527	$ 28,864	$ 49,139
	$ 87,121	**$ 92,426**	**$ 143,997**	**$ 224,343**	**$ 381,930**

WATER OPERATIONS COSTS		Proposed Improvements			
Forest System	**FY 09/10 Budget**	**2012**	**2027**	**2042**	**2060**
Forest Water Supplies	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Meter Installations	$ 65,000	$ 68,959	$ 107,435	$ 167,380	$ 284,954
Forest Water Contracted Services	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Power	$ 9,000	$ 9,548	$ 14,876	$ 23,176	$ 39,455
Forest Water Property Insurance	$ 8,895	$ 9,437	$ 14,702	$ 22,905	$ 38,995
Forest Water Sampling & Testing	$ 17,500	$ 18,566	$ 28,925	$ 45,064	$ 76,718
Forest Water Purchased	$ 1,575,318	$ 1,671,255	$ 2,603,760	$ 4,056,574	$ 6,906,045
Forest Water VDH Fees	$ 14,104	$ 14,963	$ 23,312	$ 36,319	$ 61,831
	$ 1,739,817	**$ 1,845,772**	**$ 2,875,652**	**$ 4,480,172**	**$ 7,627,193**
Well Systems					
Well System Supplies	$ 8,000	$ 8,487	$ 13,223	$ 20,601	$ 35,071
Well Systems Meter Installations	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems Contracted Services	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Well Systems Power	$ 7,800	$ 8,275	$ 12,892	$ 20,086	$ 34,194
Well Systems Property Insurance	$ 2,332	$ 2,474	$ 3,854	$ 6,005	$ 10,223
Well Systems Sampling & Testing	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems VDH Fees	$ 443	$ 470	$ 732	$ 1,141	$ 1,942
	$ 26,575	**$ 28,193**	**$ 43,924**	**$ 68,433**	**$ 116,502**
Lakes System					
SML Central System Supplies	$ 12,000	$ 80,000	$ 124,637	$ 194,181	$ 330,580
SML Central System Meter Installations	$ 35,000	$ 37,132	$ 57,850	$ 90,128	$ 153,437
SML Central System Contracted Services	$ 8,000	$ 17,360	$ 27,046	$ 42,137	$ 71,736
SML Central System Sampling & Testing	$ 1,500	$ 1,591	$ 2,479	$ 3,863	$ 6,576
SML Central System VDH Fees	$ 1,661	$ 1,762	$ 2,745	$ 4,277	$ 7,282
SML Treatment Supplies	$ 16,000	$ 16,974	$ 26,446	$ 41,201	$ 70,142
SML Treatment Contracted Services	$ 14,100	$ 14,959	$ 23,305	$ 36,309	$ 61,813
SML Treatment Phone	$ 260	$ 276	$ 430	$ 670	$ 1,140
SML Treatment Power	$ 60,000	$ 130,000	$ 202,536	$ 315,544	$ 537,193
SML Treatment Propane	$ 4,000	$ 4,244	$ 6,611	$ 10,300	$ 17,536
SML Treatment Property Insurance	$ 3,391	$ 3,598	$ 5,605	$ 8,732	$ 14,866
SML Treatment Sampling & testing	$ 4,000	$ 43,452	$ 67,697	$ 105,469	$ 179,555
SML Treatment Raw Water Fee	$ 2,200	$ 2,334	$ 3,636	$ 5,665	$ 9,645
SML Treatment Road Maintenance Fee	$ 900	$ 955	$ 1,488	$ 2,318	$ 3,946
	$ 163,012	**$ 354,636**	**$ 552,511**	**$ 860,794**	**$ 1,465,445**
Center System					
Center Water Supplies	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Center Water Meter Installations	$ 500	$ 530	$ 826	$ 1,288	$ 2,192
Center Water Contracted Services	$ 4,400	$ 4,668	$ 7,273	$ 11,330	$ 19,289
Center Water Power	$ 2,800	$ 2,971	$ 4,628	$ 7,210	$ 12,275
Center Water Property Insurance	$ 207	$ 220	$ 342	$ 533	$ 907
Center Water Sampling & testing	$ 800	$ 849	$ 1,322	$ 2,060	$ 3,507
Center Water VDH Fees	$ 107	$ 114	$ 177	$ 276	$ 469
	$ 11,814	**$ 12,533**	**$ 19,527**	**$ 30,422**	**$ 51,791**
Stewartsville System					
Stewartsville Water Supplies	$ 2,000	$ 2,122	$ 3,306	$ 5,150	$ 8,768
Stewartsville Water Meter Installations	$ 10,000	$ 10,609	$ 16,528	$ 25,751	$ 43,839
Stewartsville Water Contracted Services	$ 4,500	$ 4,774	$ 7,438	$ 11,588	$ 19,728
Stewartsville Water Communications	$ 330	$ 350	$ 545	$ 850	$ 1,447
Stewartsville Water Power	$ 450	$ 477	$ 744	$ 1,159	$ 1,973
Stewartsville Water Property Insurance	$ 505	$ 536	$ 835	$ 1,300	$ 2,214
Stewartsville Water Sampling & testing	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,659
Stewartsville Water Purchased	$ 86,344	$ 91,602	$ 142,713	$ 222,343	$ 378,524
Stewartsville Water VDH Fees	$ 178	$ 189	$ 294	$ 458	$ 780
	$ 108,107	**$ 114,691**	**$ 178,684**	**$ 278,384**	**$ 473,931**
New System O&M					
WTP Plant O&M		Included in Lakes System O&M			
WTP Power Equipment		Included in Lakes System O&M			
WTP Power Building		Included in Lakes System O&M			
Line Maintenance	**$ -**	$ 710	$ 1,106	$ 1,723	$ 2,934
PS Operations Labor	**$ -**	$ 12,775	$ 19,903	$ 31,008	$ 52,790
PS Maintenance Labor	**$ -**	$ 3,360	$ 5,235	$ 8,156	$ 13,884
Pump Station Power	**$ -**	$ 51,029	$ 79,502	$ 123,861	$ 210,865
Bedford City Water Purchases (0.74 MGD @ $2.37/1,000)	**$ -**	$ (640,137)	$ (997,313)	$ (1,553,781)	$ (2,645,207)
	$ -	**$ (572,263)**	**$ (891,567)**	**$ (1,389,033)**	**$ (2,364,735)**
Total Water Operations Cost	**$ 3,776,434**	**$ 3,615,852**	**$ 5,633,380**	**$ 8,776,622**	**$ 14,941,611**
EXISTING DEBT SERVICE					
2002A	$ 1,080,675	$ 1,080,675	$ 1,080,675	$ -	$ -
2005 Spring	$ 968,012	$ 968,012	$ 968,012	$ -	$ -
Suntrust	$ 74,543	$ 74,543	$ -	$ -	$ -
County Contribution	$ (2,000,000)	$ (2,000,000)	$ (2,000,000)	$ -	$ -
PROPOSED DEBT SERVICE					
Loan @ 4 % for 20 Years					
Proposed Improvements		$ 1,715,815	$ 1,715,815		
Total Debt Service	**$ 123,230**	**$ 1,839,045**	**$ 1,764,502**	**$ -**	**$ -**
DEBT RESERVE					
Existing	$ -		$ -	$ -	$ -
O&M Reserve (5% of Operations Cost)		$ 180,793	$ 281,669	$ 438,831	$ 747,081
Short Lived Assets	$ -	$ 75,558	$ 75,558	$ 75,558	$ 75,558
Proposed Project @ 10%	$ -	$ 171,582	$ 171,582	$ -	$ -
Total Debt Reserve	**$ -**	**$ 427,932**	**$ 528,808**	**$ 514,389**	**$ 822,639**
TOTAL ANNUAL EXPENSES	**$ 3,899,664**	**$ 5,882,830**	**$ 7,926,690**	**$ 9,291,011**	**$ 15,764,250**
ANNUAL OPERATING BALANCE	**$ 4,409,778**	**$ 4,678,333**	**$ 5,423,471**	**$ 8,449,591**	**$ 19,332,052**
BCPSA Subsidy	**$ -**		**$ -**	**$ -**	**$ -**
TOTAL	$ 510,114	$ (1,204,496)	$ (2,503,219)	$ (841,420)	$ 3,567,802
Accumulating Balance	**$ 510,114**	**$ (694,382)**	**$ (3,197,602)**	**$ (4,039,022)**	**$ (471,220)**

PROJECT PLANNING FACTORS
Bedford County PSA - Lakes-Bedford-Forest Water Supply Evaluation
Alternative B3 - Forest to Bedford
20" Waterline from Bedford to Forest / Pump Station
(0% grant and 4% 20-year loan)
JN 28714

PROJECT COST

	2012
Construction	$6,541,531
Land & Rights	$261,661
Legal Fees	$196,246
Administration	$130,831
Engineering:	
Permitting	$196,246
Preliminary Engineering Report	$50,000
Environmental Report	$4,500
Basic	$523,322
Inspection	$247,724
Additional	$351,928
Interest During Construction	$0
Subtotal	$8,503,989
TOTAL PROJECT COST	**$8,503,989**

Loan Amount	100.00%	$8,503,989
Connection Fees		
Grant Amount	0.00%	$0
TOTAL PROJECT COST		$8,503,989

Annual Debt Service

Interest Rate	4 %
Term	20 years
Annual Payment (excluding reserve)	$625,738

Revenue

EXISTING WATER RATE SCHEDULE

Forest					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Lake					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Stewartsville					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$5.00	Per 1,000 gal
Franklin County					
Fixed Fee			@	$20.00	Bi-Monthly
Per	1,000	gallons	@	$3.25	Per 1,000 gal

Use and Income

	Existing	+	New	=	Total		Gal./Month	Monthly Revenue
Forest	7085		0		7085	users	42,263,763	$282,169
Lake	1223		0		1223	users	4,713,992	$35,800
Stewartsville	142		0		142	users	647,711	$4,659
Franklin County	2225		0		2225	users	2,916,666	$31,729

TOTAL MONTHLY INCOME FROM WATER SALES					$354,356
TOTAL ANNUAL WATER INCOME	x 12 mo/ yr				**$4,252,278**
OTHER INCOME:	Connections	Facility Fee	MGD	$/1000	
Connection Fees	70	$2,250			$157,500
TOTAL OTHER INCOME					**$157,500**
TOTAL WATER SYSTEM INCOME					**$4,409,778**

EXPENSES: **Annual Increase** **3%**

	FY 09/10 Budget (Water Allocation, 74%)	Proposed Improvements 2012	2027	2042	2060
SALARIES					
Administration Team Salaries	$ 256,172	$ 271,773	$ 423,413	$ 659,664	$ 1,123,034
Administration Team Overtime	$ -	$ -	$ -	$ -	$ -
Customer Service Salaries	$ 109,175	$ 115,823	$ 180,449	$ 281,134	$ 478,612
Customer Service Overtime	$ -	$ -	$ -	$ -	$ -
Engineering Salaries	$ 223,090	$ 236,676	$ 368,734	$ 574,476	$ 978,006
Engineering Overtime	$ -	$ -	$ -	$ -	$ -
Maintenance Salaries	$ 194,916	$ 206,786	$ 322,166	$ 501,925	$ 854,493
Maintenance on call Stipend	$ 3,867	$ 4,102	$ 6,391	$ 9,957	$ 16,951
Maintenance Overtime	$ 20,567	$ 21,820	$ 33,994	$ 52,962	$ 90,164
Operations Salaries	$ 226,897	$ 240,715	$ 375,026	$ 584,278	$ 994,694
Operations On Call Stipend	$ 1,933	$ 2,051	$ 3,196	$ 4,979	$ 8,476
Operations OT	$ 7,390	$ 7,840	$ 12,215	$ 19,030	$ 32,398
	$ 1,044,007	**$ 1,107,587**	**$ 1,725,584**	**$ 2,688,404**	**$ 4,576,828**
GENERAL OFFICE EXPENSES					
Board & Committee Meetings	$ 372	$ 394	$ 615	$ 957	$ 1,630
Supplies	$ 4,090	$ 4,339	$ 6,760	$ 10,532	$ 17,929
Public Outreach Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Building Maintenance Expense	$ 10,827	$ 11,486	$ 17,895	$ 27,880	$ 47,464
Postage & Shipping Expense	$ 6,246	$ 6,627	$ 10,324	$ 16,085	$ 27,383
Commercial Phone Charges	$ 7,414	$ 7,865	$ 12,254	$ 19,091	$ 32,501
Cellular Phone Service	$ 9,557	$ 10,139	$ 15,796	$ 24,609	$ 41,896
Building Power & Utilities	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Building Fuel Costs	$ 4,462	$ 4,733	$ 7,374	$ 11,489	$ 19,559
Employee Bond	$ 352	$ 373	$ 581	$ 906	$ 1,542
Building Insurance	$ 1,713	$ 1,817	$ 2,831	$ 4,410	$ 7,507
Advertising	$ 3,718	$ 3,944	$ 6,145	$ 9,574	$ 16,299
Bank Service Charges	$ 4,194	$ 4,449	$ 6,932	$ 10,800	$ 18,386
Accounting Services	$ 12,269	$ 13,017	$ 20,279	$ 31,595	$ 53,788
Legal Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Board of Directors Fees	$ 11,600	$ 12,307	$ 19,173	$ 29,871	$ 50,854
	$ 112,505	**$ 119,357**	**$ 185,954**	**$ 289,710**	**$ 493,212**
EMPLOYEE BENEFITS AND RELATED EXPENSES					
Payroll Taxes	$ 79,423	$ 84,260	$ 131,274	$ 204,520	$ 348,182
Payroll Taxes (for Board of Directors)	$ 887	$ 941	$ 1,467	$ 2,285	$ 3,890
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Health Insurance	$ 144,170	$ 152,950	$ 238,292	$ 371,251	$ 632,029
Workers Compensation Ins.	$ 12,781	$ 13,559	$ 21,124	$ 32,911	$ 56,029
Employee Vaccinations	$ -	$ -	$ -	$ -	$ -
Mileage Reimbursements	$ -	$ -	$ -	$ -	$ -
Meetings	$ 2,023	$ 2,146	$ 3,343	$ 5,208	$ 8,867
Professional Dues	$ 3,329	$ 3,532	$ 5,502	$ 8,573	$ 14,594
Training & Education	$ 5,737	$ 6,086	$ 9,482	$ 14,773	$ 25,150
Continuing education	$ -	$ -	$ -	$ -	$ -
Clothing & Uniforms	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,658
Employee & Incentive Fund	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
	$ 361,265	**$ 383,266**	**$ 597,116**	**$ 930,287**	**$ 1,583,751**
BILLING COSTS					
Bad Debt Water	$ 5,949	$ 6,311	$ 9,832	$ 15,319	$ 26,079
Bad Debt Penalty & Misc Charges	$ 1,171	$ 1,242	$ 1,936	$ 3,016	$ 5,134
Bill Processing Services	$ 20,677	$ 21,937	$ 34,176	$ 53,246	$ 90,647
Meter Testing	$ 8,923	$ 9,467	$ 14,749	$ 22,978	$ 39,118
	$ 36,720	**$ 38,957**	**$ 60,693**	**$ 94,558**	**$ 160,979**
NETWORK COSTS					
Network Contracted Services	$ 19,407	$ 20,588	$ 32,076	$ 49,974	$ 85,077
Continuing Software Support	$ 55,153	$ 58,512	$ 91,160	$ 142,024	$ 241,786
Internet & WAN Communications	$ 6,915	$ 7,337	$ 11,430	$ 17,808	$ 30,317
Cell Tower Consulting Services	$ 4,015	$ 4,260	$ 6,637	$ 10,340	$ 17,603
	$ 85,491	**$ 90,697**	**$ 141,303**	**$ 220,146**	**$ 374,783**
TEAM SUPPLIES AND VEHICLES					
Administration Supplies	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
Customer Service Supplies	$ 283	$ 300	$ 467	$ 728	$ 1,239
Engineering Supplies	$ 4,137	$ 4,389	$ 6,838	$ 10,654	$ 18,138
Locating Notification Tickets	$ 3,792	$ 4,023	$ 6,268	$ 9,766	$ 16,625
Contruction Testing	$ 4,082	$ 4,331	$ 6,748	$ 10,512	$ 17,897
Operations Supplies	$ 744	$ 789	$ 1,229	$ 1,915	$ 3,260
Maintenance Supplies	$ 1,155	$ 1,225	$ 1,909	$ 2,974	$ 5,063
Vehicle & Equipment Supplies	$ 1,487	$ 1,578	$ 2,458	$ 3,830	$ 6,520
Vehicle & Equipment Repairs	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Vehicle & Equipment Fuel	$ 44,616	$ 47,333	$ 73,743	$ 114,890	$ 195,592
Vehicle & Equipment Insurance	$ 11,209	$ 11,892	$ 18,527	$ 28,864	$ 49,139
	$ 87,121	**$ 92,426**	**$ 143,997**	**$ 224,343**	**$ 381,930**

WATER OPERATIONS COSTS

		Proposed Improvements			
Forest System	**FY 09/10 Budget**	**2012**	**2027**	**2042**	**2060**
Forest Water Supplies	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Meter Installations	$ 65,000	$ 68,959	$ 107,435	$ 167,380	$ 284,954
Forest Water Contracted Services	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Power	$ 9,000	$ 9,548	$ 14,876	$ 23,176	$ 39,455
Forest Water Property Insurance	$ 8,895	$ 9,437	$ 14,702	$ 22,905	$ 38,995
Forest Water Sampling & Testing	$ 17,500	$ 18,566	$ 28,925	$ 45,064	$ 76,718
Forest Water Purchased	$ 1,575,318	$ 1,671,255	$ 2,603,760	$ 4,056,574	$ 6,906,045
Forest Water VDH Fees	$ 14,104	$ 14,963	$ 23,312	$ 36,319	$ 61,831
	$ 1,739,817	**$ 1,845,772**	**$ 2,875,652**	**$ 4,480,172**	**$ 7,627,193**
Well Systems					
Well System Supplies	$ 8,000	$ 8,487	$ 13,223	$ 20,601	$ 35,071
Well Systems Meter Installations	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems Contracted Services	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Well Systems Power	$ 7,800	$ 8,275	$ 12,892	$ 20,086	$ 34,194
Well Systems Property Insurance	$ 2,332	$ 2,474	$ 3,854	$ 6,005	$ 10,223
Well Systems Sampling & Testing	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems VDH Fees	$ 443	$ 470	$ 732	$ 1,141	$ 1,942
	$ 26,575	**$ 28,193**	**$ 43,924**	**$ 68,433**	**$ 116,502**
Lakes System					
SML Central System Supplies	$ 12,000	$ 12,731	$ 19,834	$ 30,901	$ 52,607
SML Central System Meter Installations	$ 35,000	$ 37,132	$ 57,850	$ 90,128	$ 153,437
SML Central System Contracted Services	$ 8,000	$ 8,487	$ 13,223	$ 20,601	$ 35,071
SML Central System Sampling & Testing	$ 1,500	$ 1,591	$ 2,479	$ 3,863	$ 6,576
SML Central System VDH Fees	$ 1,661	$ 1,762	$ 2,745	$ 4,277	$ 7,282
SML Treatment Supplies	$ 16,000	$ 16,974	$ 26,446	$ 41,201	$ 70,142
SML Treatment Contracted Services	$ 14,100	$ 14,959	$ 23,305	$ 36,309	$ 61,813
SML Treatment Phone	$ 260	$ 276	$ 430	$ 670	$ 1,140
SML Treatment Power	$ 60,000	$ 63,654	$ 99,171	$ 154,505	$ 263,034
SML Treatment Propane	$ 4,000	$ 4,244	$ 6,611	$ 10,300	$ 17,536
SML Treatment Property Insurance	$ 3,391	$ 3,598	$ 5,605	$ 8,732	$ 14,866
SML Treatment Sampling & testing	$ 4,000	$ 4,244	$ 6,611	$ 10,300	$ 17,536
SML Treatment Raw Water Fee	$ 2,200	$ 2,334	$ 3,636	$ 5,665	$ 9,645
SML Treatment Road Maintenance Fee	$ 900	$ 955	$ 1,488	$ 2,318	$ 3,946
	$ 163,012	**$ 172,939**	**$ 269,434**	**$ 419,769**	**$ 714,629**
Center System					
Center Water Supplies	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Center Water Meter Installations	$ 500	$ 530	$ 826	$ 1,288	$ 2,192
Center Water Contracted Services	$ 4,400	$ 4,668	$ 7,273	$ 11,330	$ 19,289
Center Water Power	$ 2,800	$ 2,971	$ 4,628	$ 7,210	$ 12,275
Center Water Property Insurance	$ 207	$ 220	$ 342	$ 533	$ 907
Center Water Sampling & testing	$ 800	$ 849	$ 1,322	$ 2,060	$ 3,507
Center Water VDH Fees	$ 107	$ 114	$ 177	$ 276	$ 469
	$ 11,814	**$ 12,533**	**$ 19,527**	**$ 30,422**	**$ 51,791**
Stewartsville System					
Stewartsville Water Supplies	$ 2,000	$ 2,122	$ 3,306	$ 5,150	$ 8,768
Stewartsville Water Meter Installations	$ 10,000	$ 10,609	$ 16,528	$ 25,751	$ 43,839
Stewartsville Water Contracted Services	$ 4,500	$ 4,774	$ 7,438	$ 11,588	$ 19,728
Stewartsville Water Communications	$ 330	$ 350	$ 545	$ 850	$ 1,447
Stewartsville Water Power	$ 450	$ 477	$ 744	$ 1,159	$ 1,973
Stewartsville Water Property Insurance	$ 505	$ 536	$ 835	$ 1,300	$ 2,214
Stewartsville Water Sampling & testing	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,659
Stewartsville Water Purchased	$ 86,344	$ 91,602	$ 142,713	$ 222,343	$ 378,524
Stewartsville Water VDH Fees	$ 178	$ 189	$ 294	$ 458	$ 780
	$ 108,107	**$ 114,691**	**$ 178,684**	**$ 278,384**	**$ 473,931**
New System O&M					
Line Maintenance	**$ -**	$ 544	$ 848	$ 1,320	$ 2,248
PS Operations Labor	**$ -**	$ 12,775	$ 19,903	$ 31,008	$ 52,790
PS Maintenance Labor	**$ -**	$ 3,360	$ 5,235	$ 8,156	$ 13,884
Pump Station Power	**$ -**	$ 118,532	$ 184,669	$ 287,708	$ 489,804
Bedford City Water Purchases (0.74 MGD @ $2.37/1,00	**$ -**	$ (640,137)	$ (997,313)	$ (1,553,781)	$ (2,645,207)
	$ -	**$ (504,926)**	**$ (786,658)**	**$ (1,225,588)**	**$ (2,086,481)**
	$ 3,776,434	**$ 3,501,493**	**$ 5,455,211**	**$ 8,499,041**	**$ 14,469,049**
Total Operations Cost					
EXISTING DEBT SERVICE					
2002A	$ 1,080,675	$ 1,080,675	$ 1,080,675	$ -	$ -
2005 Spring	$ 968,012	$ 968,012	$ 968,012	$ -	$ -
Suntrust	$ 74,543	$ 74,543	$ -	$ -	$ -
County Contribution	$ (2,000,000)	$ (2,000,000)	$ (2,000,000)	$ -	$ -
PROPOSED DEBT SERVICE					
Loan @ 4 % for 20 Years					
Proposed Improvements		$ 625,738	$ 625,738		
Total Debt Service	**$ 123,230**	**$ 748,969**	**$ 674,425**	**$ -**	**$ -**
DEBT RESERVE					
Existing	$ -		$ -	$ -	$ -
O&M Reserve (5% of Operations Cost)		$ 175,075	$ 272,761	$ 424,952	$ 723,452
Short Lived Assets	$ -	$ 75,558	$ 75,558	$ 75,558	$ 75,558
Proposed Project @ 10%	$ -	$ 62,574	$ 62,574	$ -	$ -
Total Debt Reserve	**$ -**	**$ 313,206**	**$ 410,892**	**$ 500,510**	**$ 799,010**
TOTAL ANNUAL EXPENSES	**$ 3,899,664**	**$ 4,563,668**	**$ 6,540,529**	**$ 8,999,552**	**$ 15,268,060**
ANNUAL OPERATING BALANCE	**$ 4,409,778**	**$ 4,678,333**	**$ 5,423,471**	**$ 8,449,591**	**$ 19,332,052**
BCPSA Subsidy	**$ -**		**$ -**	**$ -**	**$ -**
TOTAL	$ 510,114	$ 114,666	$ (1,117,058)	$ (549,961)	$ 4,063,992
Accumulating Balance	**$ 510,114**	**$ 624,779**	**$ (492,279)**	**$ (1,042,240)**	**$ 3,021,752**

PROJECT PLANNING FACTORS
Bedford County PSA - Lakes-Bedford-Forest Water Supply Evaluation
Alternative B2 Phased - Lakes to Bedford
24" Waterline from Lakes to City / 1 MGD High Point Upgrade
(0% grant and 4% 20-year loan)
JN 28714

PROJECT COST

	2012
Construction	$8,884,747
Land & Rights	$155,390
Legal Fees	$166,542
Administration	$106,587
Engineering:	
Permitting	$166,542
Preliminary Engineering Report	$60,000
Environmental Report	$4,500
Basic	$772,973
Inspection	$636,764
Additional	$587,796
Interest During Construction	$0
Subtotal	$11,541,841
TOTAL PROJECT COST	**$11,541,841**

Loan Amount	100.00%	$11,541,841
Connection Fees		$0
Grant Amount	0.00%	$0
TOTAL PROJECT COST		$11,541,841

Annual Debt Service

Interest Rate	4 %	
Term	20 years	
Annual Payment (excluding reserve)		$849,269

Revenue

EXISTING WATER RATE SCHEDULE

Forest				
Fixed Fee		@	$20.00	Bi-Monthly
Per	1,000 gallons	@	$5.00	Per 1,000 gal
Lake				
Fixed Fee		@	$20.00	Bi-Monthly
Per	1,000 gallons	@	$5.00	Per 1,000 gal
Stewartsville				
Fixed Fee		@	$20.00	Bi-Monthly
Per	1,000 gallons	@	$5.00	Per 1,000 gal
Franklin County				
Fixed Fee		@	$20.00	Bi-Monthly
Per	1,000 gallons	@	$3.25	Per 1,000 gal

Use and Income

	Existing	+	New	=	Total		Gal./Month	Monthly Revenue
Forest	7085		0		7085	users	42,263,763	$282,169
Lake	1223		0		1223	users	4,713,992	$35,800
Stewartsville	142		0		142	users	647,711	$4,659
Franklin County	2225		0		2225	users	2,916,666	$31,729

TOTAL MONTHLY INCOME FROM WATER SALES			$354,356
TOTAL ANNUAL WATER INCOME	x 12 mo/ yr		**$4,252,278**
OTHER INCOME:	Connections	Facility Fee	
Connection Fees	70	$2,250	$157,500
TOTAL OTHER INCOME			**$157,500**
TOTAL WATER SYSTEM INCOME			**$4,409,778**

EXPENSES: **Annual Increase** **3%**

	FY 09/10 Budget (Water Allocation, 74%)	Proposed Improvements 2012	2027	2042	2060
SALARIES					
Administration Team Salaries	$ 256,172	$ 271,773	$ 423,413	$ 659,664	$ 1,123,034
Administration Team Overtime	$ -	$ -	$ -	$ -	$ -
Customer Service Salaries	$ 109,175	$ 115,823	$ 180,449	$ 281,134	$ 478,612
Customer Service Overtime	$ -	$ -	$ -	$ -	$ -
Engineering Salaries	$ 223,090	$ 236,676	$ 368,734	$ 574,476	$ 978,006
Engineering Overtime	$ -	$ -	$ -	$ -	$ -
Maintenance Salaries	$ 194,916	$ 206,786	$ 322,166	$ 501,925	$ 854,493
Maintenance on call Stipend	$ 3,867	$ 4,102	$ 6,391	$ 9,957	$ 16,951
Maintenance Overtime	$ 20,567	$ 21,820	$ 33,994	$ 52,962	$ 90,164
Operations Salaries	$ 226,897	$ 240,715	$ 375,026	$ 584,278	$ 994,694
Operations On Call Stipend	$ 1,933	$ 2,051	$ 3,196	$ 4,979	$ 8,476
Operations OT	$ 7,390	$ 7,840	$ 12,215	$ 19,030	$ 32,398
	$ 1,044,007	**$ 1,107,587**	**$ 1,725,584**	**$ 2,688,404**	**$ 4,576,828**
GENERAL OFFICE EXPENSES					
Board & Committee Meetings	$ 372	$ 394	$ 615	$ 957	$ 1,630
Supplies	$ 4,090	$ 4,339	$ 6,760	$ 10,532	$ 17,929
Public Outreach Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Building Maintenance Expense	$ 10,827	$ 11,486	$ 17,895	$ 27,880	$ 47,464
Postage & Shipping Expense	$ 6,246	$ 6,627	$ 10,324	$ 16,085	$ 27,383
Commercial Phone Charges	$ 7,414	$ 7,865	$ 12,254	$ 19,091	$ 32,501
Cellular Phone Service	$ 9,557	$ 10,139	$ 15,796	$ 24,609	$ 41,896
Building Power & Utilities	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Building Fuel Costs	$ 4,462	$ 4,733	$ 7,374	$ 11,489	$ 19,559
Employee Bond	$ 352	$ 373	$ 581	$ 906	$ 1,542
Building Insurance	$ 1,713	$ 1,817	$ 2,831	$ 4,410	$ 7,507
Advertising	$ 3,718	$ 3,944	$ 6,145	$ 9,574	$ 16,299
Bank Service Charges	$ 4,194	$ 4,449	$ 6,932	$ 10,800	$ 18,386
Accounting Services	$ 12,269	$ 13,017	$ 20,279	$ 31,595	$ 53,788
Legal Expenses	$ 11,154	$ 11,833	$ 18,436	$ 28,722	$ 48,898
Board of Directors Fees	$ 11,600	$ 12,307	$ 19,173	$ 29,871	$ 50,854
	$ 112,505	**$ 119,357**	**$ 185,954**	**$ 289,710**	**$ 493,212**
EMPLOYEE BENEFITS AND RELATED EXPENSES					
Payroll Taxes	$ 79,423	$ 84,260	$ 131,274	$ 204,520	$ 348,182
Payroll Taxes (for Board of Directors)	$ 887	$ 941	$ 1,467	$ 2,285	$ 3,890
VRS Retirement & Life	$ 106,884	$ 113,394	$ 176,664	$ 275,236	$ 468,571
Health Insurance	$ 144,170	$ 152,950	$ 238,292	$ 371,251	$ 632,029
Workers Compensation Ins.	$ 12,781	$ 13,559	$ 21,124	$ 32,911	$ 56,029
Employee Vaccinations	$ -	$ -	$ -	$ -	$ -
Mileage Reimbursements	$ -	$ -	$ -	$ -	$ -
Meetings	$ 2,023	$ 2,146	$ 3,343	$ 5,208	$ 8,867
Professional Dues	$ 3,329	$ 3,532	$ 5,502	$ 8,573	$ 14,594
Training & Education	$ 5,737	$ 6,086	$ 9,482	$ 14,773	$ 25,150
Continuing education	$ -	$ -	$ -	$ -	$ -
Clothing & Uniforms	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,658
Employee & Incentive Fund	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
	$ 361,265	**$ 383,266**	**$ 597,116**	**$ 930,287**	**$ 1,583,751**
BILLING COSTS				$ -	$ -
Bad Debt Water	$ 5,949	$ 6,311	$ 9,832	$ 15,319	$ 26,079
Bad Debt Penalty & Misc Charges	$ 1,171	$ 1,242	$ 1,936	$ 3,016	$ 5,134
Bill Processing Services	$ 20,677	$ 21,937	$ 34,176	$ 53,246	$ 90,647
Meter Testing	$ 8,923	$ 9,467	$ 14,749	$ 22,978	$ 39,118
	$ 36,720	**$ 38,957**	**$ 60,693**	**$ 94,558**	**$ 160,979**
NETWORK COSTS					
Network Contracted Services	$ 19,407	$ 20,588	$ 32,076	$ 49,974	$ 85,077
Continuing Software Support	$ 55,153	$ 58,512	$ 91,160	$ 142,024	$ 241,786
Internet & WAN Communications	$ 6,915	$ 7,337	$ 11,430	$ 17,808	$ 30,317
Cell Tower Consulting Services	$ 4,015	$ 4,260	$ 6,637	$ 10,340	$ 17,603
	$ 85,491	**$ 90,697**	**$ 141,303**	**$ 220,146**	**$ 374,783**
TEAM SUPPLIES AND VEHICLES					
Administration Supplies	$ 2,231	$ 2,367	$ 3,687	$ 5,744	$ 9,780
Customer Service Supplies	$ 283	$ 300	$ 467	$ 728	$ 1,239
Engineering Supplies	$ 4,137	$ 4,389	$ 6,838	$ 10,654	$ 18,138
Locating Notification Tickets	$ 3,792	$ 4,023	$ 6,268	$ 9,766	$ 16,625
Contruction Testing	$ 4,082	$ 4,331	$ 6,748	$ 10,512	$ 17,897
Operations Supplies	$ 744	$ 789	$ 1,229	$ 1,915	$ 3,260
Maintenance Supplies	$ 1,155	$ 1,225	$ 1,909	$ 2,974	$ 5,063
Vehicle & Equipment Supplies	$ 1,487	$ 1,578	$ 2,458	$ 3,830	$ 6,520
Vehicle & Equipment Repairs	$ 13,385	$ 14,200	$ 22,123	$ 34,467	$ 58,678
Vehicle & Equipment Fuel	$ 44,616	$ 47,333	$ 73,743	$ 114,890	$ 195,592
Vehicle & Equipment Insurance	$ 11,209	$ 11,892	$ 18,527	$ 28,864	$ 49,139
	$ 87,121	**$ 92,426**	**$ 143,997**	**$ 224,343**	**$ 381,930**

OPERATIONS COSTS

		Proposed Improvements			
Forest System	**FY 09/10 Budget**	**2012**	**2027**	**2042**	**2060**
Forest Water Supplies	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Meter Installations	$ 65,000	$ 68,959	$ 107,435	$ 167,380	$ 284,954
Forest Water Contracted Services	$ 25,000	$ 26,523	$ 41,321	$ 64,377	$ 109,598
Forest Water Power	$ 9,000	$ 9,548	$ 14,876	$ 23,176	$ 39,455
Forest Water Property Insurance	$ 8,895	$ 9,437	$ 14,702	$ 22,905	$ 38,995
Forest Water Sampling & Testing	$ 17,500	$ 18,566	$ 28,925	$ 45,064	$ 76,718
Forest Water Purchased	$ 1,575,318	$ 1,671,255	$ 2,603,760	$ 4,056,574	$ 6,906,045
Forest Water VDH Fees	$ 14,104	$ 14,963	$ 23,312	$ 36,319	$ 61,831
	$ 1,739,817	**$ 1,845,772**	**$ 2,875,652**	**$ 4,480,172**	**$ 7,627,193**
Well Systems					
Well System Supplies	$ 8,000	$ 8,487	$ 13,223	$ 20,601	$ 35,071
Well Systems Meter Installations	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems Contracted Services	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Well Systems Power	$ 7,800	$ 8,275	$ 12,892	$ 20,086	$ 34,194
Well Systems Property Insurance	$ 2,332	$ 2,474	$ 3,854	$ 6,005	$ 10,223
Well Systems Sampling & Testing	$ 2,500	$ 2,652	$ 4,132	$ 6,438	$ 10,960
Well Systems VDH Fees	$ 443	$ 470	$ 732	$ 1,141	$ 1,942
	$ 26,575	**$ 28,193**	**$ 43,924**	**$ 68,433**	**$ 116,502**
Lakes System					
SML Central System Supplies	$ 12,000	$ 80,000	$ 124,637	$ 194,181	$ 330,580
SML Central System Meter Installations	$ 35,000	$ 37,132	$ 57,850	$ 90,128	$ 153,437
SML Central System Contracted Services	$ 8,000	$ 17,360	$ 27,046	$ 42,137	$ 71,736
SML Central System Sampling & Testing	$ 1,500	$ 1,591	$ 2,479	$ 3,863	$ 6,576
SML Central System VDH Fees	$ 1,661	$ 1,762	$ 2,745	$ 4,277	$ 7,282
SML Treatment Supplies	$ 16,000	$ 16,974	$ 26,446	$ 41,201	$ 70,142
SML Treatment Contracted Services	$ 14,100	$ 14,959	$ 23,305	$ 36,309	$ 61,813
SML Treatment Phone	$ 260	$ 276	$ 430	$ 670	$ 1,140
SML Treatment Power	$ 60,000	$ 130,000	$ 202,536	$ 315,544	$ 537,193
SML Treatment Propane	$ 4,000	$ 4,244	$ 6,611	$ 10,300	$ 17,536
SML Treatment Property Insurance	$ 3,391	$ 3,598	$ 5,605	$ 8,732	$ 14,866
SML Treatment Sampling & testing	$ 4,000	$ 43,452	$ 67,697	$ 105,469	$ 179,555
SML Treatment Raw Water Fee	$ 2,200	$ 2,334	$ 3,636	$ 5,665	$ 9,645
SML Treatment Road Maintenance Fee	$ 900	$ 955	$ 1,488	$ 2,318	$ 3,946
	$ 163,012	**$ 354,636**	**$ 552,511**	**$ 860,794**	**$ 1,465,445**
Center System					
Center Water Supplies	$ 3,000	$ 3,183	$ 4,959	$ 7,725	$ 13,152
Center Water Meter Installations	$ 500	$ 530	$ 826	$ 1,288	$ 2,192
Center Water Contracted Services	$ 4,400	$ 4,668	$ 7,273	$ 11,330	$ 19,289
Center Water Power	$ 2,800	$ 2,971	$ 4,628	$ 7,210	$ 12,275
Center Water Property Insurance	$ 207	$ 220	$ 342	$ 533	$ 907
Center Water Sampling & testing	$ 800	$ 849	$ 1,322	$ 2,060	$ 3,507
Center Water VDH Fees	$ 107	$ 114	$ 177	$ 276	$ 469
	$ 11,814	**$ 12,533**	**$ 19,527**	**$ 30,422**	**$ 51,791**
Stewartsville System					
Stewartsville Water Supplies	$ 2,000	$ 2,122	$ 3,306	$ 5,150	$ 8,768
Stewartsville Water Meter Installations	$ 10,000	$ 10,609	$ 16,528	$ 25,751	$ 43,839
Stewartsville Water Contracted Services	$ 4,500	$ 4,774	$ 7,438	$ 11,588	$ 19,728
Stewartsville Water Communications	$ 330	$ 350	$ 545	$ 850	$ 1,447
Stewartsville Water Power	$ 450	$ 477	$ 744	$ 1,159	$ 1,973
Stewartsville Water Property Insurance	$ 505	$ 536	$ 835	$ 1,300	$ 2,214
Stewartsville Water Sampling & testing	$ 3,800	$ 4,031	$ 6,281	$ 9,785	$ 16,659
Stewartsville Water Purchased	$ 86,344	$ 91,602	$ 142,713	$ 222,343	$ 378,524
Stewartsville Water VDH Fees	$ 178	$ 189	$ 294	$ 458	$ 780
	$ 108,107	**$ 114,691**	**$ 178,684**	**$ 278,384**	**$ 473,931**
New System O&M					
WTP Plant O&M		Included in Lakes System O&M			
WTP Power Equipment		Included in Lakes System O&M			
WTP Power Building		Included in Lakes System O&M			
Line Maintenance	**$ -**	$ 710	$ 1,106	$ 1,723	$ 2,934
Bedford Water Purchases (0.74 MGD @ $2.37/1,000)	**$ -**	$ (640,137)	$ (997,313)	$ (1,553,781)	$ (2,645,207)
	$ -	**$ (639,427)**	**$ (996,206)**	**$ (1,552,057)**	**$ (2,642,273)**
Total Operations Cost	**$ 3,776,434**	**$ 3,548,688**	**$ 5,528,740**	**$ 8,613,597**	**$ 14,664,072**
EXISTING DEBT SERVICE					
2002A	$ 1,080,675	$ 1,080,675	$ 1,080,675	$ -	$ -
2005 Spring	$ 968,012	$ 968,012	$ 968,012	$ -	$ -
Suntrust	$ 74,543	$ 74,543	$ -	$ -	$ -
County Contribution	$ (2,000,000)	$ (2,000,000)	$ (2,000,000)	$ -	$ -
PROPOSED DEBT SERVICE					
Loan @ 4% for 20 Years					
Proposed Improvements		$ 849,269	$ 849,269		
County Contribution		$ (564,182)	$ (564,182)	$ (564,182)	
Total Debt Service	**$ 123,230**	**$ 408,317**	**$ 333,774**	**$ (564,182)**	**$ -**
DEBT RESERVE					
Existing	$ -		$ -	$ -	$ -
O&M Reserve (5% of Operations Cost)		$ 177,434	$ 276,437	$ 430,680	$ 733,204
Short Lived Assets	$ -	$ 75,558	$ 75,558	$ 75,558	$ 75,558
Proposed Project @ 10%	$ -	$ 84,927	$ 84,927	$ -	$ -
Total Debt Reserve	**$ -**	**$ 337,919**	**$ 436,922**	**$ 506,238**	**$ 808,762**
TOTAL ANNUAL EXPENSES	**$ 3,899,664**	**$ 4,294,925**	**$ 6,299,436**	**$ 8,555,653**	**$ 15,472,834**
ANNUAL OPERATING BALANCE	**$ 4,409,778**	**$ 4,678,333**	**$ 5,423,471**	**$ 8,449,591**	**$ 19,332,052**
BCPSA Subsidy	**$ -**		**$ -**	**$ -**	**$ -**
TOTAL	$ 510,114	$ 383,409	$ (875,965)	$ (106,062)	$ 3,859,218
Accumulating Balance	**$ 510,114**	**$ 893,523**	**$ 17,557**	**$ (88,505)**	**$ 3,770,713**

APPENDIX E

Environmental Agency Responses and Documentation

July 1, 2010

Robert Weld
Regional Director
Virginia Department of Environmental Quality
Roanoke Office
3019 Peters Creek Road
Roanoke, VA 24019

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Mr. Weld:

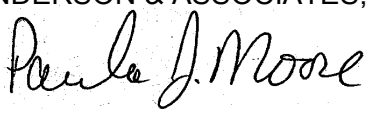
Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

Anderson & Associates has been retained to prepare a Preliminary Engineering Report and to investigate environmental impacts as a result of the proposed countywide waterlines. This environmental inquiry is being performed as the first step towards an Environmental Review (ER) that may be submitted to U.S. Department of Agriculture Rural Utilities Service. In order to complete this document we are contacting various agencies for input on environmental concerns under their jurisdiction that may be present in or adjacent to the project area. In order to aid you in your determination we have attached an Environmental Review Exhibit, showing the proposed alignments. It is anticipated that the proposed alignments will fall within existing rights-of-way or be adjacent to existing rights-of-way.

Please respond to indicate potential concerns within your jurisdiction that may be affected by the proposed project. Please call (540-552-5592) or e-mail Paula Moore (moorep@andassoc.com) if you should have any questions. Thank you for your prompt attention to this request.

Sincerely,

ANDERSON & ASSOCIATES, INC.



Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

July 2, 2010

Ms. Shirl Dressler
Department of Game and Inland Fisheries
Environmental Services Section
4010 West Broad Street
Richmond, VA 23230

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Ms. Dressler:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

Anderson & Associates has been retained to prepare a Preliminary Engineering Report and to investigate environmental impacts as a result of the proposed countywide waterlines. This environmental inquiry is being performed as the first step towards an Environmental Review (ER) that may be submitted to U.S. Department of Agriculture Rural Utilities Service. In order to complete this document we are contacting various agencies for input on environmental concerns under their jurisdiction that may be present in or adjacent to the project area. In order to aid you in your determination we have attached an Environmental Review Exhibit, showing the proposed alignments. It is anticipated that the proposed alignments will fall within existing rights-of-way or be adjacent to existing rights-of-way.

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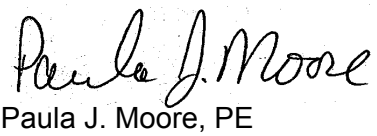
Sincerely,

ANDERSON & ASSOCIATES, INC.



Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit
VAFWIS Search

July 1, 2010

Jennifer McPherson
Office Supervisor
Virginia Department of Health
Bedford County Health Department
600 Bedford Avenue
Bedford, VA 24523

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Ms. McPherson:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

Anderson & Associates has been retained to prepare a Preliminary Engineering Report and to investigate environmental impacts as a result of the proposed countywide waterlines. This environmental inquiry is being performed as the first step towards an Environmental Review (ER) that may be submitted to U.S. Department of Agriculture Rural Utilities Service. In order to complete this document we are contacting various agencies for input on environmental concerns under their jurisdiction that may be present in or adjacent to the project area. In order to aid you in your determination we have attached an Environmental Review Exhibit, showing the proposed alignments. It is anticipated that the proposed alignments will fall within existing rights-of-way or be adjacent to existing rights-of-way.

Please respond to indicate potential concerns within your jurisdiction that may be affected by the proposed project. Please call (540-552-5592) or e-mail Paula Moore (moorep@andassoc.com) if you should have any questions. Thank you for your prompt attention to this request.

Sincerely,

ANDERSON & ASSOCIATES, INC.

Paula J. Moore

Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

July 1, 2010

Paul Johnson
Virginia Department of Transportation
Salem District Environmental Manager
731 Harrison Ave.
Salem, VA 24153

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Mr. Johnson:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

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Sincerely,

ANDERSON & ASSOCIATES, INC.

Paula J. Moore

Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

Moore, Paula

From: Johnson, Paul [Paul.Johnson@VDOT.Virginia.gov]
Sent: Tuesday, July 13, 2010 4:05 PM
To: Moore, Paula
Cc: Shinstine, Debbie, P.E.
Subject: RE: Bedford County PSA; Lakes - Bedford - Forest; Water Supply Evaluation; A&A JN 28714; BCPSA Job # 2010-040
Categories: Filed by Newforma

Paula

I made one correction below in the reference to the date of your letter --- it's year 2010 instead of 1010

From: Johnson, Paul
Sent: Tuesday, July 13, 2010 3:41 PM
To: 'Paula Moore'
Cc: Shinstine, Debbie, P.E.
Subject: Bedford County PSA; Lakes - Bedford - Forest; Water Supply Evaluation; A&A JN 28714; BCPSA Job # 2010-040

Paula,

Thank you for your July 1, 2010 letter requesting VDOT's review and comment with respect to possible environmental or other concerns within our jurisdiction regarding the proposed water supply project. VDOT does not have any environmental regulatory responsibility; so there is no environmental information we can provide Anderson & Associates regarding this project. Information such as that would need to be obtained from the various state and federal environmental resource agencies.

The primary consideration regarding VDOT would be if work is proposed to take place within VDOT right-of-way, then a Land Use Permit (and the associated plan review, comments and approval) would be required. Your letter indicates that it is anticipated that the proposed water distribution line alignment will fall within or be located adjacent to existing Routes 122 and 460 rights-of-way; therefore, I recommend that you contact Debbie Shinstine (Area Land Use Engineer) in the VDOT Bedford Residency office at 540-586-7931 if you need additional information regarding the Land Use Permit process.

Thank you.

Paul Johnson
Salem District Environmental Manager | Virginia Department of Transportation |
731 Harrison Avenue | P.O. Box 3071 | Salem, VA 24153 |
540.387.5432 phone | 540.312.3606 cell | 540.387.5258 fax |

July 2, 2010

Tony Watkinson
VMRC Deputy Chief – Habitat Management
2600 Washington Avenue, 3rd Floor
Newport News, VA 23607

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Mr. Watkinson:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

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Sincerely,

ANDERSON & ASSOCIATES, INC.

Paula J. Moore

Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

July 2, 2010

Army Corps of Engineers
803 Front Street
Norfolk, VA 23510
Attention: Regulatory Branch

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

To Whom It May Concern:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

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Sincerely,

ANDERSON & ASSOCIATES, INC.

Paula J. Moore

Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

Moore, Paula

From: Richardson, Jeanne C NAO [Jeanne.C.Richardson@usace.army.mil]
Sent: Thursday, August 05, 2010 2:03 PM
To: Moore, Paula
Subject: RE: Bedford County PSA

Ms. Moore,

I have reviewed the information you submitted to this office (dated July 2, 2010) and I have the following comments:

-The information you submitted to this office is not detailed enough for me to provide you with a thorough evaluation.
-A preliminary review of the information you submitted indicates that streams and wetlands may be impacted by the construction of the waterline. It is recommended that an environmental consultant trained in identifying streams and wetlands walk the proposed waterline route to determine if resources are present within the project footprint.
-If the project will result in the placement of fill material into streams or wetlands a permit from the Corps of Engineers will be required.
-As you get further along in the design of your project it would be to your benefit to schedule a preapplication meeting with this office (contact information below) in order to review the proposed project and the potential impacts that project will have on streams and/or wetlands.

Feel free to contact me if you have any questions or require additional information.

Thanks, J

Jeanne C. Richardson
Environmental Scientist
US Army Corps of Engineers
Norfolk District-West Central Field Office
PO Box 3160
Lynchburg, Virginia 24503
434.384.0182

July 2, 2010

Tylan Dean
Assistant Field Office Supervisor
U.S. Fish & Wildlife Service
6669 Short Lane
Gloucester, VA 23061

Re: Bedford County PSA
Lakes – Bedford – Forest
Water Supply Evaluation
A&A JN 28714
BCPSA Job # 2010-040

Dear Mr. Dean:

Our client, the Bedford County Public Service Authority (BCPSA), is in the study phase of a countywide water supply evaluation. This will include water distribution lines along routes 122 and 460 in Bedford County. The goal of this project is to evaluate the technical (including environmental) and financial requirements of supplying water across the County from various sources.

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Sincerely,

ANDERSON & ASSOCIATES, INC.

Paula J. Moore

Paula J. Moore, PE
Project Manager

Enclosures – Environmental Review Exhibit

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
6669 Short Lane
Gloucester, Virginia 23061

OCT 05 2010

Ms. Paula Moore
Anderson & Associates, Inc.
100 Ardmore Street
Blacksburg, Virginia 24060

Re: Bedford County PSA Lakes Water Supply Evaluation, Bedford County, Virginia, Project # 2010-I-0574

Dear Ms. Moore:

The U.S. Fish and Wildlife Service (Service) has reviewed your request for information on federally listed endangered and threatened species and designated critical habitat for the referenced project. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended.

The proposed project is to evaluate routes for water supply improvements for the City of Bedford, Virginia. The proposed water lines will be located within existing rights-of-way for State Route 122 and U.S. Route 460 within Bedford County, Virginia. Based on our review of the project, several stream crossings are in areas that support the federally listed endangered Roanoke logperch (*Percina rex*) and its habitat. The installation of the proposed water line has the potential to affect the Roanoke logperch and its habitat at the following stream crossings:

COUNTY:	ROAD:	STREAM CROSSING:
Bedford	VA Route 122	Goose Creek
Bedford	VA Route 122	Stony Fork
Bedford	US 460	Big Otter River
Bedford	US 460	Little Otter River

The information provided does not include details on how these crossings will be made, the size and extent of the pipe and associated ground disturbance during installation, and other information necessary to evaluate the potential effects of the project. Send this office detailed plans on the crossings so that we may provide additional recommendations on how to avoid impacts to the logperch and its habitat.

We recommend strictly adhering to sediment and erosion control measures as defined in the Virginia Erosion and Sedimentation Control Handbook and/or other applicable guidance or regulations specific to your location when installing the water lines to aid in protecting sensitive aquatic species.

Species information and other information regarding project reviews within Virginia is available at our website http://www.fws.gov/northeast/virginiafield/endspecies/project_reviews.html. If you have any questions, please contact Mike Drummond of this office at (804) 693-6694, extension 122.

Sincerely,

Cindy Schulz
Supervisor
Virginia Field Office

cc. VDCR, DNH, Richmond, VA (René Hypes)
VDGIF, Richmond, VA (Amy Ewing)

DIVISIONS
ENERGY
GAS AND OIL
GEOLOGY AND MINERAL RESOURCES
MINED LAND RECLAMATION
MINERAL MINING
MINES
ADMINISTRATION

COMMONWEALTH OF VIRGINIA

Department of Mines, Minerals and Energy
Washington Building, 8th Floor
1100 Bank Street
Richmond, Virginia 23219-3638
(804) 692-3200 FAX (804) 692-3237
www.dmme.virginia.gov

March 22, 2010

To Whom It May Concern:

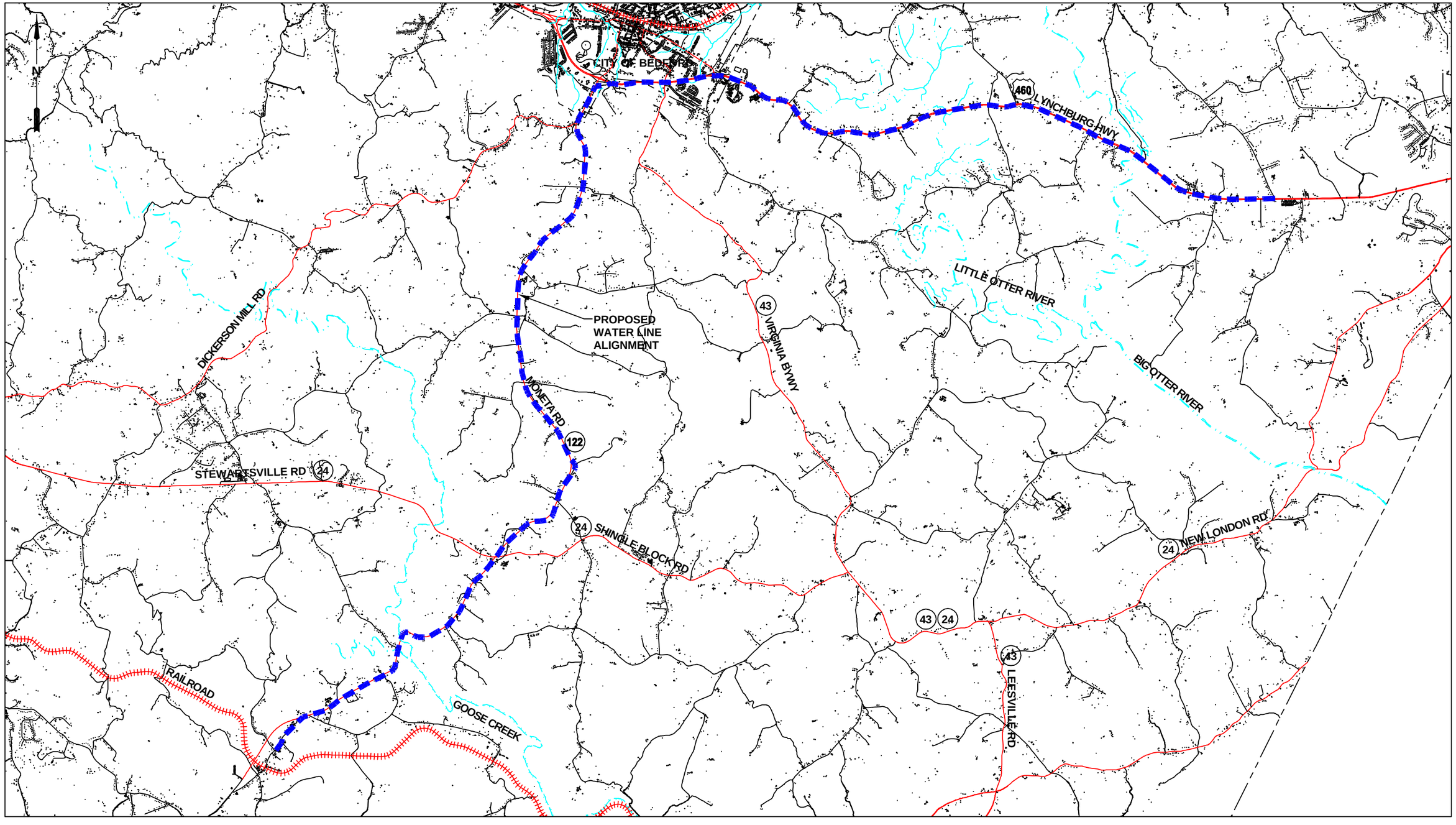
The Department of Mines, Minerals and Energy (DMME) is making difficult decisions in response to state budget reductions. One of the most difficult decisions to date was to reduce staff in our Division of Geology and Mineral Resources (DGMR) in January 2009. Since that time, DMME has carefully reviewed services that we have provided in the past in order to determine which services can be provided in the future with existing staff. One service that we considered was the review of environmental impact reports for state and local projects.

We have determined that existing staff levels within DMME do not allow for the review of environmental impact reports on a routine basis. As a result, we ask that you remove DMME from your environmental review distribution lists. We understand that there are times when specific information related to geologic conditions, mineral extraction, and energy policy is an important consideration for a particular project. In these instances, please contact David Spears at (434) 951-6350 or by e-mail at david.spears@dmme.virginia.gov/.

Sincerely,

Stephen A.Walz
Director

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY



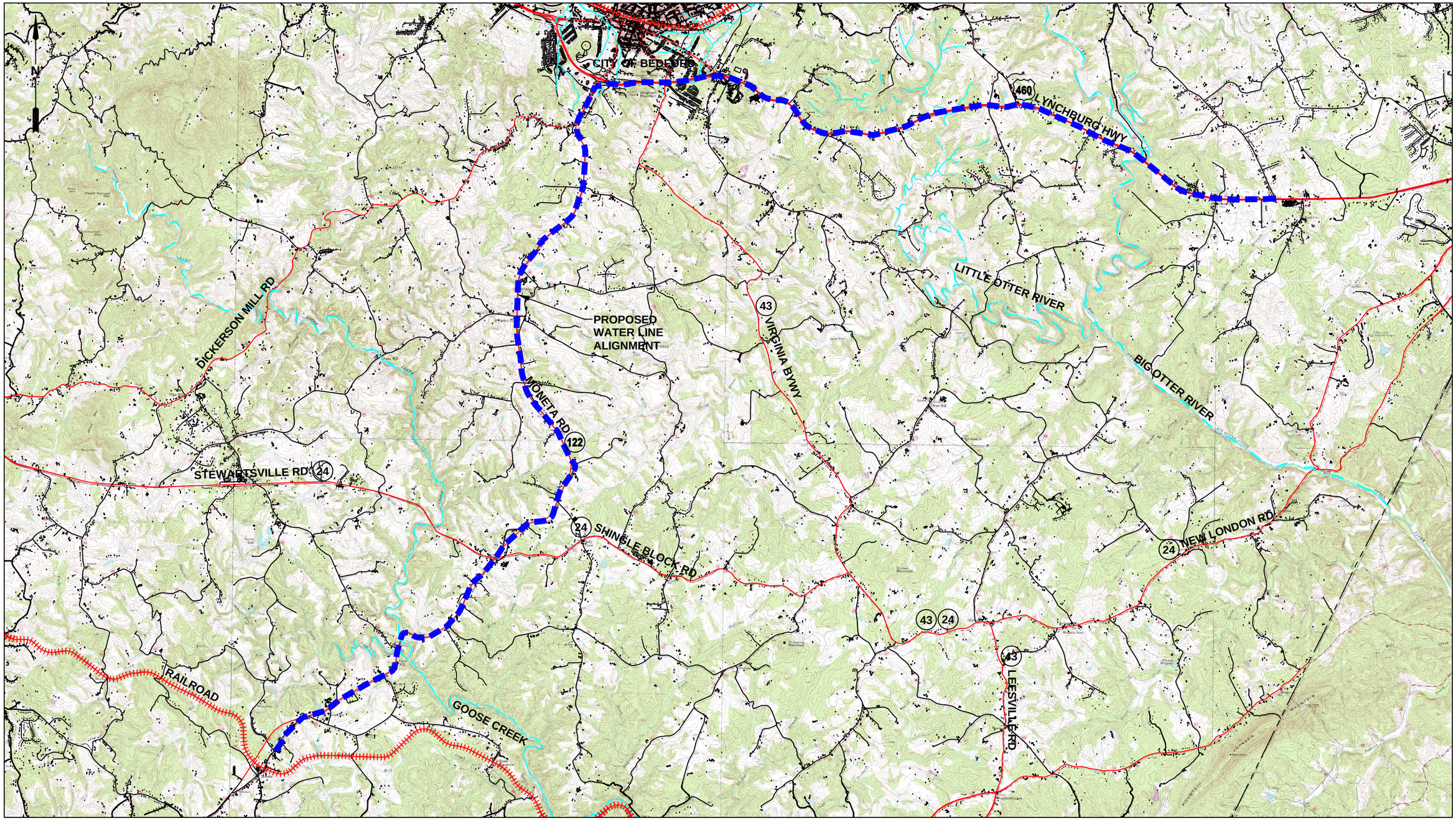
3500 0 3500 7000 10500

SCALE IN FEET

LAKES - BEDFORD - FOREST WATER SUPPLY EVALUATION
ENVIRONMENTAL REVIEW EXHIBIT
JULY 1, 2010

ANDERSON AND ASSOCIATES, Inc.

BEDFORD COUNTY PUBLIC SERVICE AUTHORITY



3500 0 3500 7000 10500
SCALE IN FEET

LAKES - BEDFORD - FOREST WATER SUPPLY EVALUATION
ENVIRONMENTAL REVIEW EXHIBIT 2
JULY 1, 2010

ANDERSON AND ASSOCIATES, Inc.

Define Point of Interest

37,13,36.9 -79,34,14.5
is the Search Point

Submit Cancel

Search Point

- **Change** to "clicked" map point
- **Fixed** at 37,13,36.9 -79,34,14.5

Show Position Rings

Yes No
16 miles and 4 miles at the **Search Point**

Show Search Area

Yes No
10 miles

Search Point is at map center

Base Map Choices

County - Quadrangle

Map Overlay Choices

Current List: Position, Search

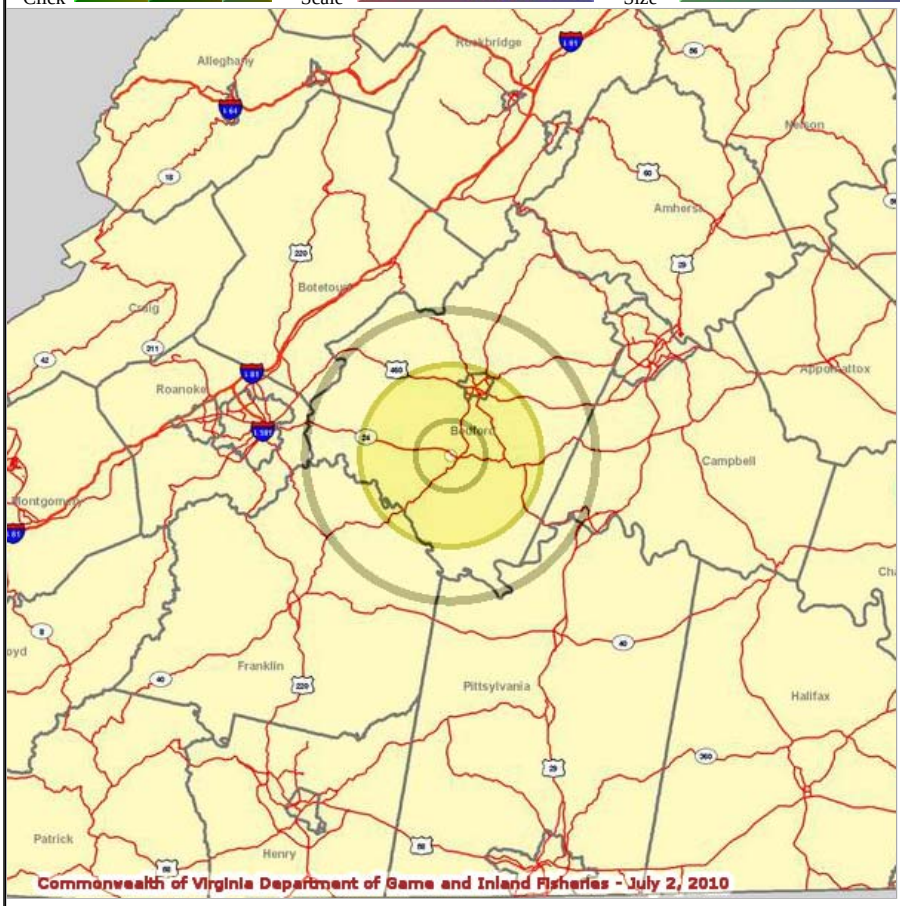
Map Overlay Legend

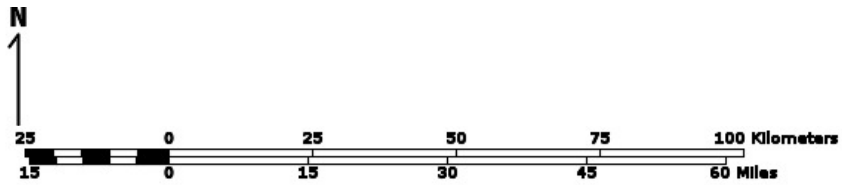
Position Rings 16 miles and 4 miles at the Search Point

10 mile radius Search Area

Refresh Browser Page

Map Click Pan Id M Map Scale In Zoom Out Screen Size Small Size Big Help





Point of Search 37,13,36.9 -79,34,14.5
Map Location 37,13,36.9 -79,34,14.5

Select **Coordinate System:**
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: 2003 Va. DGIF Virginia Basemap

Map projection is UTM Zone 17 NAD 1983 with left 550017 and top 4197819. Pixel size is 256 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 153600 meters east to west by 153600 meters north to south for a total of 23592.9 square kilometers. The map display represents 504023 feet east to west by 504023 feet north to south for a total of 9112.4 square miles.

Black and white aerial photography aquired near 1990 and topographic maps are from the United States Department of the Interior, United States Geological Survey.
Shaded topographic maps are from TOPO! ©2006 National Geographic

	http://www.nationa.geographic.com/topo Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries. map assembled 2010-07-02 13:42:37 (qa/qc July 27, 2009 10:09 - tn=298485 dist=16093 Visitor)

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- Governor

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- Virginia Department of Game and Inland Fisheries

- **Fish and Wildlife Information Service**

- Home
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- VaFWIS GeographicSelect Options

- Visitor Options
- Species Information
- By Name
- By Land Management
- References
- Geographic Search
- By Map
- By Coordinates
- By Place Name
- Help

- Show This Page as Printer Friendly

VaFWIS Search Report Compiled on 7/2/2010, 1:43:22 PM

Help

Known or likely to occur within a **10 mile radius of 37,13,36.9 -79,34,14.5**
in **019 Bedford County, 067 Franklin County, 515 Bedford City, VA**

506 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 40) (40 species with Status* or Tier I**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010214	FESE	I	Logperch, Roanoke	Percina rex
040096	ST	I	Falcon, peregrine	Falco peregrinus
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
010127	FSST	II	Madtom, orangefin	Noturus gilberti
040093	FSST	II	Eagle, bald	Haliaeetus leucocephalus
060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
100248	FS	I	Fritillary, regal	Speyeria idalia idalia
020039	FSSS	II	Salamander, Peaks of Otter	Plethodon hubrichti
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius
100256	FS	II	Crescent, tawny	Phyciodes batesii batesii
010110	FS	III	Jumprock, bigeye	Moxostoma ariommum
100001	FS	IV	fritillary, Diana	Speyeria diana

010077	SS	I	Shiner, bridle	Notropis bifrenatus
040372	SS	I	Crossbill, red	Loxia curvirostra
040306	SS	I	Warbler, golden-winged	Vermivora chrysoptera
010174	SS	II	Bass, Roanoke	Ambloplites cavifrons
040213	SS	II	Owl, northern saw-whet	Aegolius acadicus
040304	SS	II	Warbler, Swainson's	Limnothlypis swainsonii
040266	SS	II	Wren, winter	Troglodytes troglodytes
040094	SS	III	Harrier, northern	Circus cyaneus
040040	SS	III	Ibis, glossy	Plegadis falcinellus
040036	SS	III	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040204	SS	III	Owl, barn	Tyto alba pratincola
030012	CC	IV	Rattlesnake, timber	Crotalus horridus
040264	SS	IV	Creeper, brown	Certhia americana
040364	SS		Dickcissel	Spiza americana
040032	SS		Egret, great	Ardea alba egretta
040366	SS		Finch, purple	Carpodacus purpureus
040285	SS		Kinglet, golden-crowned	Regulus satrapa
040112	SS		Moorhen, common	Gallinula chloropus cachinnans
040262	SS		Nuthatch, red-breasted	Sitta canadensis
040189	SS		Tern, Caspian	Sterna caspia
040278	SS		Thrush, hermit	Catharus guttatus
040314	SS		Warbler, magnolia	Dendroica magnolia
050045	SS		Otter, northern river	Lontra canadensis lataxina
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens

To view **All 506 species** View 506

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Candidate; CC=Collection Concern; SS=State Special Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage (1 records)

View Map of All Fish Impediments

ID	Name	River	View Map
971	BEDFORD	JAMES R	Yes

Threatened and Endangered Waters (3 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code	Status*	Tier**	Common	Scientific Name	
Big Otter River (03010101)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes
Goose Creek (03010101)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes
Little Otter River (03010101)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes

Cold Water Stream Survey (Trout Streams)
Managed Trout Species

N/A

Virginia Breeding Bird Atlas Blocks (13 records)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

		Breeding Bird Atlas Species	

BBA ID	Atlas Quadrangle Block Name	Different Species	Highest TE *	Highest Tier **	View Map
34076	Bedford, SE	55		IV	Yes
34075	Bedford, SW	1	SS	III	Yes
35076	Goode, SE	63	SS	IV	Yes
33066	Goodview, SE	60		IV	Yes
32062	Hardy, NE	1			Yes
35066	Huddleston, SE	49		IV	Yes
35065	Huddleston, SW	1		IV	Yes
33076	Irving, SE	68		IV	Yes
35052	Leesville, NE	1		IV	Yes
33052	Moneta SW, NE	3		IV	Yes
34061	Moneta, NW	1		III	Yes
34066	Moneta, SE	61		IV	Yes
32076	Stewartsville, SE	66		IV	Yes

USFWS Breeding Bird Survey Routes

N/A

Christmas Bird Count Survey (1 records)

View Map of All Query Results
Christmas Bird Count Survey

CBC ID	Survey Name	Christmas Bird Count Species			View Map
		Different Species	Highest TE *	Highest Tier **	
880026	Peaks of Otter	67	ST	I	Yes

Public Holdings: (1 names)

Name	Agency	Level
Smith Mountain Lake State Park	VA Dept. of Conservation and Recreation	State

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
019	Bedford	466	FESE	I
067	Franklin	377	FESE	I
515	Bedford City	353	FSST	I

USGS 7.5' Quadrangles:
Hardy
Stewartsville
Moneta SW
Goodview
Irving
Smith Mtn. Dam
Moneta
Bedford
Leesville
Huddleston
Goode

USGS NRCS Watersheds in Virginia:
L23 - UPPER BIG OTTER RIVER
L25 - BIG OTTER RIVER/ELK CREEK
L20 - UPPER GOOSE CREEK
L26 - LITTLE OTTER RIVER/MACHINE CREEK
L21 - MIDDLE GOOSE CREEK/BORE AUGER CREEK/WOLF CREEK
L27 - BIG OTTER RIVER/BUFFALO CREEK
L07 - ROANOKE RIVER/SMITH MOUNTAIN LAKE/BEAVERDAM CREEK
L22 - LOWER GOOSE CREEK
L12 - LOWER SMITH MOUNTAIN LAKE
L13 - LEESVILLE LAKE/OLD WOMANS CREEK

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
RU16	Roanoke River/Smith Mountain Lake-Lynville Creek	67	FESE	I
RU17	Beaverdam Creek	62	FESE	I
RU18	Roanoke River/Smith Mountain Lake-Stony Creek	54	FESE	I
RU19	Roanoke River/Smith Mountain Lake-Bettys Creek	54	FESE	I
RU27	Roanoke River/Smith Mountain Lake-Craddock Creek	55	FESE	I
RU38	Roanoke River/Leesville Lake-Old Womans Creek	56	FESE	I
RU39	Goose Creek-North Fork Goose Creek	64	FESE	I
RU40	Bore Auger Creek	64	FESE	I
RU41	Goose Creek-Wolf Creek	54	FESE	I
RU42	Stony Fork	53	FESE	I
RU43	Goose Creek-Mill Creek	53	FESE	I
RU44	Carter Mill Creek	53	FESE	I
RU45	Goose Creek-Back Creek	54	FESE	I
RU49	Big Otter River-Stony Creek	68	FESE	I
RU52	Big Otter River-Roaring Run	62	FESE	I
RU53	Machine Creek	53	FESE	I
RU54	Little Otter River-Johns Creek	55	FESE	I
RU55	Big Otter River-Orrix Creek	55	FESE	I

- | DGIF| Credits | Disclaimer | Contact shirl.dressler@dgif.virginia.gov |Please view our privacy policy |

- Site tested using browsers Firefox 2+, IE 6+, Opera 9+, and Safari 4 (AMD July 02, 2010 1:43:25PM Visitor Visitor 298485)
- W3C HTML validation <BASE href="http://vafwis.org/fwis/NewPages/">VaFWIS_GeographicSelect_Options.asp

Define Point of Interest

37,21,56.1 -79,25,08.5
is the Search Point

Submit Cancel

Search Point

- **Change** to "clicked" map point
- **Fixed** at 37,21,56.1 - 79,25,08.5

Show Position Rings

Yes No
16 miles and 4 miles at the **Search Point**

Show Search Area

Yes No
10 miles

Search Point is at map center

Base Map Choices

County - Quadrangle

Map Overlay Choices

Current List: Position, Search

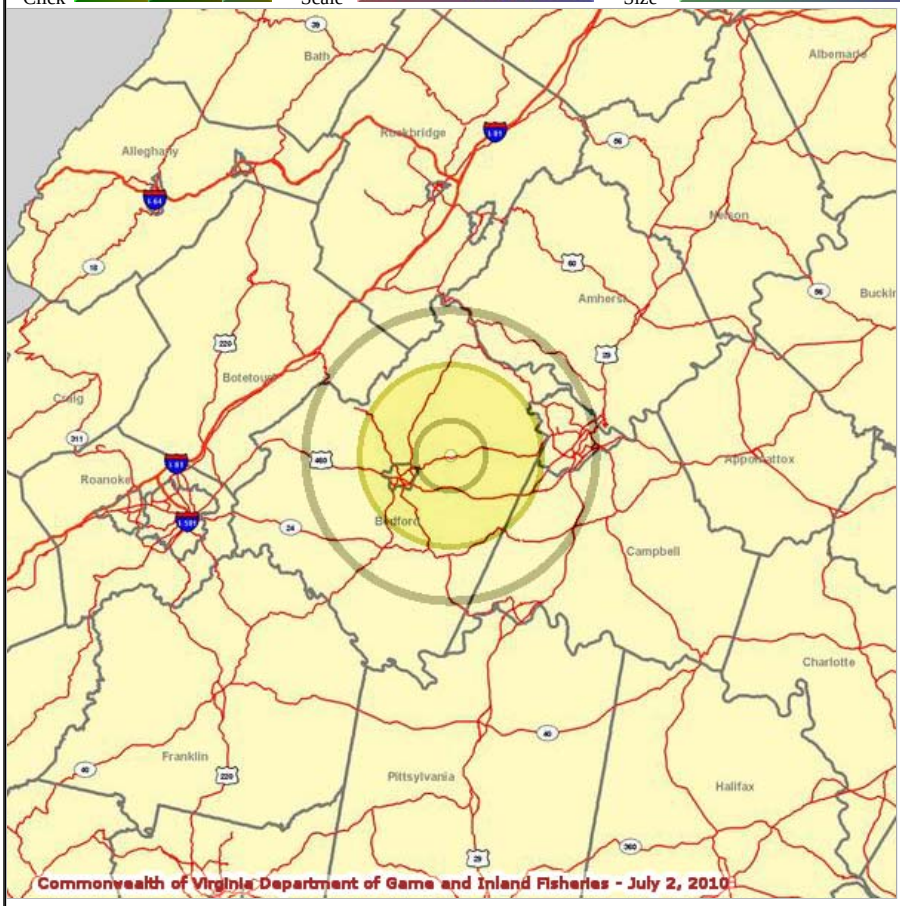
Map Overlay Legend

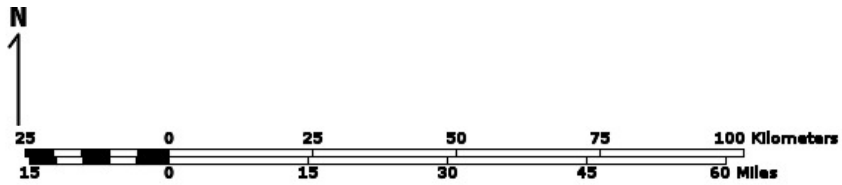
Position Rings 16 miles and 4 miles at the Search Point

10 mile radius Search Area

Refresh Browser Page

Map Click Pan Id M Map Scale In Zoom Out Screen Size Small Size Big Help





Point of Search 37,21,56.1 -79,25,08.5
Map Location 37,21,56.1 -79,25,08.5

Select **Coordinate System:**
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: 2003 Va. DGIF Virginia Basemap

Map projection is UTM Zone 17 NAD 1983 with left 563217 and top 4213419. Pixel size is 256 meters . Coordinates displayed are Degrees, Minutes, Seconds North and West.Map is currently displayed as 600 columns by 600 rows for a total of 360000 pixles. The map display represents 153600 meters east to west by 153600 meters north to south for a total of 23592.9 square kilometers. The map display represents 504023 feet east to west by 504023 feet north to south for a total of 9112.4 square miles.

Black and white aerial photography aquired near 1990 and topographic maps are from the United States Department of the Interior, United States Geological Survey.
Shaded topographic maps are from TOPO! ©2006 National Geographic

http://www.nationa.geographic.com/topo
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2010-07-02 13:44:44 (qa/qc July 27, 2009 10:09 - tn=298485 dist=16093 Visitor)

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- Species Information
- By Name
- By Land Management
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VaFWIS Search Report Compiled on 7/2/2010, 1:45:20 PM

Help

Known or likely to occur within a **10 mile radius of 37,21,56.1 -79,25,08.5**
in **019 Bedford County, 031 Campbell County, 515 Bedford City, 680 Lynchburg City, VA**

539 Known or Likely Species ordered by Status Concern for Conservation
(displaying first 46) (46 species with Status* or Tier I**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name
010214	FESE	I	Logperch, Roanoke	Percina rex
060017	FESE	I	Spinymussel, James	Pleurobema collina
040096	ST	I	Falcon, peregrine	Falco peregrinus
040129	ST	I	Sandpiper, upland	Bartramia longicauda
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus
040379	ST	I	Sparrow, Henslow's	Ammodramus henslowii
010353	ST	II	Darter, Carolina	Etheostoma collis
040093	FSST	II	Eagle, bald	Haliaeetus leucocephalus
060081	ST	II	Floater, green	Lasmigona subviridis
060173	FSST	II	Pigtoe, Atlantic	Fusconaia masoni
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans
100248	FS	I	Fritillary, regal	Speyeria idalia idalia
020039	FSSS	II	Salamander, Peaks of Otter	Plethodon hubrichti
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius
100256	FS	II	Crescent, tawny	Phyciodes batesii batesii

010110	FS	III	Jumprock, bigeye	Moxostoma ariommum
060029	FSSS	III	Lance, yellow	Elliptio lanceolata
100001	FS	IV	fritillary, Diana	Speyeria diana
010077	SS	I	Shiner, bridle	Notropis bifrenatus
040372	SS	I	Crossbill, red	Loxia curvirostra
040306	SS	I	Warbler, golden-winged	Vermivora chrysoptera
010174	SS	II	Bass, Roanoke	Ambloplites cavifrons
020023	SS	II	Salamander, mole	Ambystoma talpoideum
040213	SS	II	Owl, northern saw-whet	Aegolius acadicus
040266	SS	II	Wren, winter	Troglodytes troglodytes
010115	SS	III	Sucker, rustyside	Thoburnia hamiltoni
040094	SS	III	Harrier, northern	Circus cyaneus
040040	SS	III	Ibis, glossy	Plegadis falcinellus
040036	SS	III	Night-heron, yellow-crowned	Nyctanassa violacea violacea
040204	SS	III	Owl, barn	Tyto alba pratincola
040270	SS	III	Wren, sedge	Cistothorus platensis
030012	CC	IV	Rattlesnake, timber	Crotalus horridus
040264	SS	IV	Creeper, brown	Certhia americana
040364	SS		Dickcissel	Spiza americana
040032	SS		Egret, great	Ardea alba egretta
040366	SS		Finch, purple	Carpodacus purpureus
040285	SS		Kinglet, golden-crowned	Regulus satrapa
040112	SS		Moorhen, common	Gallinula chloropus cachinnans
040262	SS		Nuthatch, red-breasted	Sitta canadensis
040210	SS		Owl, long-eared	Asio otus
040189	SS		Tern, Caspian	Sterna caspia
040278	SS		Thrush, hermit	Catharus guttatus
040314	SS		Warbler, magnolia	Dendroica magnolia
050045	SS		Otter, northern river	Lontra canadensis lataxina
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius
040319		I	Warbler, black-throated green	Dendroica virens

To view **All 539 species** View 539

***** FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; SC=State Candidate; CC=Collection Concern; SS=State Special Concern

****** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Anadromous Fish Use Streams

N/A

Impediments to Fish Passage (6 records)

View Map of All Fish Impediments

ID	Name	River	View Map
971	BEDFORD	JAMES R	Yes
331	IVY HILL DAM	IVY CREEK	Yes
330	LAKE VISTA DAM #1, C/O BILL BERKELE	TR-IVY CREEK	Yes
333	LAKE VISTA DAM #2	IVY CREEK	Yes
327	POPLAR FOREST DAM	TR-TOMAHAWK CREEK	Yes
328	RAMSEY DAM	TR-IVY CREEK	Yes

Threatened and Endangered Waters (2 Reaches)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species		View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name	

Big Otter River (03010101)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes
Little Otter River (03010101)	FESE	010214	FESE	I	Logperch, Roanoke	Percina rex	Yes

Cold Water Stream Survey (Trout Streams) (7 records)
Managed Trout Species

View Map of All Cold Water Stream Surveys

Reach ID	Stream Name	Class	Brook Trout	Brown Trout	Rainbow Trout	View Map
10GNS-01	Gunstock Creek	Wild trout	Y		Y	Yes
10GNS-01T	Gunstock Creek	Wild trout				Yes
10LST-01	Little Stony Creek	Wild trout	Y			Yes
10OVS-01	Overstreet Creek	Wild trout	Y			Yes
10OVS-01T	Overstreet Creek	Wild trout				Yes
10RED-01	Reed Creek	Wild trout	Y			Yes
10STC-01	Stony Creek	Wild trout	Y			Yes

Virginia Breeding Bird Atlas Blocks (22 records - displaying first 20)

View Map of All Query Results
Virginia Breeding Bird Atlas Blocks

BBA ID	Atlas Quadrangle Block Name	Breeding Bird Atlas Species			View Map
		Different Species	Highest TE*	Highest Tier**	
34076	Bedford, SE	55		IV	Yes
34075	Bedford, SW	1	SS	III	Yes
36095	Big Island, SW	22		II	Yes
36082	Boonsboro, NE	3			Yes
36081	Boonsboro, NW	1		IV	Yes
36086	Boonsboro, SE	72		IV	Yes
36085	Boonsboro, SW	1		IV	Yes
37073	City Farm, CW	3		IV	Yes
37071	City Farm, NW	3			Yes
36074	Forest, CE	94	SS	III	Yes
36073	Forest, CW	1	SS		Yes
36072	Forest, NE	14	SS	IV	Yes
36071	Forest, NW	2		IV	Yes
36076	Forest, SE	75	ST	I	Yes
35076	Goode, SE	63	SS	IV	Yes
36061	Lynch Station, NW	2			Yes
37083	Lynchburg, CW	2	SS	III	Yes
37085	Lynchburg, SW	1			Yes
34082	Peaks of Otter, NE	2			Yes
34086	Peaks of Otter, SE	71	ST	I	Yes

To view **All 22 Breeding Bird Atlas records** View 22

USFWS Breeding Bird Survey Routes

N/A

Christmas Bird Count Survey (2 records)

View Map of All Query Results
Christmas Bird Count Survey

CBC ID	Survey Name	Christmas Bird Count Species			View Map
		Different Species	Highest TE*	Highest Tier**	
880024	Lynchburg	127	FSST	I	Yes
880026	Peaks of Otter	67	ST	I	Yes

Public Holdings: (2 names)

Name	Agency	Level
Blue Ridge Parkway National Park	National Park Service	Federal
Jefferson National Forest	U.S. Forest Service	Federal

Summary of BOVA Species Associated with Cities and Counties of the Commonwealth of Virginia:

FIPS Code	City and County Name	Different Species	Highest TE	Highest Tier
019	Bedford	466	FESE	I
031	Campbell	364	FSST	I
515	Bedford City	353	FSST	I
680	Lynchburg City	347	FSST	I

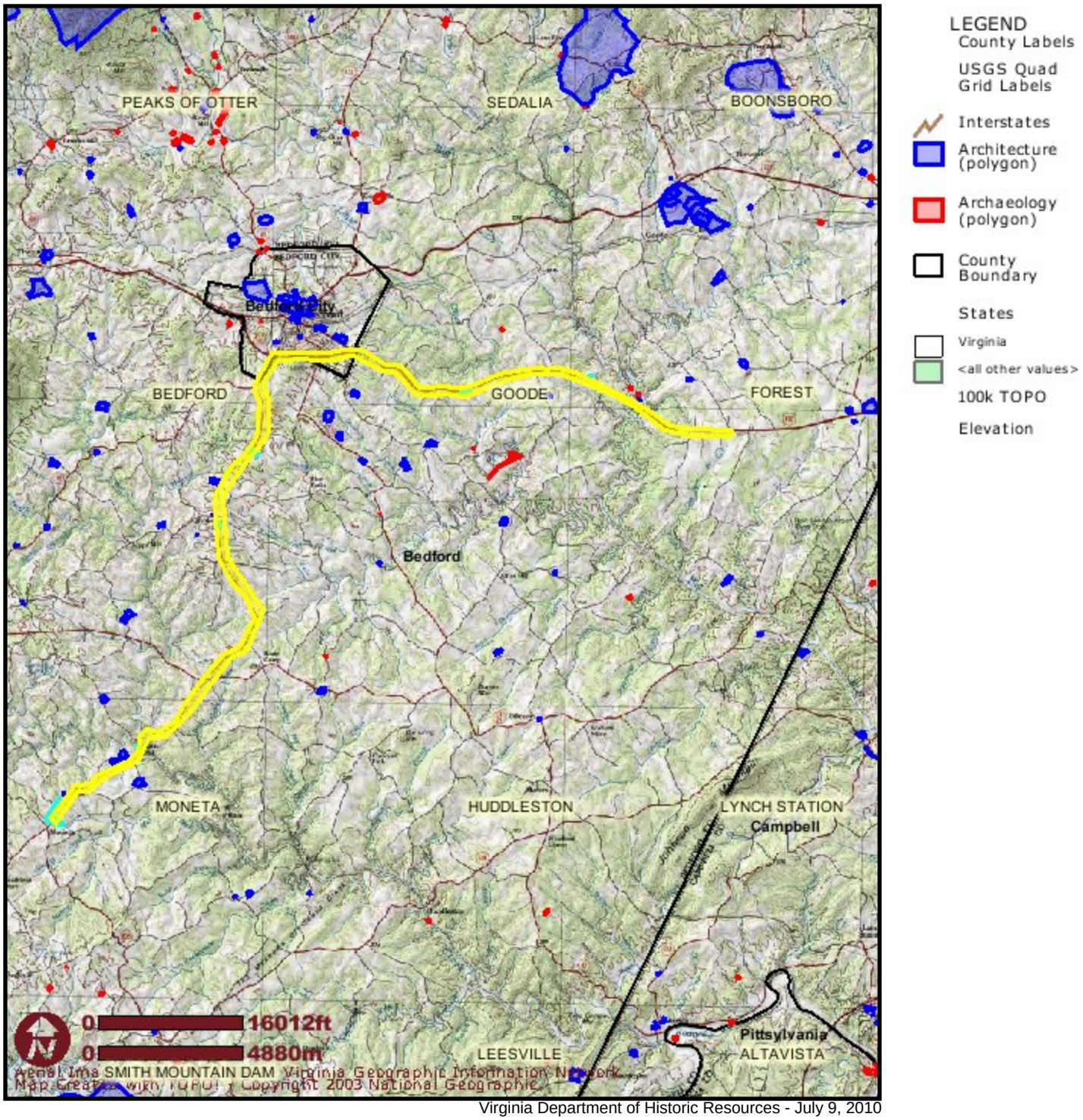
USGS 7.5' Quadrangles:
Moneta
Bedford
Peaks of Otter
Huddleston
Goode
Sedalia
Snowden
Lynch Station
Forest
Boonsboro
Big Island
City Farm
Lynchburg

USGS NRCS Watersheds in Virginia:
H01 - JAMES RIVER/REED CREEK
H03 - JAMES RIVER/BLACKWATER CREEK/IVY CREEK
L24 - NORTH OTTER CREEK
L23 - UPPER BIG OTTER RIVER
L25 - BIG OTTER RIVER/ELK CREEK
L26 - LITTLE OTTER RIVER/MACHINE CREEK
L21 - MIDDLE GOOSE CREEK/BORE AUGER CREEK/WOLF CREEK
L27 - BIG OTTER RIVER/BUFFALO CREEK
L28 - LOWER BIG OTTER RIVER

USGS National 6th Order Watersheds Summary of Wildlife Action Plan Tier I, II, III, and IV Species:

HU6 Code	USGS 6th Order Hydrologic Unit	Different Species	Highest TE	Highest Tier
JM02	Reed Creek	63	FSST	I
JM03	James River-Thomas Mill Creek	65	FESE	I
JM07	James River-Judith Creek	65	FESE	I
JM09	Ivy Creek-Cheese Creek	56	FSST	I
JM10	Blackwater Creek	54	FSST	I
RU41	Goose Creek-Wolf Creek	54	FESE	I
RU43	Goose Creek-Mill Creek	53	FESE	I
RU49	Big Otter River-Stony Creek	68	FESE	I
RU50	North Otter Creek	68	FESE	I
RU51	Elk Creek-Chestnut Branch	60	FESE	I
RU52	Big Otter River-Roaring Run	62	FESE	I
RU53	Machine Creek	53	FESE	I
RU54	Little Otter River-Johns Creek	55	FESE	I
RU55	Big Otter River-Orrix Creek	55	FESE	I
RU56	Buffalo Creek	55	FESE	I
RU57	Big Otter River-Johnson Creek	55	FESE	I

Virginia Department of Historic Resources Data Sharing System, 07/12/2010



Virginia Department of Historic Resources - July 9, 2010 11:16 am

DHR DSS Map

Bedford County Public Service Authority Water Improvements - July 2010

City/County: **Bedford (County)**

DEPARTMENT OF HISTORIC RESOURCES
ARCHAEOLOGICAL REPORT

DHR ID#: **44BE0010**

DHR Site Number: 44BE0010 **Other DHR Number:**
Resource Name: Merriman's Tavern
Temporary Designation:
Site Class: Terrestrial, open air

CULTURAL/TEMPORAL AFFILIATION

Cultural Designation **Temporal Designation**

THEMATIC CONTEXTS/SITE FUNCTIONS

Thematic Context: Domestic **Example:** Tavern/Inn

Comments/Remarks:
Six miles east of Bedford, VA on Route 460. l

LOCATION INFORMATION

USGS Quadrangle(s): GOODE **Restrict UTM Data?**

Center UTM Coordinates (for less than 10 acres):

NAD **ZONE** **EAST** **NORTH**

Boundary UTM Coordinates (for 10 acres or more):

NAD **ZONE** **EAST** **NORTH**

Physiographic Province:
Aspect:
Elevation (in feet):
Slope:
Landform: other

Drainage:
Nearest Water Source:
Distance to Water(in feet):
Site Soils:
Adjacent Soils:

SITE CONDITION/SURVEY DESCRIPTION

Site Dimensions: feet by feet **Acreage:**

Survey Strategy: Informant

Site Condition: Site Totally Destroyed

City/County: **Bedford (County)**

Threats to Resource:

Survey Description:

Informant: Earl Dennis l
l
l
l
l

CURRENT LAND USE

Land Use: **Example:** **Dates of Use:**

Comments/Remarks:

SPECIMENS, FIELDNOTES, DEPOSITORIES

Specimens Obtained? **Specimens Depository:**

Assemblage Description:

Specimens Reported?

Assemblage Description--Reported:

Field Notes Reported? **Depository:**

REPORTS, DEPOSITORY AND REFERENCES

Report (s) ? **Depository:**

DHR Library Reference Number:

Reference for reports and publications:

PHOTOGRAPHIC DOCUMENTATION AND DEPOSITORY

Photographic Documentation? **Depository** **Type of Photos** **Photo Date**

CULTURAL RESOURCE MANAGEMENT EVENTS

Cultural Resource Management Event: Survey:Phase I/Reconnaissance **Date:** 1977/07/07

Organization and Person:

Organization: **First:** VDHR-Keith Egloff **Last:**

Sponsor Organization:

DHR Project Review File No:

CRM Event Notes or Comments:

City/County: **Bedford (County)**

INDIVIDUAL/ORGANIZATION/AGENCY INFORMATION

Individual Category Codes:

Honorif: **First:** **Last:**
Suffix:
Title:
Company/
Agency:

Address:

City: **State:** **Zip:**
Phone/Ext:

Notes:

Ownership Type:

Government Agency:

DEPARTMENT OF HISTORIC RESOURCES
ARCHAEOLOGICAL REPORT

DHR ID#: **44BE0142**

DHR Site Number: 44BE0142 **Other DHR Number:**
Resource Name:
Temporary Designation:
Site Class: Terrestrial, open air

CULTURAL/TEMPORAL AFFILIATION

Cultural Designation	Temporal Designation
Native American	Early Archaic
	Middle Archaic

THEMATIC CONTEXTS/SITE FUNCTIONS

Thematic Context: Domestic **Example:** Camp
Comments/Remarks:

LOCATION INFORMATION

USGS Quadrangle(s): BEDFORD **Restrict UTM Data?**

Center UTM Coordinates (for less than 10 acres):

NAD	ZONE	EAST	NORTH

Boundary UTM Coordinates (for 10 acres or more):

NAD	ZONE	EAST	NORTH

Physiographic Province: **Drainage:**
Aspect: **Nearest Water Source:**
Elevation (in feet): **Distance to Water(in feet):**
Slope: **Site Soils:**
Adjacent Soils:
Landform: other

SITE CONDITION/SURVEY DESCRIPTION

Site Dimensions: 492 feet by 164 feet **Acreage:**

Survey Strategy: Surface Testing

Site Condition: Unknown Portion of Site Destroyed

City/County: **Bedford (County)**

Threats to Resource:

Survey Description:

site recently cleared--Cultural l
material scattered evenly over entire l
site with apparent thin concetrations l
approximately midway between the l
northern and southern limits of site.

CURRENT LAND USE

Land Use: **Example:** **Dates of Use:**

Comments/Remarks:

SPECIMENS, FIELDNOTES, DEPOSITORIES

Specimens Obtained? Yes **Specimens Depository:** Childress, William

Assemblage Description:

1 Stanley of light green patinated chert, 1 Palmer of milky l
quartz, 1 Lecroy of milky quartz, 2 untyped Archaic points, 1 l
untyped Archaic point of translucent quartz(fragment), 4 point l
fragments of quartz, 3 possible point fragments, 17 side l
scrapers, 6 end scrapers, 3 thumbnail scrapers, 5 misc. l
scraper forms, 1 large quartzite scraper chopper, 17 flake l
knives, 2 small blades, 2 choppers, 1 possible hammerstone, 8 l
gravers, 6 possible drill perforators, 4 possible perforators, l
42 possible utilized chunks, 37 possible utilized flakes, 51 l
chunks, 17 flakes

Specimens Reported?

Assemblage Description--Reported:

Field Notes Reported? **Depository:**

REPORTS, DEPOSITORY AND REFERENCES

Report (s) ? **Depository:**

DHR Library Reference Number:

Reference for reports and publications:

PHOTOGRAPHIC DOCUMENTATION AND DEPOSITORY

Photographic Documentation?	Depository	Type of Photos	Photo Date
Yes			9999/99/99

CULTURAL RESOURCE MANAGEMENT EVENTS

City/County: **Bedford (County)**

Cultural Resource Management Event:	Survey:Phase I/Reconnaissance	**Date:**	1985/07/20

Organization and Person:
Organization: **First:** William **Last:** Childress
Sponsor Organization:
DHR Project Review File No:

CRM Event Notes or Comments:

Cultural Resource Management Event:	Other	**Date:**	1997/02/20

Organization and Person:
Organization: **First:** WMCAR **Last:**
Sponsor Organization:
DHR Project Review File No:

CRM Event Notes or Comments:
change to temporal designation

INDIVIDUAL/ORGANIZATION/AGENCY INFORMATION

Individual Category Codes:

Honorif: **First:** **Last:**
Suffix:
Title:
Company/
Agency:

Address:

City: **State:** **Zip:**
Phone/Ext:

Notes:

Ownership Type:

Government Agency:

City/County: Bedford (County)

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0004** ***Other DHR ID#:***

Resource Information

Resource Name(s): The Cedars {Historic/Current}
Date of Construction: ca 1800

Local Historic District :

National Register Eligibility Status

The Primary Resource is No Longer Extant

Property has been recommended Not Eligible for listing

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): Route 460 {Current}
Route 297 {Name change}
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Transportation Corridor
Open to Public: No
Site Description:
1968: Located in the vicinity of the city of Bedford. 0.5 mile SE of Johns Creek, 0.1 mile north of Route 297, 1.5 miles SE of intersection of Routes 297 and 43.
Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Other	Contributing
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type.	Other	*Primary Resource?*	No
Date of Construction:	9999	*Accessed?*	
Architectural Style:		*Number of Stories:*	1.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	Demolition

Architecture Summary: log outbuilding with gable roof; one single-leaf batten wood door

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0004** ***Other DHR ID#:***

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1800	*Accessed?*	
Architectural Style:		*Number of Stories:*	2.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	Demolition Development Transportation Expansion

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Foundation	Foundation - Solid/Continuous	Concrete	Foundation - Block
Porch	Porch - 1-story, 3-bay	Wood	other
Roof	other	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/6
Windows	Windows - Sash, Double-Hung	Wood	Windows - Multiple-light
Chimneys	Chimneys - Exterior end	Brick	Chimneys, Cap, Corbeled

Historic Time Period(s): M- Early National Period (1790-1829)

Historic Context(s): Architecture/Landscape
Domestic

Significance Statement

Hospital during Civil War and Union graves on property. Hole shot in roof.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
2706	B&W 35mm Photos		August 1973	
311	B&W 35mm Photos		November 1968	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:HABS Inventory
Date of CRM Event: April 05, 1958
CRM Person: E.B. Gale
CRM Event Notes or Comments:

CRM Event # 2,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 9999
CRM Person:
CRM Event Notes or Comments:

CRM Event # 3,
Cultural Resource Management Event: DHR Staff: Not Eligible
Date of CRM Event: October 26, 1988
CRM Person: Julie Vosmik
CRM Event Notes or Comments:

CRM Event # 4,
Cultural Resource Management Event: DHR Id Number Change
Date of CRM Event: 9999
CRM Person: Quatro Hubbard
CRM Event Notes or Comments:
Has been recorded as both 009-0004 and 141-0087 - location of this building likely was just outside of city of Bedford boundaries in Bedford County, so file materials consolidated under 009-0004.

CRM Event # 5,
Cultural Resource Management Event: Destroyed
Date of CRM Event: 9999
CRM Person:
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0067** ***Other DHR ID#:***

Resource Information

Resource Name(s): Hurt Place {Historic/Current}
Date of Construction: 1871

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Davis Mill
Tax Parcel:
Zip Code:
Address(s): Route 1 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	1871 {Site Visit}	*Accessed?*	Yes
Architectural Style:		*Number of Stories:*	2.0
Form:		*Condition:*	Good
Interior Plan Type:			

Threats to Resource:

Architecture Summary: Retangular frame house. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior end	Brick	other

Chimneys	other	Concrete	Chimneys - Block
other	other	Wood	other
other	other	Wood	other
Porch	Porch - 1-story, 3-bay	Wood	other
Roof	Roof - Hipped	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/6

Historic Context(s): Domestic

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
2178	B&W 35mm Photos		February 1973	
1956	B&W 35mm Photos		June 1973	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase II/Intensive
Date of CRM Event: 1973
CRM Person: Anne Carter Lee
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0140** ***Other DHR ID#:***

Resource Information

Resource Name(s): House and Cabin at Davis Mill {Current}
Date of Construction:

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet:
Tax Parcel:
Zip Code:
Address(s):

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type. Single Dwelling *Primary Resource?* No
Date of Construction: *Accessed?*
Architectural Style: *Number of Stories:* 1.0
Form: *Condition:*
Interior Plan Type:
Threats to Resource:

Architecture Summary: Appears to be a 1-story wood frame cabin with stone chimneys. Seams to be in poor condition. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0140** ***Other DHR ID#:***

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:		*Accessed?*	
Architectural Style:		*Number of Stories:*	2.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: Appears to be of frame construction. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Exterior end	Stone	Chimneys - Rubble, Random
other	other		
Porch	Porch - 1-story, 3-bay	Wood	Porch - Posts, Turned
Roof	Roof - Gable	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	Structural System - Weatherboard
Windows	Windows - Sash, Double-Hung	Wood	Windows - 2/2

Historic Context(s): Domestic

Significance Statement

Near Davis' Mill.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:

Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
1782	B&W 35mm Photos		November 1972	
2730	B&W 35mm Photos		November 1972	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

Bridge Information

Cemetery Information

Ownership Information

Miscellaneous Survey Notes: No survey.

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0184** ***Other DHR ID#:***

Resource Information

Resource Name(s): Merriman's Tavern Site {Historic}
Date of Construction: ca 1828

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): Route 624 {Current}
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Tavern/Ordinary	Contributing
2	Archaeological Site	Contributing

Individual Resource Detail Information

Resource Type. Tavern/Ordinary *Primary Resource?* Yes
Date of Construction: ca 1828 {Written Data} *Accessed?*
Architectural Style: *Number of Stories:* 0.0
Form: *Condition:* N/A
Interior Plan Type:
Threats to Resource:

Architecture Summary: A large brick tavern built between 1828-1835 once existed on this site. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0184** ***Other DHR ID#:***

Individual Resource Detail Information

Resource Type.	Archaeological Site	*Primary Resource?*	No
Date of Construction:	ca 1855 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	N/A
Interior Plan Type:			

Threats to Resource:

Architecture Summary: records show there was once a mill and also a toll gate also on this site that was operated on commission for the Lynchburg and Salem Turnpike Company. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Structural System	Structural System - Masonry	Brick	

Historic Context(s): Commerce/Trade

Significance Statement

An important tavern for travel thorough the Lynchburg area. Andrew l Jackson stopped here often for refreshments. It was kept open until l the coming of the railroad which made it useless to the public. Five l of the Merriman sons fought in the Civil War, 2 died at Gettysburg.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 9999
CRM Person:
CRM Event Notes or Comments:
WPA report

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0185** ***Other DHR ID#:***

Resource Information

Resource Name(s): Oaklands {Historic/Current}
Dr. Thomas Mitchell House {Historic}
Dr. John Saunders Mitchell House {}

Date of Construction: 1826

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia

County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): Route 624 {Current}
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

	NAD	Zone	Easting	Northing
UTM Center coordinates :		17	636552	4130748

UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

2006: The house sits on the south side of US 460, close to (within 150 feet or so) the east bound lanes. The front yard practically serves as a berm for the road. The area is rural/ residential.

Secondary Resource Summary:

Reportedly, all brick used in the construction of the house and buildings was made on the place.

2006: A few frame outbuildings, all in poor condition, are within view from the yard, to the south (rear) of the house.

Individual Resource Information

Count	Resource Types	Resource Status
1	Kitchen	Contributing
1	Office/Office Building.	Contributing
2	Stable	Contributing
1	Single Dwelling	Contributing
1	Slave/Servant Quarters	Contributing
1	Other	Contributing
1	Ice House	Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	1826 {Written Data}	*Accessed?*	Yes
Architectural Style:	Federal/Adamesque	*Number of Stories:*	2.0
Form:		*Condition:*	Poor
Interior Plan Type:	Central Passage, Single Pile		
		Threats to Resource:	Deterioration Neglect Vacant

1974: The front facade is laid in Flemish bond, while the sides are of Common bond. Openings are surmounted by flat arches. The walls are 18 inches thick. Each window has a heavy piece of wood for a sill. Interior Description: The west room of the 1st floor has a fine Federal mantlepiece with reeded pilasters supporting an entablature with flanking trusses and a central panel. In this room as well as in the central hall, there is a molded chair rail and baseboard. In the hall a long flight of stairs on the west wall leads to a landing on the south wall which in turn leads to a short flight up the east wall to the second floor. Rails and newel post are unturned but the posts have a ball finial. The east room of the first floor has a very lovely ceiling with a plaster cornice, corner medallions, and a central wreath and circle with classical motifs. The plaster decoration and the mantle may have been put in 15-20 years after the construction of the house.

Individual Resource Detail Information

Resource Type.	Stable	*Primary Resource?*	No
Date of Construction:	post 1826 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	Demolition

Architecture Summary: There were 2 stables about 300 yards in the rear of the house, one was for the exclusive use of Dr.Mitchell's saddle horses.

Individual Resource Detail Information

Resource Type.	Kitchen	*Primary Resource?*	No
Date of Construction:	post 1826 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	Demolition

Architecture Summary: In the rear of the main house there was a 2 room kitchen with a central brick chimney, and a wide deep fireplace in each room.

Individual Resource Detail Information

Resource Type.	Office/Office Building.	*Primary Resource?*	No
Date of Construction:	post 1826 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: The doctor's office was in the right corner of the front yard. It is a small frame building with beaded weatherboarding, brick foundation, and an outside brick chimney of unknown function.

Individual Resource Detail Information

Resource Type.	Slave/Servant Quarters	*Primary Resource?*	No
Date of Construction:	post 1826 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	Ruinous
Interior Plan Type:			
		Threats to Resource:	Demolition

Architecture Summary: There are no signs left of the slave cabins except some stones which are now covered with vines.

Individual Resource Detail Information

Resource Type.	Ice House	*Primary Resource?*	No
Date of Construction:	post 1826 {Written Data}	*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	Demolished
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: The ice house, which no longer exists, was in the front yard to the left of the house, in about the relative location of the office.

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Roof	Roof - Gable	Metal	Roof - Standing Seam
Structural System	Structural System - Masonry	Brick	Structural System - Bond, Flemish
Windows	Windows - Sash, Double-Hung	Wood	Windows - 9/9
Chimneys	Chimneys - Exterior end	Brick	
other	other	Wood	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 9/6
other	other	Wood	

Historic Time Period(s): M- Early National Period (1790-1829)

Historic Context(s): Architecture/Community Planning
Domestic

Significance Statement

The house was built by Col. David Saunders for his daughter and was presented to her upon the occasion of her marriage to Dr. Thomas Mitchell. Dr. Mitchell's grandfather had come to Pennsylvania from Ireland. Mitchell supplied the Confederate army from his plantation and donated money as well. He himself also served in the war as a physician. He died in 1877.

According to the book Bedford Villages Lost and Found, Vol. I: Oakland was built in 1826 by Dr. Thomas Mitchell for his bride, Ann Dandridge Saunders, daughter of Col. David Saunders of 'Pleasant Grove'. An earlier report gave the date 1818. The doctors' office (pictured on page 222) was a small one-story, one-room, side-gable frame building with beaded weatherboarding, brick foundation, and brick exterior end chimney. It stood in the 'right corner of the front yard'. Dr. Mitchell received his medical degree from the University of Pennsylvania and began practice in 1820. His son, John Saunders Mitchell also became a physician, graduating from the University of Pennsylvania in 1852, and father and son practiced medicine during the Civil War. "Mrs. Mitchell had the most beautiful flower garden in Bedford County." The grounds might then yield ethnobotanical specimens for landscape archaeologists.

Significant Individuals and Events

Associated Individuals: Dr. Thomas Mitchell, Owner
Dr. John Saunders Mitchell, Owner

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
	B&W 35mm Photos		1974	
	B&W 35mm Photo		2005	Pulice
	digital	DHR	2005	Pulice

Bibliographic Documentation

Reference #: 1
Bibliographic RecordType: Book
Author:
DHR CRM Report Number:
Notes:
Bedford Villages Lost and Found, Vol. I, 4th printing, Sept. 2000; pages 222, 223, 306. Compiled by the Peaks of Otter Chapter of the Daughters of the Revolution, Bedford VA.

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: November 22, 1937
CRM Person: Nora A. Carter
CRM Event Notes or Comments:
WPA Virginia Historical Inventory survey - no photograph

CRM Event # 2,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: March 1974
CRM Person: Ann Carter Lee
CRM Event Notes or Comments:

CRM Event # 3,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: October 2005
CRM Person: Mike Pulice
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#:* 009-0206** ***Other DHR ID#:

Resource Information

Resource Name(s): Lowry, Elliot, Place {Current}
Date of Construction:

Local Historic District :

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet:
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Primary Resource Exterior Component Description:

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

Bibliographic Documentation

Cultural Resource Management (CRM) Events

Bridge Information

Cemetery Information

Ownership Information

Miscellaneous Survey Notes: Nothing in File.

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0237** ***Other DHR ID#:***

Resource Information

Resource Name(s): Meador, William Howard, House {Historic}
Date of Construction: 1930

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Moneta
Tax Parcel:
Zip Code:
Address(s): Route 122 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing
1	Shed	Contributing

Individual Resource Detail Information

Resource Type. Shed *Primary Resource?* No

Date of Construction: *Accessed?*
Architectural Style: *Number of Stories:* 1.0
Form: *Condition:*
Interior Plan Type:
Threats to Resource:

Architecture Summary: 1-story slatted building with gable roof and 1 single-leaf door
End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0237** ***Other DHR ID#:***

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	1930 {Oral History}	*Accessed?*	
Architectural Style:		*Number of Stories:*	2.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: has 2-story and 1-story rear wings with 1-story screened porch, distinctive local detailing
End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Exterior end	Brick	other
other	other	Wood	other
Roof	Roof - Gable	Wood	other
Foundation	Foundation - Solid/Continuous	Concrete	Foundation - Poured
Porch	Porch - 1-story, 3-bay	Wood	other
Roof	Roof - Hipped	Asphalt	Roof - Shingle
Structural System	Structural System - Frame	Wood	other
Windows	Windows - Sash, Double-Hung	Wood	other

Historic Context(s): Domestic

Significance Statement

The W.H. Meador House is a conventional dwelling form of the period l
with detailing characteristic of local builder W.C. Dooley.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
10068	B&W 35mm Photos		May 1989	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 1989
CRM Person: Dan & Crowther, Cabell Pezzoni
CRM Event Notes or Comments:

Bridge Information

DHR ID#: **009-0237** ***Other DHR ID#:***

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0242** ***Other DHR ID#:***

Resource Information

Resource Name(s): House, Route 122 {Function/Location}
Date of Construction: ca 1910

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Moneta
Tax Parcel:
Zip Code:
Address(s): Route 122, Off Of {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1910 {Site Visit}	*Accessed?*	
Architectural Style:	Victorian, Queen Anne	*Number of Stories:*	1.5
Form:		*Condition:*	
Interior Plan Type:			

Threats to Resource:

Architecture Summary: Conc. block found., roof with kicked eaves, modern 1/1 sash windows, 1-story hipped rear wing., per recon. survey.

End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment

other	other	Metal	other
Roof	Roof - Gable	Unknown	other
Foundation		Concrete	Foundation - Block
Porch	Porch - 1-story	Unknown	Porch - Enclosed
Roof	Roof - Hipped	Asphalt	Roof - Shingle
Structural System	Structural System - Frame	Wood	Structural System - Siding, Aluminum
Windows	Windows - Sash, Double-Hung	Wood	Windows - 1/1

Historic Context(s): Domestic

Significance Statement

Typical dwelling form of period; no integrity., per recon. survey.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
10011	B&W 35mm Photos		May 1989	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 1989
CRM Person: Dan; Crowther, Cabell Pezzoni
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0262** ***Other DHR ID#:***

Resource Information

Resource Name(s): Moneta Historic District {Historic/Current}
Date of Construction: ca 1905

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Moneta
Tax Parcel:
Zip Code:
Address(s): Route 122 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Hamlet
Open to Public: Yes
Site Description:

The small community of Moneta is located in Southern Bedford County at the Terry's Branch crossing of Route 122. It developed in the 2nd half of the 19th century with the establishment of a tanyard and a store. The log and frame buildings of this period no longer exist. Growth in Moneta was accelerated by the construction of Terry's Branch of the Virginian Railway, in 1908, and led to the construction of the communities earliest surviving buildings- Dinwiddie and Meador Store (1910) is a 2 story frame store with a false front with sawn brackets, 2 tier rear porch, interior tongue and goove walls and pressed metal ceilings; Samuel L. Rucker House, 2 story frame with late Victorian detailing, 2 story cutway bay window (oldest surviving house); Dana House, 1-story frame; Thrasher House, and c.1914 Grover Martin House.

About 1915, W.C. Dooley built a planning mill adjacent to Moneta's small commercial district. There is also the Bethleham Church with its influence of the Georgian Revival and Tudor Revival style. There is the 2 story rock faced concrete Grover Martin Building with housed an automobile repair shop in its lower story. There was a brick school built in the 1930s. A train depot was also built c. 1906, and a Masonic Lodge in the 1920s.

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Outbuilding,Domestic	Contributing
1	Depot	Contributing
0	Single Dwelling	Contributing
0	Church/Chapel	Contributing

1	School	Contributing
0	Commercial Building	Contributing
1	Meeting/Fellowship Hall	Contributing
1	Historic District	Contributing

Individual Resource Detail Information

Resource Type.	Historic District	*Primary Resource?*	Yes
Date of Construction:	ca 1905 {Site Visit/Written Data}	*Accessed?*	
Architectural Style:	Mixed (more than 3 styles from different periods)	*Number of Stories:*	0.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	None Known

Primary Resource Exterior Component Description:

Historic Time Period(s): P- Reconstruction and Growth (1866 to 1916)

Historic Context(s): Architecture/Community Planning
Commerce/Trade
Domestic
Education

Significance Statement

When the Virginian Railway built its line through Moneta in 1905-1906 to connect the coal fields of West Virginia with Norfolk, the community began to flourish. Mark Twain himself rode on he rail's inaugural run in July 1909 and is said to have made a speech at or near Moneta. The town grew gradually during 1905 and 1930. The largest business was the planning mill of W.C. Dooley which supplied finished lumber to a large section of Bedford County. In the mid 20th century, the town grew very slowly, only did growth pick up again in the 1970-80s due to development along Smith Mountain Lake several miles to the south. During the 1920s W.C. Dooley built many of the buildings in Moneta and introduced a distinctive and idiosyncratic style to the community. The syle's distinguishing characteristics are fielded recessed paneling in gable and cornice friezes and the use of dentil moldings. These characteristics incicate the influence of the Georgian Revival style or even the Tudor Revival. The best example of Dooley's syle is the Bethlehem United Methodist Church.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
	B&W 35mm Photos		September 1972	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,

Cultural Resource Management Event:	PIF
Date of CRM Event:	1980
CRM Person:	RRPO/VDHR
CRM Event Notes or Comments:	

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0337** ***Other DHR ID#:***

Resource Information

Resource Name(s): Bridge #1035, Route 460 {Function/Location}
Date of Construction:

Local Historic District :

National Register Eligibility Status

Property has been recommended Not Eligible for listing

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet:
Tax Parcel:
Zip Code:
Address(s): Rt. 460
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:
mid to late 20th Century Rural Residential
Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Bridge	Contributing

Individual Resource Detail Information

Resource Type. Bridge *Primary Resource?*
Date of Construction: 1948 {Written Data} *Accessed?*
Architectural Style: *Number of Stories:* 0.0
Form: *Condition:* Good
Interior Plan Type:
Threats to Resource:

Architecture Summary: This is a three-span, 128-foot, T-beam (104), with Single B rails.
End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Historic Context(s): Transportation/Communication

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0337** ***Other DHR ID#:***

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

NR Count	NR Resource Type	NR Resource Status
1		Undetermined

Undetermined: 1

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
	Slides		0	
	B&W 35mm Photos		0	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 10, 1994
CRM Person: VTRC
CRM Event Notes or Comments:

CRM Event # 2,
Cultural Resource Management Event: DHR Staff: Not Eligible
Date of CRM Event: November 01, 1995
CRM Person: HSTG
CRM Event Notes or Comments:

Bridge Information

Bridge # 1 *Virginia Structure #* 1035 Structure *ID #* 0

Type: Beam
Bridge Use: Road
# of Spans: 3
Type of Entity Spanned: Water
Name of Entity Spanned: Little Otter River
# of Lanes: 3

Cemetery Information

Ownership Information

Name: ..... Unknown Unknown
Title: .....
Company: ..... Commonwealth of Virginia
Address: .....
City: .....

Zip: ..... *State:* Virginia *Country:* USA
Phone/Extension: .....
Surveyor Notes:
/

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5237** ***Other DHR ID#:***

Resource Information

Resource Name(s): House, Route 122 South {Descriptive}
Date of Construction: ca 1890

Local Historic District :

National Register Eligibility Status

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Body Camp
Tax Parcel:
Zip Code:
Address(s): W. Side Of Rte 122S, At Jct. W/ Rte 868 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

This tree-shaded farmhouse sits on the ridge along which Route 122 South runs, but faces west down a slope and away from the current alignment. operty. The house is tree-shaded with open fields and woodland surrounding the house.

Secondary Resource Summary:

None.

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1890 {Site Visit}	*Accessed?*	No Not accessible
Architectural Style:	Other	*Number of Stories:*	2.0
Form:		*Condition:*	Good
Interior Plan Type:	Hall-Parlor		
		Threats to Resource:	Deterioration

This two story, saddlebag dwelling has a side gable roof, asbestos siding, an enclosed porch, and a two story rear ell. The rear ell has an intact, L-shaped porch supported by turned posts with spindlework brackets. The house has two-over-two windows

Asbestos siding, enclosed porch

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5237** ***Other DHR ID#:***

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior	Stone	
other	other	Wood	other
Roof		Metal	Roof - Standing Seam
other	other	Asbestos	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 2/2
other	other	Concrete	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 2/2
Porch			
Foundation	Foundation - Solid/Continuous	Stone	

Historic Context(s): Domestic

Significance Statement

This house has undergone some alteration and lacks any important historical or architectural significance. The propoerty is not recommended for further investigation.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15768	B&W 35mm Photos		November 10, 1997	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: November 10, 1997
CRM Person: Alexander and Associates, Mattson
VDHR Project ID # Associated with Event: 09-5237
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0107** ***Other DHR ID#:***

Resource Information

Resource Name(s): Garrett Place {Historic}
Garrett House {Current}
Date of Construction: ca 1830

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bunker Hill
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: BEDFORD
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type. Single Dwelling *Primary Resource?* Yes
Date of Construction: ca 1830 {Site Visit} *Accessed?*
Architectural Style: *Number of Stories:* 1.0
Form: *Condition:* Poor
Interior Plan Type:
Threats to Resource:

Architecture Summary: The Garrett Place is a log cabin, now sheathed with weatherboarding which probably dates from the mid-19th century or earlier. The logs are smoothed and v-shaped corner notching. Chinks are partly filled with slabs of wood laid diagonally. Windows on the first floor are 6/6. The loft has two ventilation windows on each gable end side and they are 4/4. On the entrance facade, there is also a ventilation window for the loft. The cellar also has windows on the gable ends--in this case 4 beside 4. The foundations and chimneys are brick. End Architecture Summary Additions and alterations: End Additions and alterations

Interior Description: It appears that the mantel is Classical Revival with flat Grecian moldngs on a surround, plain trusses, and a mantel shelf with flattened Grecian moldings under the shelf. End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Exterior end	Brick	
other	other		other
Foundation		Brick	
Roof	Roof - Gable	Metal	Roof - Standing Seam
Structural System	Structural System - Log	Wood	Structural System - Weatherboard
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/6

Historic Context(s): Domestic

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
2171	B&W 35mm Photos		May 1973	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 1973
CRM Person: Anne Carter Lee
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0118** ***Other DHR ID#:***

Resource Information

Resource Name(s): Lee Place {Current}
Burroughs Place {Historic}
Date of Construction: 1857

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Davis Mill
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Kitchen	Contributing
1	Barn	Contributing
1	Shed	Contributing
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type. Barn *Primary Resource?* No
Date of Construction: *Accessed?*
Architectural Style: *Number of Stories:* 0.0
Form: *Condition:*
Interior Plan Type:
Threats to Resource:

Architecture Summary: Frame barn with gambrel roof. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	1857 {Site Visit}	*Accessed?*	Yes
Architectural Style:		*Number of Stories:*	2.0
Form:		*Condition:*	
Interior Plan Type:	Central Passage, Single Pile		
		Threats to Resource:	

Architecture Summary: There are not photos of the main house. It can be seen in background of one photograph. Described as frame house with weatherboard siding on form. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: Numerous photos of interior. End Interior Description

Individual Resource Detail Information

Resource Type.	Kitchen	*Primary Resource?*	No
Date of Construction:		*Accessed?*	
Architectural Style:		*Number of Stories:*	1.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: Small frame building with board and batten siding, gable roof, and exterior end stone chimney. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Individual Resource Detail Information

Resource Type.	Shed	*Primary Resource?*	No
Date of Construction:		*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: Log shed with shed roof. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Exterior end	Unknown	
Roof	Roof - Gable	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	Structural System - Weatherboard

Historic Context(s): Domestic

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0118** ***Other DHR ID#:***

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
2705	B&W 35mm Photos		March 1973	
2718	B&W 35mm Photos		March 1973	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: 9999
CRM Person: Anne Carter Lee
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0141** ***Other DHR ID#:***

Resource Information

Resource Name(s): Store, near Davis Mill {Descriptive}
Date of Construction: ca 1800

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet:
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Commercial Building	Contributing

Individual Resource Detail Information

Resource Type. Commercial Building
Primary Resource? Yes
Date of Construction: ca 1800 {Site Visit/Photograph}
Accessed?
Architectural Style:
Number of Stories: 2.0
Form:
Condition: Poor
Interior Plan Type:
Threats to Resource: Deterioration

Architecture Summary: A 2 story, frame with weatherboard, old store with metal gable roof, double leaf wood paneled front doors and double hung sash 6/6 windows. Presently located by a paved 2 lane highway. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment

other	other	Wood	other
Roof	Roof - Gable	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	Structural System - Weatherboard
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/6

Historic Context(s): Commerce/Trade

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
1794	B&W 35mm Photos		January 1973	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

Bridge Information

Cemetery Information

Ownership Information

Miscellaneous Survey Notes: No survey was included in this l file, only 2 photgraphs.

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0233** ***Other DHR ID#:***

Resource Information

Resource Name(s): Dooley, W.C., Farm {Historic/Current}
Date of Construction: ca 1910

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Moneta
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
3	Other	Contributing
1	Single Dwelling	Contributing
1	Office/Office Building.	Contributing
1	Garage	Contributing

Individual Resource Detail Information

Resource Type. Garage *Primary Resource?* No
Date of Construction: *Accessed?*
Architectural Style: *Number of Stories:* 0.0
Form: *Condition:*
Interior Plan Type:
Threats to Resource:

Architecture Summary: End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Individual Resource Detail Information

Resource Type.	Other	*Primary Resource?*	No
Date of Construction:		*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: 3 frame outbuildings. End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Individual Resource Detail Information

Resource Type.	Office/Office Building.	*Primary Resource?*	No
Date of Construction:		*Accessed?*	
Architectural Style:		*Number of Stories:*	0.0
Form:		*Condition:*	
Interior Plan Type:			
		Threats to Resource:	

Architecture Summary: End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1910 {Site Visit}	*Accessed?*	Yes
Architectural Style:	Victorian, Queen Anne	*Number of Stories:*	2.5
Form:		*Condition:*	Good
Interior Plan Type:	Central Passage, Double Pile		
		Threats to Resource:	None Known

Architecture Summary: End Architecture Summary Additions and alterations: End Additions and alterations Interior Description: End Interior Description

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior	Brick	other
other	other	Wood	other
Roof	Roof - Pediment	Wood	other
Foundation	Foundation - Solid/Continuous	Concrete	Foundation - Poured
Porch	other	Wood	other
Roof	other	Metal	Roof - Standing Seam
Structural System	Structural System - Frame	Wood	Structural System - Weatherboard
Windows	Windows - Sash, Double-Hung	Wood	Windows - 1/1

Historic Context(s): Domestic

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
10011	B&W 35mm Photos		May 1989	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase II/Intensive
Date of CRM Event: 1989
CRM Person: Dan Pezzoni
CRM Event Notes or Comments:
With Cabell Crowther.

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-0417** ***Other DHR ID#:***

Resource Information

Resource Name(s): Sunnyside Acres {Current}
Date of Construction:

Local Historic District :

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)

Magisterial District:
Town/Village/Hamlet:
Tax Parcel:
Zip Code:
Address(s):
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Resource Description

Ownership Status:
Government Agency Owner:
Acreage:
Surrounding area:
Open to Public:
Site Description:

Secondary Resource Summary:

Individual Resource Information

Primary Resource Exterior Component Description:

Significance Statement

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

Bibliographic Documentation

Cultural Resource Management (CRM) Events

Bridge Information

Cemetery Information

Ownership Information

Miscellaneous Survey Notes: File is missing.

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#:* 009-5002** ***Other DHR ID#:

Resource Information

Resource Name(s): Jake Fizer Farm {Historic}
Date of Construction: 1908

Local Historic District :

National Register Eligibility Status

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): East Side Of Route 122 {Current}
USGS Quadrangle Name: BEDFORD
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage: 90.00
Surrounding area: Rural
Open to Public: No
Site Description:

The Jake Fizer Farm is located south of Bedford on the east side of Route 122. The farmhouse is set on a knoll, back from the highway, and is surrounded by rolling pastureland and fields, wooded hills, and numerous streams.

Secondary Resource Summary:

This farm property includes three historic outbuildings: a frame granary (ca. 1910); a ca. 1940 concrete block dairy barn; and a ca. 1940 concrete block, milk bottling house. The farm also includes two frame, gable roofed sheds (ca. 1960). The granary has a standing seam, tin, gable roof; weatherboard siding; exposed rafters; a full basement; and single door. The dairy barn has a gambrel roof, concrete block walls, and a concrete slab floor. The milk bottling house has a gable roof and concrete block walls.

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing
1	Granary	Contributing
1		Contributing
1	Shed	Non-Contributing
1	Dairy	Contributing
1	Shed	Non-Contributing

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5002** ***Other DHR ID#:***

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	1908 {Site Visit/Owner}	*Accessed?*	No Denied
Architectural Style:	Other	*Number of Stories:*	2.0
Form:		*Condition:*	Good
Interior Plan Type:	Central Passage, Single Pile		
		Threats to Resource:	None Known

The Jake Fizer House is a frame I-house with a two story, rear ell, and a hip roofed porch. The house has a standing seam, tin hip roof (with a center gable), aluminum siding, six-over-one light, double hung, wooden sash windows, and fieldstone foundation. The porch is supported by battered box piers resting on brick pedestals. The house has molded box eaves and a replacement panelled door.

Aluminum siding and replacement front door.

Interior access was denied.

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior end	Brick	
Porch	Porch - 1-story, 3-bay	Wood	
Roof	Roof - Gable	Metal	Roof - Standing Seam
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/1
Foundation	Foundation - Solid/Continuous	Stone	

Historic Time Period(s): P- Reconstruction and Growth (1866 to 1916)

Historic Context(s): Domestic
Subsistence/Agriculture

Significance Statement

This farmhouse was built in 1908 by local contractor, Fred Luck, for the Jake Fizer family. On this 90 acre farm, they produced tobacco, wheat, and corn. By ca. 1940, the Fizer farm included dairy production, and several outbuildings, including the large dairy barn, reflect this transition. The dairy buildings were constructed of concrete block with concrete slab flooring, a sanitation measure recommended by progressive farming literature of the early to mid-twentieth century. The granary (ca. 1910) has a basement where tobacco was stripped. This early twentieth century farm retains an intact farmhouse, agricultural outbuildings, and agricultural fields and pastures. The Fizer farm warrants further investigation to determine National Register eligibility.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15381	B&W 35mm Photos		January 23, 1997	

Bibliographic Documentation

Reference #: 1

Bibliographic RecordType:	Oral History/Interview
DHR CRM Report Number:	Interview with Fizer family. 23 January 1997.
Notes:	

Cultural Resource Management (CRM) Events

CRM Event # 1,	
Cultural Resource Management Event:	Survey:Phase I/Reconnaissance
Date of CRM Event:	January 23, 1997
CRM Person:	Alexander and Associates, Mattson
VDHR Project ID # Associated with Event:	09-5002
CRM Event Notes or Comments:	

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5003** ***Other DHR ID#:***

Resource Information

Resource Name(s): Farmhouse, Rt 122 {Function/Location}
Date of Construction: ca 1890

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): East Side Of Route 122 {Current}
USGS Quadrangle Name: BEDFORD
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

This farm is located south of Bedford on the east side of Route 122. The farmhouse is set back from the highway, amid open, rolling fields and pastures with woodland to the rear.

Secondary Resource Summary:

This farm property includes two modern, metal outbuildings.

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing
2	Shed	Non-Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1890 {Site Visit}	*Accessed?*	No Not accessible
Architectural Style:	Other	*Number of Stories:*	2.0
Form:		*Condition:*	Fair
Interior Plan Type:	Central Passage, Double Pile		
		Threats to Resource:	Major Alteration

The farmhouse is a two story, three bay, double pile dwelling with a hip roofed porch. The porch is supported by battered box piers resting on brick pedestals. The house has a standing seam tin, hip roof; aluminum siding; and replacement one-over-one light, double hung, wooden sash windows. The rear porch has replacement metal posts. The house has replacement panelled doors

Aluminum siding, replacement windows and doors, and replacement posts on rear porch.

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior	Brick	
Porch	Porch - 1-story, 2-bay	Wood	
Roof	Roof - Hipped	Metal	Roof - Standing Seam
Foundation	Foundation - Solid/Continuous	Stone	Foundation - Stucco
Windows	Windows - Sash, Double-Hung	Wood	Windows - 1/1

Historic Time Period(s): P- Reconstruction and Growth (1866 to 1916)

Historic Context(s): Domestic
Subsistence/Agriculture

Significance Statement

This farmhouse was built ca. 1900, but little else is known about the property. The house has been extensively modified with replacement siding, windows, and doors and no longer retains sufficient integrity to meet National Register criteria. The property is not recommended for further investigation.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15381	B&W 35mm Photos		January 23, 1997	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: January 23, 1997
CRM Person: Alexander and Associates, Mattson
VDHR Project ID # Associated with Event: 09-5003
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5236** ***Other DHR ID#:***

Resource Information

Resource Name(s): House, Route 122 South {Descriptive}
Date of Construction: ca 1870

Local Historic District :

National Register Eligibility Status

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Body Camp
Tax Parcel:
Zip Code:
Address(s): E. Side Of Rte 122S, .2 Mi. S Of Rte 735 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

This tree-shaded farmhouse sits on a small knoll and faces north with Route 122 running along the west side of the property. The old alignment of the highway now provides access to this farm.

Secondary Resource Summary:

None.

Individual Resource Information

Count	Resource Types	Resource Status
1	Single Dwelling	Contributing

Individual Resource Detail Information

Resource Type.	Single Dwelling	*Primary Resource?*	Yes
Date of Construction:	ca 1870 {Site Visit}	*Accessed?*	No Not accessible
Architectural Style:	Other	*Number of Stories:*	2.0
Form:		*Condition:*	Fair
Interior Plan Type:	Central Passage, Single Pile		
		Threats to Resource:	Deterioration

This I-house has a symmetrical, three bay facade, a two story rear ell, and a hip roofed porch supported by wooden columns. The house retains its weatherboard siding and a few of the original six-over-six windows, the rear ell has late two-over-two windows, and there are also a few modern one-over-one windows. The rear ell porch is supported by turned posts

Replacement windows and replacement front door (ca. 1960

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Exterior end	Stone	
other	other	Wood	other
other	other	Brick	other
Porch	Porch - 1-story, 3-bay	Wood	
other	other	Wood	
other	other	Wood	other
Windows	Windows - Sash, Double-Hung	Metal	Windows - 1/1
Windows	Windows - Sash, Double-Hung	Wood	Windows - 2/2
Foundation	Foundation - Solid/Continuous	Stone	
Windows	Windows - Sash, Double-Hung	Wood	Windows - 6/6
Roof		Metal	Roof - Standing Seam

Historic Context(s): Domestic

Significance Statement

This I-house has undergone some alteration and lacks any important historical or architectural significance and thus is not recommended for further investigation.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15768	B&W 35mm Photos		November 10, 1997	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: November 10, 1997
CRM Person: Alexander and Associates, Mattson
VDHR Project ID # Associated with Event: 09-5236
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5238** ***Other DHR ID#:***

Resource Information

Resource Name(s): School, Route 122 South {Descriptive}
Date of Construction: ca 1880

Local Historic District :

National Register Eligibility Status

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Body Camp
Tax Parcel:
Zip Code:
Address(s): E. Side Rte 122 S At Jct With Rte 731 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

This former school is located along Route 122 South near Body Camp. The property is surrounded by woodland, agricultural fields, and both early twentieth centry and modern development.

Secondary Resource Summary:

None.

Individual Resource Information

Count	Resource Types	Resource Status
1	School	Contributing

Individual Resource Detail Information

Resource Type.	School	*Primary Resource?*	Yes
Date of Construction:	ca 1880 {Site Visit}	*Accessed?*	No Not accessible
Architectural Style:	Vernacular	*Number of Stories:*	1.0
Form:		*Condition:*	Fair
Interior Plan Type:			
		Threats to Resource:	None Known

This former school is a one story, frame building with a high hipped roof and a pedimented, front gable porch, supported by box piers on brick pedestals. The building has a metal, standing seam roof, vinyl siding, ca. 1955 replacement windows, and a replacement door. The school is now residential

Vinyl siding, replacement windows and door; replacement porch posts

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5238** ***Other DHR ID#:***

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
Chimneys	Chimneys - Interior	Brick	Chimneys - Bond, Common
Foundation	Foundation - Solid/Continuous	Brick	Foundation - Bond, Common
Porch	Porch - 1-story, 3-bay		
other	other	Vinyl	
Windows	Windows - Sash, Double-Hung	Wood	Windows - 2/2
Roof	Roof - Hipped	Metal	Roof - Standing Seam
other	other	Wood	other

Historic Context(s): Education

Significance Statement

This former school building is located near the crossroads community of Body Camp. The school has been converted to domestic use, and has undergone significant alteration. The property no longer retains sufficient integrity to meet National Register criteria.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15768	B&W 35mm Photos		November 10, 1997	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: November 10, 1997
CRM Person: Alexander and Associates, Mattson
VDHR Project ID # Associated with Event: 09-5238
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5239** ***Other DHR ID#:***

Resource Information

Resource Name(s): Gas Station {Descriptive}
Date of Construction: ca 1925

Local Historic District :

National Register Eligibility Status

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Body Camp
Tax Parcel:
Zip Code:
Address(s): E. Side Rte 122 S, At Jct. With Rte 731 {Current}
USGS Quadrangle Name: MONETA
UTM Boundary Coordinates :

NAD	Zone	Easting	Northing

UTM Center coordinates :
UTM Data Restricted?.

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage:
Surrounding area: Rural
Open to Public: No
Site Description:

This store sits directly on Route 122 South at the junction with unpaved Route 731. Houses and farms dating to the late nineteenth and early twentieth centuries are located near this now vacant gas station.

Secondary Resource Summary:

None.

Individual Resource Information

Count	Resource Types	Resource Status
1	Commercial Building	Contributing

Individual Resource Detail Information

Resource Type.	Commercial Building	*Primary Resource?*	Yes
Date of Construction:	ca 1925 {Site Visit}	*Accessed?*	No Not accessible
Architectural Style:	No Discernable Style	*Number of Stories:*	1.0
Form:		*Condition:*	Fair
Interior Plan Type:	Undivided Space (non-domestic)		
		Threats to Resource:	Deterioration

This hip roofed gas station has brick exterior walls, an engaged porte cochere supported by substantial brick piers, and a double leaf, horizontal panelled doors. The building has molded box eaves, a molded cornice, and both one-over-one and two-over-two windows

Rear shed, covered in tar paper

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5239** ***Other DHR ID#:***

Primary Resource Exterior Component Description:

Component	Comp Type/Form	Material	Material Treatment
other	other	Wood	other
other	other	Brick	other
other	other	Brick	other
Windows	Windows - Sash, Double-Hung	Wood	Windows - 1/1
Porch			
Foundation	Foundation - Solid/Continuous	Concrete	Foundation - Poured
Roof	Roof - Hipped	Metal	Roof - Standing Seam

Historic Context(s): Commerce/Trade

Significance Statement

This well-preserved gas station is located on Route 122, a major north-south route through Bedford County. Dating to the mid-1920s, this substantial building is an increasingly rare example of the early twentieth century gas stations and stores, which were once common in rural communities. This 1property warrants further investigation.

National Register Eligibility Information (Intensive Level Survey):

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
15768	B&W 35mm Photos		November 10, 1997	

Bibliographic Documentation

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: November 10, 1997
CRM Person: Alexander and Associates, Mattson
VDHR Project ID # Associated with Event: 09-5239
CRM Event Notes or Comments:

Bridge Information

Cemetery Information

Ownership Information

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5297** ***Other DHR ID#:***

Resource Information

Resource Name(s): Thomas Cemetery {Descriptive}
Date of Construction: post 1850

Local Historic District :

National Register Eligibility Status

Resource has not been evaluated.*

* Resource has not been formally evaluated by DHR or eligibility information has not been documented in DSS at this time.

Location of Resource

Commonwealth of Virginia
County/Independent City: Bedford (County)
Magisterial District:
Town/Village/Hamlet: Bedford
Tax Parcel:
Zip Code:
Address(s): Route 460
USGS Quadrangle Name: GOODE
UTM Boundary Coordinates :

	NAD	Zone	Easting	Northing
UTM Center coordinates :		17	660130	4131546

UTM Data Restricted?. No

Resource Description

Ownership Status: Private
Government Agency Owner:
Acreage: 0.20
Surrounding area: Suburban
Open to Public: Yes
Site Description:

Thomas cemetery, 50 x 80' approx, is located south of Route 460 by the bypass just at the eastern city limits, in a trailer park. Cemetery surrounded by a continuous stone wall. Has marked stones from Thomas family. Graves of 1 Rev. War soldier, 1 War of 1812 soldier and 2 Civil War soldiers are present. One grave has half a millstone as partial headstone.

The cemetery surrounds have been sold for use as a trailer park. An Access Road is planned to be directly adjacent to it. Some vandalism (gravestones broken) has occurred relatively recently. Some stones appear to be missing as well.

Secondary Resource Summary:

Individual Resource Information

Count	Resource Types	Resource Status
1	Cemetery	Contributing

Individual Resource Detail Information

Resource Type.	Cemetery	*Primary Resource?*	Yes
Date of Construction:	post 1850 {Date Stone/Cornerstone}	*Accessed?*	
Architectural Style:	No Discernable Style	*Number of Stories:*	0.0
Form:		*Condition:*	Deteriorated
Interior Plan Type:			
		Threats to Resource:	Deterioration

Tombstones all 19th century marble, flat or slight curved tops or first quarter 20th. Clasped hand, Mason symbol with G, cross in

circle, floral, badges, shields are motif examples.

Primary Resource Exterior Component Description:

Historic Time Period(s):
N- Antebellum Period (1830 to 1860)
O- Civil War (1861 to 1865)
P- Reconstruction and Growth (1866 to 1916)
Q- World War I to World War II (1917-1945)

Historic Context(s): Funerary

Significance Statement

This cemetery is for the Thomas family. It has 1 Revolutarionary War soldier, 1 War of 1812 soldier and 2 Civil War soldiers plus family members buried therein. The tombstones are not in themselves outstanding, apart from the oddity of the millstone half being used as a headstone surround for one lady. The importance is that the family produced soldiers for the three major American wars.

The cemetery does not appear eligible on artistic grounds. Some tombstones appear to have been added well after the deaths of the individuals. The cemetery might be eligible based upon associations with significant events.

Significant Individuals and Events

Associated Individuals: William Thomas, Interred
James Thomas, Interred
John E. Thomas, Interred

Associated Events:

Event # 1,
Start Date: 9999 *End Date:* 1853 *Date Source:* Date Stone/Cornerstone
Event Notes:
Inscription: Va Troops, Rev War. No birth date
Start Date: 1792 *End Date:* 1855 *Date Source:* Date Stone/Cornerstone
Event Notes:
Kyle's Co. VA Mil. War of 1812
Start Date: 9999 *End Date:* 9999 *Date Source:* Date Stone/Cornerstone
Event Notes:
No dates on stone. Co. E, 34 Va Inf. C.S.A.

National Register Eligibility Information (Intensive Level Survey):

NR Count	NR Resource Type	NR Resource Status
1	Site	Contributing

Contributing: 1

National Register Criteria:

Period of Significance:
Level of Significance:

Graphic Media Documentation

DHR Negative #	*Photographic Media*	*Negative Repository*	*Photo Date*	*Photographer*
	Digital photographs	DHR	March 10, 2005	

Bibliographic Documentation

Reference #: 1

Virginia Department of Historic Resources
Reconnaissance Level Survey

DHR ID#: **009-5297** ***Other DHR ID#:***

Bibliographic RecordType: Report
Author: Lyle E. Browning
DHR CRM Report Number: BE-40
Notes:
Bedford Access Road Phase I Intensive Cultural Resources Survey, Browning & Associates, Ltd. 2005

Cultural Resource Management (CRM) Events

CRM Event # 1,
Cultural Resource Management Event: Survey:Phase I/Reconnaissance
Date of CRM Event: March 10, 2005
CRM Person: Lyle E. Browning
VDHR Project ID # Associated with Event: 2005-0777
CRM Event Notes or Comments:
Bedford Access Road Phase I Intensive Cultural Resources Survey, Browning & Associates, Ltd. 2005

CRM Event # 2,
Cultural Resource Management Event: Other
Date of CRM Event: June 24, 2005
CRM Person: Joanna Wilson
VDHR Project ID # Associated with Event: 2005-0777
CRM Event Notes or Comments:
DHR Letter: Survey of the project area found no archaeological resources, but did identify and record a family cemetery (Thomas Cemetery, 009-5297) adjacent to the project area. Based upon the information provided we concur with the recommendation that no further investigation of the project area is necessary. We further concur with the recommendation that the cemetery be avoided by all construction and construction-related activity. Given the location of the cemetery in relation to the project's limits of disturbance it is advisable to conduct limited stripping in the area between to ensure that no additional gravesites are present within the construction area.

Bridge Information

Cemetery Information

Ownership Information

U.S. Fish and Wildlife Service
National Wetlands Inventory

NWI Mapping

Jul 12, 2010

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deetwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Status

- Digital
- Scan
- Non-Digital
- No Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

Bedford County PSA Water Improvements July 2010

U.S. Fish and Wildlife Service

National Wetlands Inventory

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Jul 12, 2010

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User Remarks:

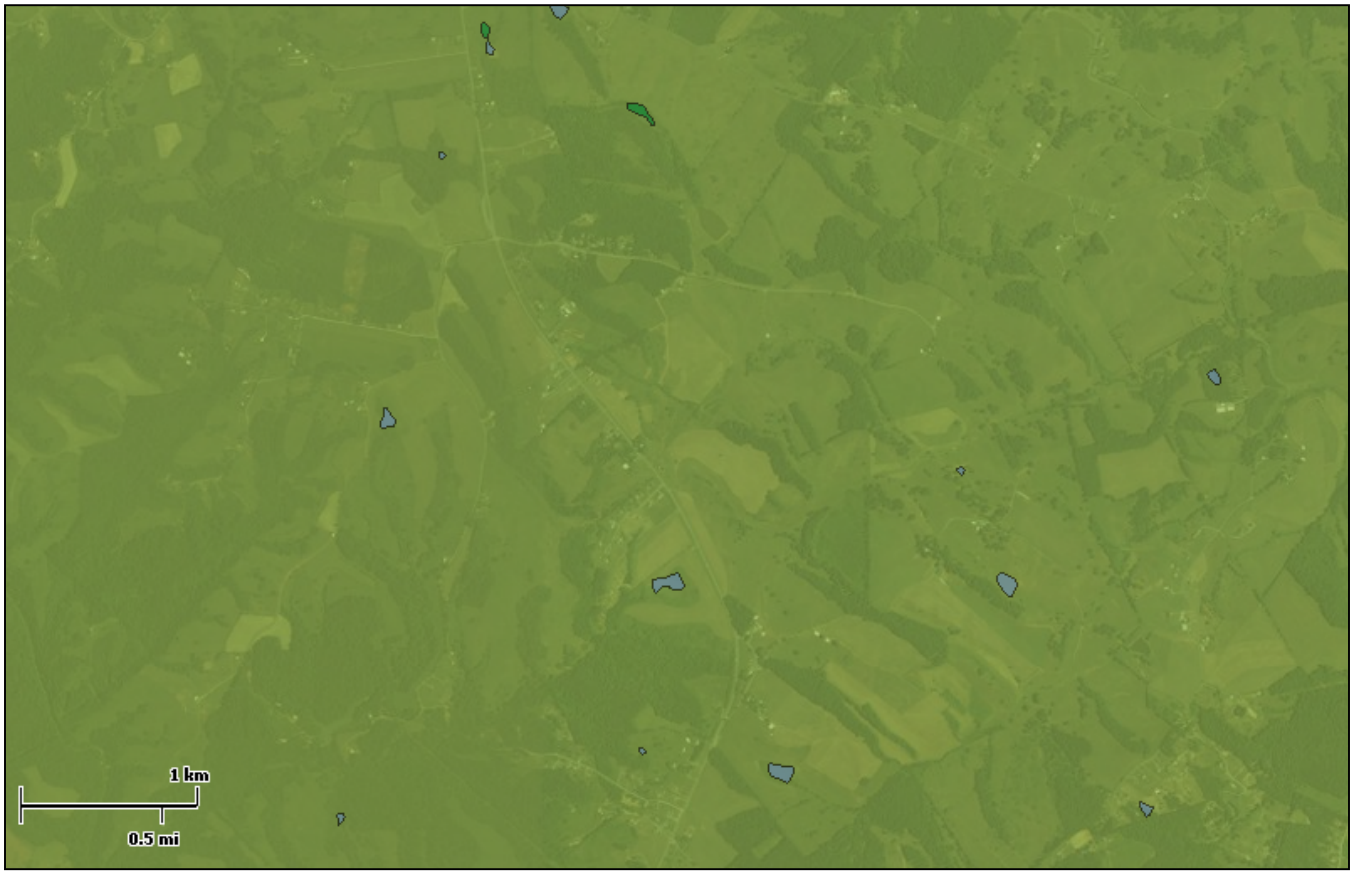
Bedford County PSA Water Improvements July 2010

U.S. Fish and Wildlife Service

National Wetlands Inventory

NWI Mapping

Jul 12, 2010



Wetlands

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Status

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- Scan
- Non-Digital
- No Data

User Remarks:

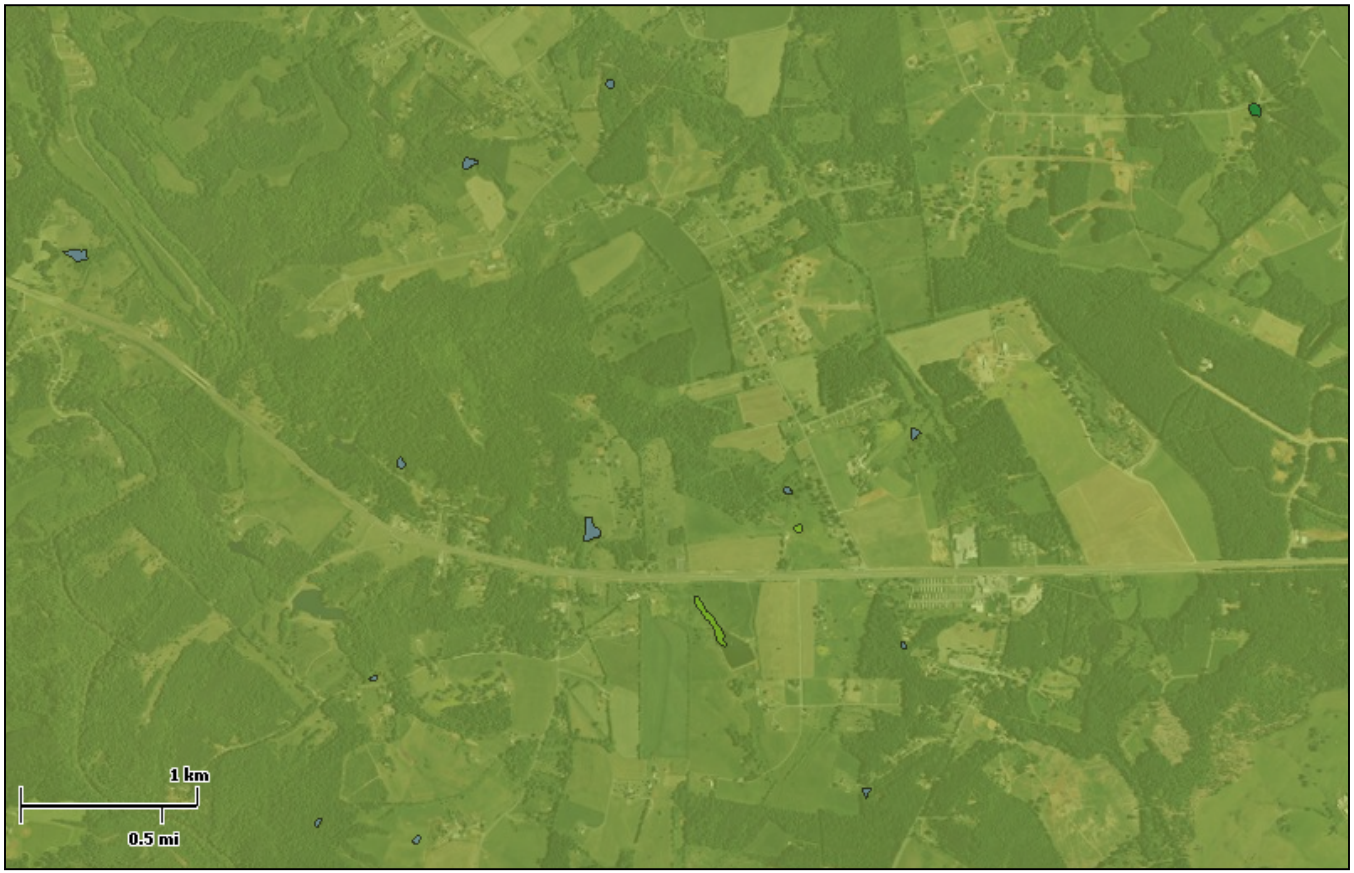
Bedford County PSA Water Improvements July 2010

U.S. Fish and Wildlife Service

National Wetlands Inventory

NWI Mapping

Jul 12, 2010



Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deetwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Status

- Digital
- Scan
- Non-Digital
- No Data

User Remarks:

Bedford County PSA Water Improvements July 2010

Prime and other Important Farmlands

Bedford County, Virginia

Map symbol	Map unit name	Farmland classification
1B	Altavista fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
4B	Braddock fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
7B	Cecil fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
9B	Cullen loam, 2 to 7 percent slopes	All areas are prime farmland
16B	Hayesville loam, 2 to 7 percent slopes	All areas are prime farmland
18B	Helena fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
20B	Laidig gravelly fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
23B	Mattaponi sandy loam, 2 to 7 percent slopes	All areas are prime farmland
24B	Mecklenburg loam, 2 to 7 percent slopes	All areas are prime farmland
28B	State fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
31B	Thurmont fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
33B	Turbeville fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
34B	Vance fine sandy loam, 2 to 7 percent slopes	All areas are prime farmland
4C	Braddock fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
4D	Braddock fine sandy loam, 15 to 25 percent slopes	Farmland of statewide importance
5B	Braddock cobbly fine sandy loam, 2 to 7 percent slopes	Farmland of statewide importance
5C	Braddock cobbly fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
6C	Braddock fine sandy loam, 7 to 15 percent slopes very stony	Farmland of statewide importance
6D	Braddock fine sandy loam, 15 to 25 percent slopes, very stony	Farmland of statewide importance
7C	Cecil fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
9C	Cullen loam, 7 to 15 percent slopes	Farmland of statewide importance
9D	Cullen loam, 15 to 25 percent slopes	Farmland of statewide importance
11C	Edneytown loam, 7 to 15 percent slopes	Farmland of statewide importance
11D	Edneytown loam, 15 to 25 percent slopes	Farmland of statewide importance
14C	Grover fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
14D	Grover fine sandy loam, 15 to 25 percent slopes	Farmland of statewide importance
16C	Hayesville loam, 7 to 15 percent slopes	Farmland of statewide importance
16D	Hayesville loam, 15 to 25 percent slopes	Farmland of statewide importance
17C	Hayesville loam, 7 to 15 percent slopes, very stony	Farmland of statewide importance
17D	Hayesville loam, 15 to 25 percent slopes, very stony	Farmland of statewide importance
18C	Helena fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
19B	Iredell fine sandy loam, 2 to 7 percent slopes	Farmland of statewide importance
19C	Iredell fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
23C	Mattaponi sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
24C	Mecklenburg loam, 7 to 15 percent slopes	Farmland of statewide importance
24D	Mecklenburg loam, 15 to 25 percent slopes	Farmland of statewide importance
25C	Nason gravelly silt loam, 7 to 15 percent slopes	Farmland of statewide importance
25D	Nason gravelly silt loam, 15 to 25 percent slopes	Farmland of statewide importance
27C	Sequoia loam, 7 to 15 percent slopes	Farmland of statewide importance
27D	Sequoia loam, 15 to 25 percent slopes	Farmland of statewide importance
31C	Thurmont fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
31D	Thurmont fine sandy loam, 15 to 25 percent slopes	Farmland of statewide importance
33C	Turbeville fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
33D	Turbeville fine sandy loam, 15 to 25 percent slopes	Farmland of statewide importance
34C	Vance fine sandy loam, 7 to 15 percent slopes	Farmland of statewide importance
8A	Chewacla loam, 0 to 2 percent slopes	Prime farmland if drained
32A	Toccoa sandy loam, 0 to 2 percent slopes	Prime farmland if protected from flooding or not frequently flooded during the growing season

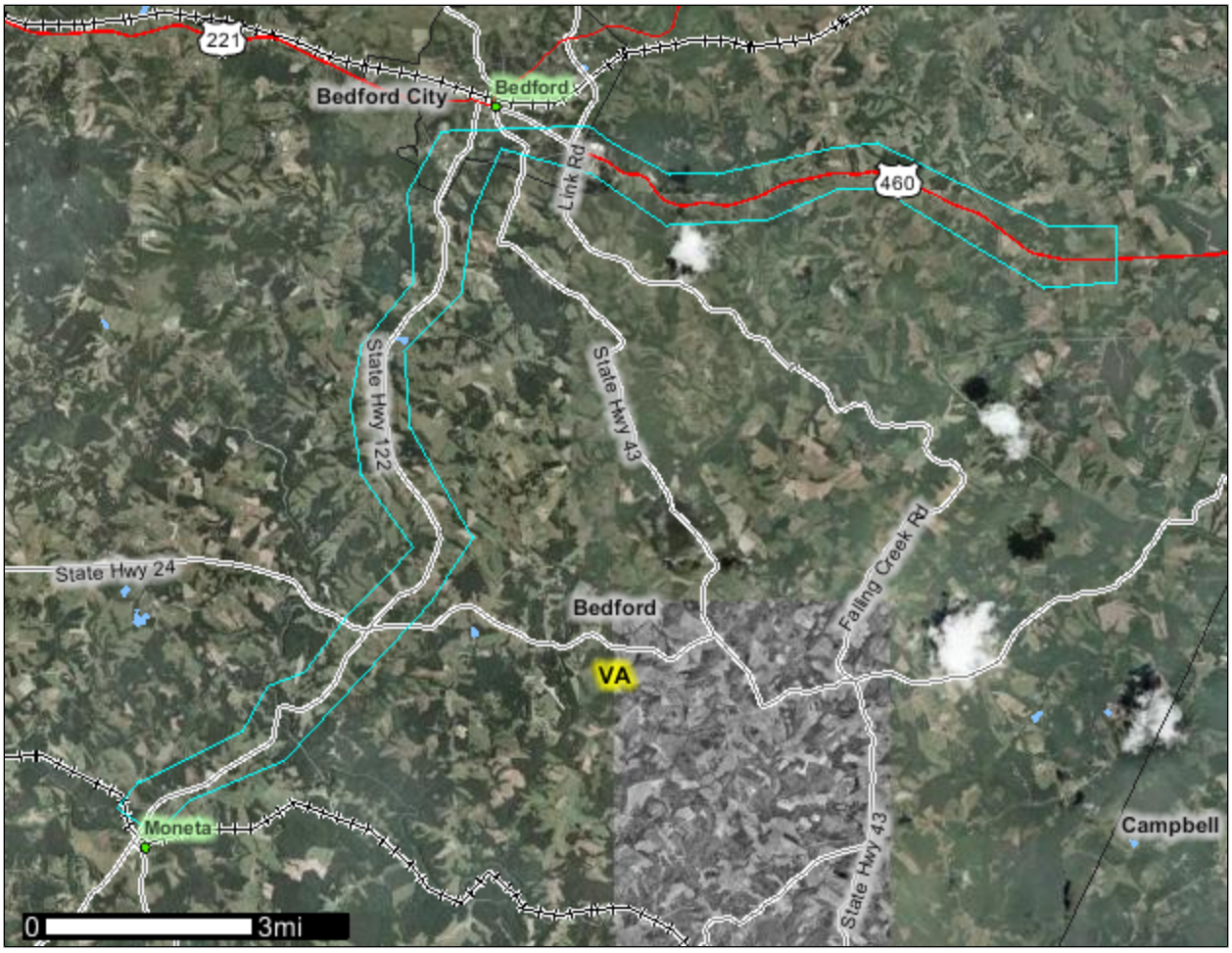
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Bedford City, Virginia, and Bedford County, Virginia



July 12, 2010

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

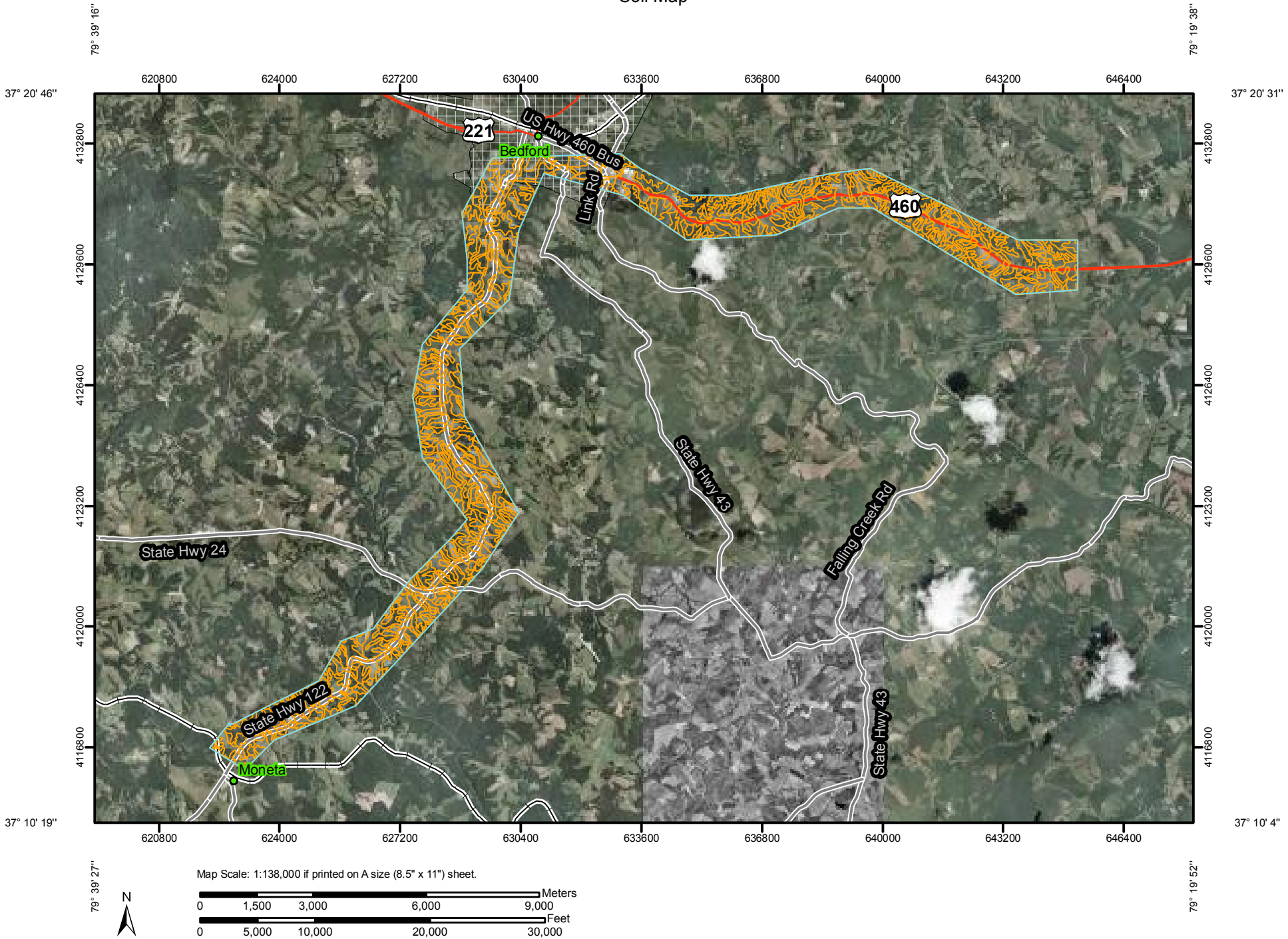
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Gully
- Short Steep Slope
- Other

Political Features
- Urban Areas
- Cities

Water Features
- Oceans

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:138,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bedford City, Virginia
Survey Area Data: Version 3, Jan 25, 2010

Soil Survey Area: Bedford County, Virginia
Survey Area Data: Version 9, Jan 11, 2010

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 6/23/2003; 1994; 6/9/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Bedford City, Virginia (VA515)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
50B	Clifford fine sandy loam, 2 to 7 percent slopes	119.5	1.2%
50C	Clifford fine sandy loam, 7 to 15 percent slopes	79.2	0.8%
51B	Clifford-Urban land complex, 2 to 7 percent slopes	51.8	0.5%
51C	Clifford-Urban land complex, 7 to 20 percent slopes	13.1	0.1%
54E	Rhodhiss loam, 25 to 60 percent slopes	36.2	0.4%
55D	Fairview fine sandy loam, 15 to 25 percent slopes	55.6	0.6%
55E	Fairview fine sandy loam, 25 to 45 percent slopes	13.1	0.1%
56D3	Fairview sandy clay loam, 15 to 25 percent slopes, severely eroded	302.2	3.0%
56E3	Fairview sandy clay loam, 25 to 45 percent slopes, severely eroded	30.0	0.3%
57E	Spriggs loam, 25 to 60 percent slopes	0.9	0.0%
58	Udorthents, loamy	1.0	0.0%
59	Urban land	56.4	0.6%
Subtotals for Soil Survey Area		**759.1**	**7.6%**
Totals for Area of Interest		**9,950.1**	**100.0%**

Bedford County, Virginia (VA019)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1B	Altavista fine sandy loam, 2 to 7 percent slopes	41.0	0.4%
7B	Cecil fine sandy loam, 2 to 7 percent slopes	1,734.3	17.4%
7C	Cecil fine sandy loam, 7 to 15 percent slopes	2,204.5	22.2%
9B	Cullen loam, 2 to 7 percent slopes	151.6	1.5%
9C	Cullen loam, 7 to 15 percent slopes	106.3	1.1%
9D	Cullen loam, 15 to 25 percent slopes	42.0	0.4%
14C	Grover fine sandy loam, 7 to 15 percent slopes	18.9	0.2%
14D	Grover fine sandy loam, 15 to 25 percent slopes	101.6	1.0%
14E	Grover fine sandy loam, 25 to 40 percent slopes	76.7	0.8%
18B	Helena fine sandy loam, 2 to 7 percent slopes	10.3	0.1%
18C	Helena fine sandy loam, 7 to 15 percent slopes	5.5	0.1%
19B	Iredell fine sandy loam, 2 to 7 percent slopes	3.2	0.0%
19C	Iredell fine sandy loam, 7 to 15 percent slopes	7.7	0.1%
21D3	Madison sandy clay loam, 15 to 25 percent slopes, severely eroded	2,363.6	23.8%

Bedford County, Virginia (VA019)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
21E3	Madison sandy clay loam, 25 to 40 percent slopes, severely eroded	307.5	3.1%
23B	Mattaponi sandy loam, 2 to 7 percent slopes	20.8	0.2%
23C	Mattaponi sandy loam, 7 to 15 percent slopes	1.7	0.0%
24B	Mecklenburg loam, 2 to 7 percent slopes	75.0	0.8%
24C	Mecklenburg loam, 7 to 15 percent slopes	147.5	1.5%
24D	Mecklenburg loam, 15 to 25 percent slopes	68.7	0.7%
26C	Poindexter fine sandy loam, 7 to 15 percent slopes	77.7	0.8%
26D	Poindexter fine sandy loam, 15 to 25 percent slopes	317.8	3.2%
26E	Poindexter fine sandy loam, 25 to 60 percent slopes	135.2	1.4%
29D	Sweetapple fine sandy loam, 15 to 25 percent slopes	115.3	1.2%
29E	Sweetapple fine sandy loam, 25 to 60 percent slopes	147.9	1.5%
32A	Toccoa sandy loam, 0 to 2 percent slopes	108.1	1.1%
33B	Turbeville fine sandy loam, 2 to 7 percent slopes	388.6	3.9%
33C	Turbeville fine sandy loam, 7 to 15 percent slopes	211.2	2.1%
34B	Vance fine sandy loam, 2 to 7 percent slopes	12.7	0.1%
34C	Vance fine sandy loam, 7 to 15 percent slopes	82.4	0.8%
35D	Wateree fine sandy loam, 15 to 25 percent slopes	67.5	0.7%
35E	Wateree fine sandy loam, 25 to 40 percent slopes	13.6	0.1%
W	Water	24.9	0.3%
Subtotals for Soil Survey Area		**9,191.3**	**92.4%**
Totals for Area of Interest		**9,950.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic

class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Bedford City, Virginia

50B—Clifford fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Elevation: 700 to 1,300 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 200 days

Map Unit Composition

Clifford and similar soils: 95 percent

Description of Clifford

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, and metagrawacke

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 7 inches: Fine sandy loam
7 to 54 inches: Clay loam
54 to 62 inches: Clay loam
62 to 82 inches: Fine sandy loam

50C—Clifford fine sandy loam, 7 to 15 percent slopes

Map Unit Setting

Elevation: 700 to 1,300 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 200 days

Map Unit Composition
Clifford and similar soils: 95 percent

Description of Clifford

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, and metagrawacke

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 7 inches: Fine sandy loam
7 to 54 inches: Clay loam
54 to 62 inches: Clay loam
62 to 82 inches: Fine sandy loam

51B—Clifford-Urban land complex, 2 to 7 percent slopes

Map Unit Setting
Elevation: 700 to 1,300 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 222 days

Map Unit Composition
Clifford and similar soils: 50 percent
Urban land: 40 percent

Description of Clifford

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex

Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, and metagrawacke

Properties and qualities
Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 7 inches: Fine sandy loam
7 to 54 inches: Clay loam
54 to 62 inches: Clay loam
62 to 82 inches: Fine sandy loam

51C—Clifford-Urban land complex, 7 to 20 percent slopes

Map Unit Setting
Elevation: 700 to 1,300 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 222 days

Map Unit Composition
Clifford and similar soils: 55 percent
Urban land: 35 percent

Description of Clifford

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, and metagrawacke

Properties and qualities
Slope: 7 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 3e

Typical profile
0 to 7 inches: Fine sandy loam
7 to 54 inches: Clay loam
54 to 62 inches: Clay loam
62 to 82 inches: Fine sandy loam

54E—Rhodhiss loam, 25 to 60 percent slopes

Map Unit Setting
Elevation: 700 to 1,300 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 200 days

Map Unit Composition
Rhodhiss and similar soils: 85 percent

Description of Rhodhiss

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, metagrawacke, and high grade metamorphic rocks

Properties and qualities
Slope: 25 to 60 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups
Land capability (nonirrigated): 7e

Typical profile
0 to 5 inches: Loam
5 to 38 inches: Clay loam
38 to 80 inches: Sandy loam

55D—Fairview fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

Elevation: 700 to 1,300 feet
Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 200 days

Map Unit Composition

Fairview and similar soils: 85 percent

Description of Fairview

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, metagrawacke, and high grade metamorphic rocks

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 9 inches: Fine sandy loam
9 to 23 inches: Clay
23 to 29 inches: Clay loam
29 to 80 inches: Fine sandy loam

55E—Fairview fine sandy loam, 25 to 45 percent slopes

Map Unit Setting

Elevation: 700 to 1,300 feet

Mean annual precipitation: 40 to 48 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 150 to 200 days

Map Unit Composition
Fairview and similar soils: 85 percent

Description of Fairview

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum from mica schist, mica gneiss, metagrawacke, and high grade metamorphic rocks

Properties and qualities
Slope: 25 to 45 percent
Surface area covered with cobbles, stones or boulders: 0.1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups
Land capability (nonirrigated): 7e

Typical profile
0 to 9 inches: Fine sandy loam
9 to 23 inches: Clay
23 to 29 inches: Clay loam
29 to 80 inches: Fine sandy loam

56D3—Fairview sandy clay loam, 15 to 25 percent slopes, severely eroded

Map Unit Setting
Elevation: 200 to 1,400 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 160 to 222 days

Map Unit Composition
Fairview, moderately eroded, and similar soils: 72 percent

Description of Fairview, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from schist and/or gneiss

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 9 inches: Sandy clay loam
9 to 24 inches: Clay
24 to 29 inches: Sandy clay loam
29 to 80 inches: Loam

56E3—Fairview sandy clay loam, 25 to 45 percent slopes, severely eroded

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 50 to 59 degrees F
Frost-free period: 160 to 222 days

Map Unit Composition

Fairview, moderately eroded, and similar soils: 72 percent

Description of Fairview, Moderately Eroded

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Saprolite derived from schist and/or gneiss

Properties and qualities

Slope: 25 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 9 inches: Sandy clay loam
9 to 24 inches: Clay
24 to 29 inches: Sandy clay loam
29 to 80 inches: Loam

57E—Spriggs loam, 25 to 60 percent slopes

Map Unit Setting

Elevation: 500 to 2,000 feet
Mean annual precipitation: 35 to 52 inches
Mean annual air temperature: 45 to 66 degrees F
Frost-free period: 162 to 207 days

Map Unit Composition

Spriggs and similar soils: 85 percent

Description of Spriggs

Setting

Landform: Hillslopes, mountain slopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from gabbro and/or diorite and/or greenstone

Properties and qualities

Slope: 25 to 60 percent
Surface area covered with cobbles, stones or boulders: 1.5 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 4 inches: Loam
4 to 14 inches: Gravelly loam
14 to 20 inches: Gravelly loam
20 to 41 inches: Bedrock
41 to 51 inches: Bedrock

58—Udorthents, loamy

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Frost-free period: 179 to 222 days

Map Unit Composition

Udorthents and similar soils: 85 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 15 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

59—Urban land

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Frost-free period: 179 to 222 days

Map Unit Composition

Urban land: 85 percent

Bedford County, Virginia

1B—Altavista fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Altavista and similar soils: 85 percent

Description of Altavista

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Alluvium

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 8 inches: Fine sandy loam
8 to 65 inches: Clay loam
65 to 72 inches: Sandy clay loam

7B—Cecil fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Cecil and similar soils: 70 percent

Description of Cecil

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 6 inches: Fine sandy loam
6 to 9 inches: Sandy clay loam
9 to 56 inches: Clay
56 to 72 inches: Loam

7C—Cecil fine sandy loam, 7 to 15 percent slopes

Map Unit Setting

Elevation: 200 to 1,400 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Cecil and similar soils: 70 percent

Description of Cecil

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.4 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 6 inches: Fine sandy loam
6 to 9 inches: Sandy clay loam
9 to 56 inches: Clay
56 to 72 inches: Loam

9B—Cullen loam, 2 to 7 percent slopes

Map Unit Setting

Elevation: 300 to 1,200 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Cullen and similar soils: 75 percent

Description of Cullen

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Loam
9 to 50 inches: Clay
50 to 55 inches: Clay
55 to 72 inches: Clay loam

9C—Cullen loam, 7 to 15 percent slopes

Map Unit Setting

Elevation: 300 to 1,200 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Cullen and similar soils: 75 percent

Description of Cullen

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Loam
9 to 50 inches: Clay
50 to 55 inches: Clay
55 to 72 inches: Clay loam

9D—Cullen loam, 15 to 25 percent slopes

Map Unit Setting

Elevation: 300 to 1,200 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Cullen and similar soils: 70 percent

Description of Cullen

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 9 inches: Loam
9 to 50 inches: Clay
50 to 55 inches: Clay
55 to 72 inches: Clay loam

14C—Grover fine sandy loam, 7 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Grover and similar soils: 70 percent

Description of Grover

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 9 inches: Fine sandy loam
9 to 36 inches: Sandy clay loam
36 to 72 inches: Sandy loam

14D—Grover fine sandy loam, 15 to 25 percent slopes

Map Unit Setting
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Grover and similar soils: 70 percent

Description of Grover

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 36 inches: Sandy clay loam
36 to 72 inches: Sandy loam

14E—Grover fine sandy loam, 25 to 40 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Grover and similar soils: 70 percent

Description of Grover

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 36 inches: Sandy clay loam
36 to 72 inches: Sandy loam

18B—Helena fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Helena and similar soils: 80 percent

Description of Helena

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 13 inches: Sandy clay loam
13 to 59 inches: Clay
59 to 72 inches: Fine sandy loam

18C—Helena fine sandy loam, 7 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Helena and similar soils: 75 percent

Description of Helena

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 13 inches: Sandy clay loam
13 to 59 inches: Clay
59 to 72 inches: Fine sandy loam

19B—Iredell fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Elevation: 300 to 550 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Iredell and similar soils: 70 percent

Description of Iredell

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities
Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 11 inches: Fine sandy loam
11 to 27 inches: Clay
27 to 37 inches: Clay loam
37 to 72 inches: Sandy clay loam

19C—Iredell fine sandy loam, 7 to 15 percent slopes

Map Unit Setting
Elevation: 300 to 550 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Iredell and similar soils: 70 percent

Description of Iredell

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex

Parent material: Mixed mafic residuum

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 11 inches: Fine sandy loam
11 to 27 inches: Clay
27 to 37 inches: Clay loam
37 to 72 inches: Sandy clay loam

21D3—Madison sandy clay loam, 15 to 25 percent slopes, severely eroded

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Madison and similar soils: 75 percent

Description of Madison

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 7 inches: Sandy clay loam
7 to 25 inches: Clay
25 to 30 inches: Loam
30 to 72 inches: Sandy loam

21E3—Madison sandy clay loam, 25 to 40 percent slopes, severely eroded

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Madison and similar soils: 70 percent

Description of Madison

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.1 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 7 inches: Sandy clay loam
7 to 25 inches: Clay
25 to 30 inches: Loam
30 to 72 inches: Sandy loam

23B—Mattaponi sandy loam, 2 to 7 percent slopes

Map Unit Setting

Elevation: 50 to 700 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Mattaponi and similar soils: 85 percent

Description of Mattaponi

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 12 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 10 inches: Sandy loam
10 to 65 inches: Clay

23C—Mattaponi sandy loam, 7 to 15 percent slopes

Map Unit Setting

Elevation: 50 to 700 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Mattaponi and similar soils: 80 percent

Description of Mattaponi

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 12 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 10 inches: Sandy loam
10 to 65 inches: Clay

24B—Mecklenburg loam, 2 to 7 percent slopes

Map Unit Setting
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Mecklenburg and similar soils: 70 percent

Description of Mecklenburg

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 5 inches: Loam
5 to 17 inches: Clay
17 to 26 inches: Clay loam
26 to 72 inches: Fine sandy loam

24C—Mecklenburg loam, 7 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Mecklenburg and similar soils: 70 percent

Description of Mecklenburg

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 4e

Typical profile

0 to 5 inches: Loam
5 to 17 inches: Clay
17 to 26 inches: Clay loam
26 to 72 inches: Fine sandy loam

24D—Mecklenburg loam, 15 to 25 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Mecklenburg and similar soils: 75 percent

Description of Mecklenburg

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 6e

Typical profile

0 to 5 inches: Loam
5 to 17 inches: Clay
17 to 26 inches: Clay loam
26 to 72 inches: Fine sandy loam

26C—Poindexter fine sandy loam, 7 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Poindexter and similar soils: 75 percent

Description of Poindexter

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 22 inches: Sandy clay loam
22 to 41 inches: Fine sandy loam
41 to 51 inches: Bedrock

26D—Poindexter fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Poindexter and similar soils: 85 percent

Description of Poindexter

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Mixed mafic residuum

Properties and qualities
Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 9 inches: Fine sandy loam
9 to 22 inches: Sandy clay loam
22 to 41 inches: Fine sandy loam
41 to 51 inches: Bedrock

26E—Poindexter fine sandy loam, 25 to 60 percent slopes

Map Unit Setting
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Poindexter and similar soils: 80 percent

Description of Poindexter

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex

Parent material: Mixed mafic residuum

Properties and qualities

Slope: 25 to 60 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 22 inches: Sandy clay loam
22 to 41 inches: Fine sandy loam
41 to 51 inches: Bedrock

29D—Sweetapple fine sandy loam, 15 to 25 percent slopes

Map Unit Setting

Elevation: 500 to 1,000 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Sweetapple and similar soils: 70 percent

Description of Sweetapple

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 60 to 79 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water capacity: Low (about 3.4 inches)

Interpretive groups
Land capability (nonirrigated): 7e

Typical profile
0 to 5 inches: Fine sandy loam
5 to 17 inches: Fine sandy loam
17 to 39 inches: Loamy coarse sand
39 to 65 inches: Loamy coarse sand
65 to 75 inches: Bedrock

29E—Sweetapple fine sandy loam, 25 to 60 percent slopes

Map Unit Setting
Elevation: 500 to 1,000 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Sweetapple and similar soils: 70 percent

Description of Sweetapple

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from mica schist

Properties and qualities
Slope: 25 to 60 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 60 to 79 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.4 inches)

Interpretive groups
Land capability (nonirrigated): 7e

Typical profile
0 to 5 inches: Fine sandy loam
5 to 17 inches: Fine sandy loam
17 to 39 inches: Loamy coarse sand

39 to 65 inches: Loamy coarse sand
65 to 75 inches: Bedrock

32A—Toccoa sandy loam, 0 to 2 percent slopes

Map Unit Setting
Elevation: 470 to 1,500 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Toccoa and similar soils: 70 percent

Description of Toccoa

Setting
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 30 to 60 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups
Land capability (nonirrigated): 3w

Typical profile
0 to 7 inches: Sandy loam
7 to 72 inches: Sandy loam

33B—Turbeville fine sandy loam, 2 to 7 percent slopes

Map Unit Setting
Elevation: 200 to 900 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Turbeville and similar soils: 80 percent

Description of Turbeville

Setting
Landform: Hillslopes
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium

Properties and qualities
Slope: 2 to 7 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups
Land capability (nonirrigated): 2e

Typical profile
0 to 9 inches: Fine sandy loam
9 to 12 inches: Clay loam
12 to 72 inches: Clay

33C—Turbeville fine sandy loam, 7 to 15 percent slopes

Map Unit Setting
Elevation: 200 to 900 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Turbeville and similar soils: 75 percent

Description of Turbeville

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium

Properties and qualities

Slope: 7 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile

0 to 9 inches: Fine sandy loam
9 to 12 inches: Clay loam
12 to 72 inches: Clay

34B—Vance fine sandy loam, 2 to 7 percent slopes

Map Unit Setting

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition

Vance and similar soils: 80 percent

Description of Vance

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities

Slope: 2 to 7 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability (nonirrigated): 3e

Typical profile
0 to 12 inches: Fine sandy loam
12 to 40 inches: Clay
40 to 72 inches: Sandy clay loam

34C—Vance fine sandy loam, 7 to 15 percent slopes

Map Unit Setting
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Vance and similar soils: 75 percent

Description of Vance

Setting
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities
Slope: 7 to 15 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups
Land capability (nonirrigated): 4e

Typical profile
0 to 12 inches: Fine sandy loam
12 to 40 inches: Clay
40 to 72 inches: Sandy clay loam

35D—Wateree fine sandy loam, 15 to 25 percent slopes

Map Unit Setting
Elevation: 350 to 700 feet

Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Wateree and similar soils: 75 percent

Description of Wateree

Setting
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities
Slope: 15 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups
Land capability (nonirrigated): 7e

Typical profile
0 to 6 inches: Fine sandy loam
6 to 19 inches: Sandy loam
19 to 39 inches: Sandy loam
39 to 59 inches: Sandy loam
59 to 69 inches: Bedrock

35E—Wateree fine sandy loam, 25 to 40 percent slopes

Map Unit Setting
Elevation: 350 to 700 feet
Mean annual precipitation: 23 to 59 inches
Mean annual air temperature: 45 to 64 degrees F
Frost-free period: 168 to 222 days

Map Unit Composition
Wateree and similar soils: 75 percent

Description of Wateree

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Residuum weathered from granite and gneiss

Properties and qualities

Slope: 25 to 40 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock; 40 to 60 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to low (0.00 to 0.01 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 7e

Typical profile

0 to 6 inches: Fine sandy loam
6 to 19 inches: Sandy loam
19 to 39 inches: Sandy loam
39 to 59 inches: Sandy loam
59 to 69 inches: Bedrock

W—Water

Map Unit Composition

Water: 100 percent

Description of Water

Properties and qualities

Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

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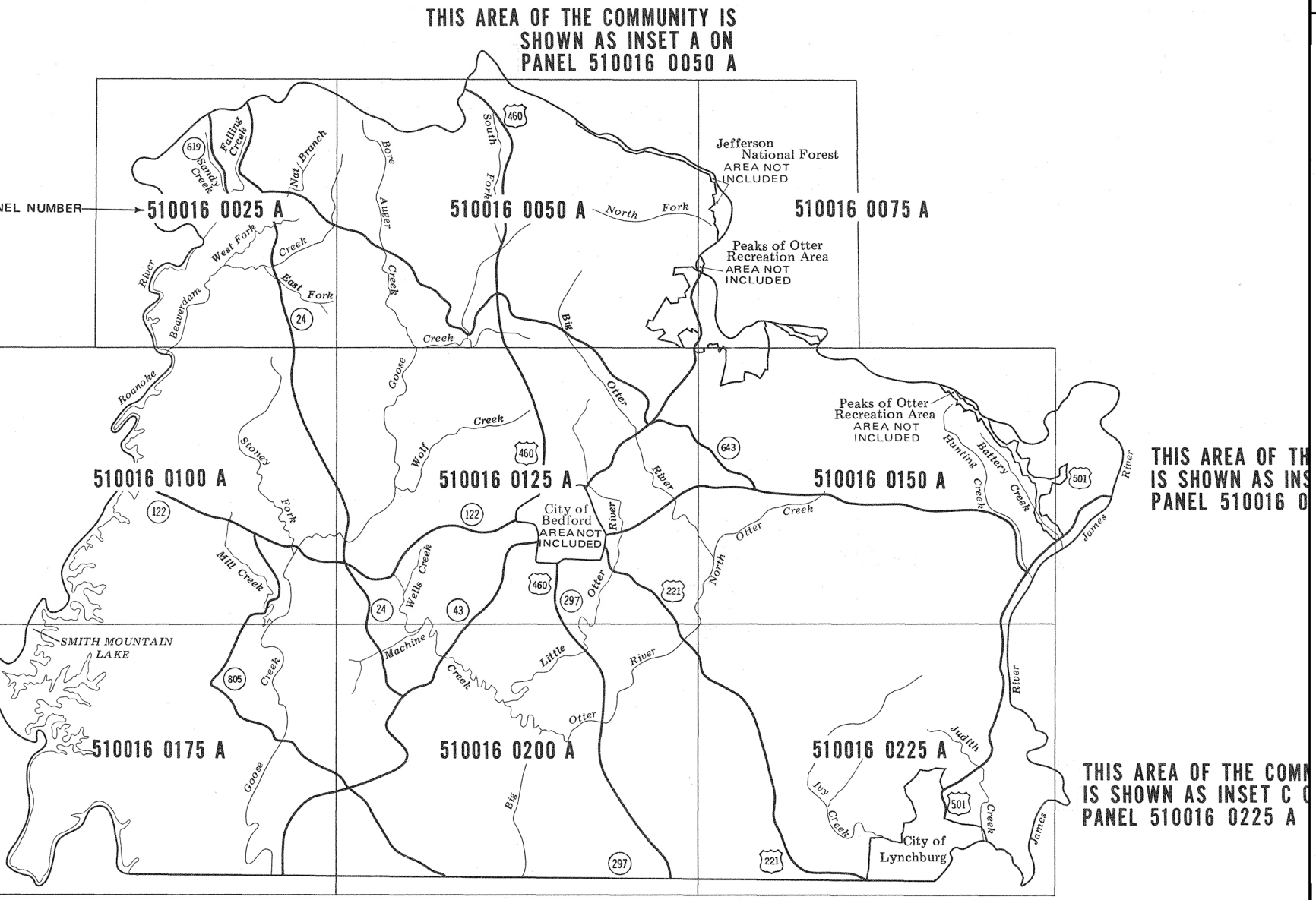

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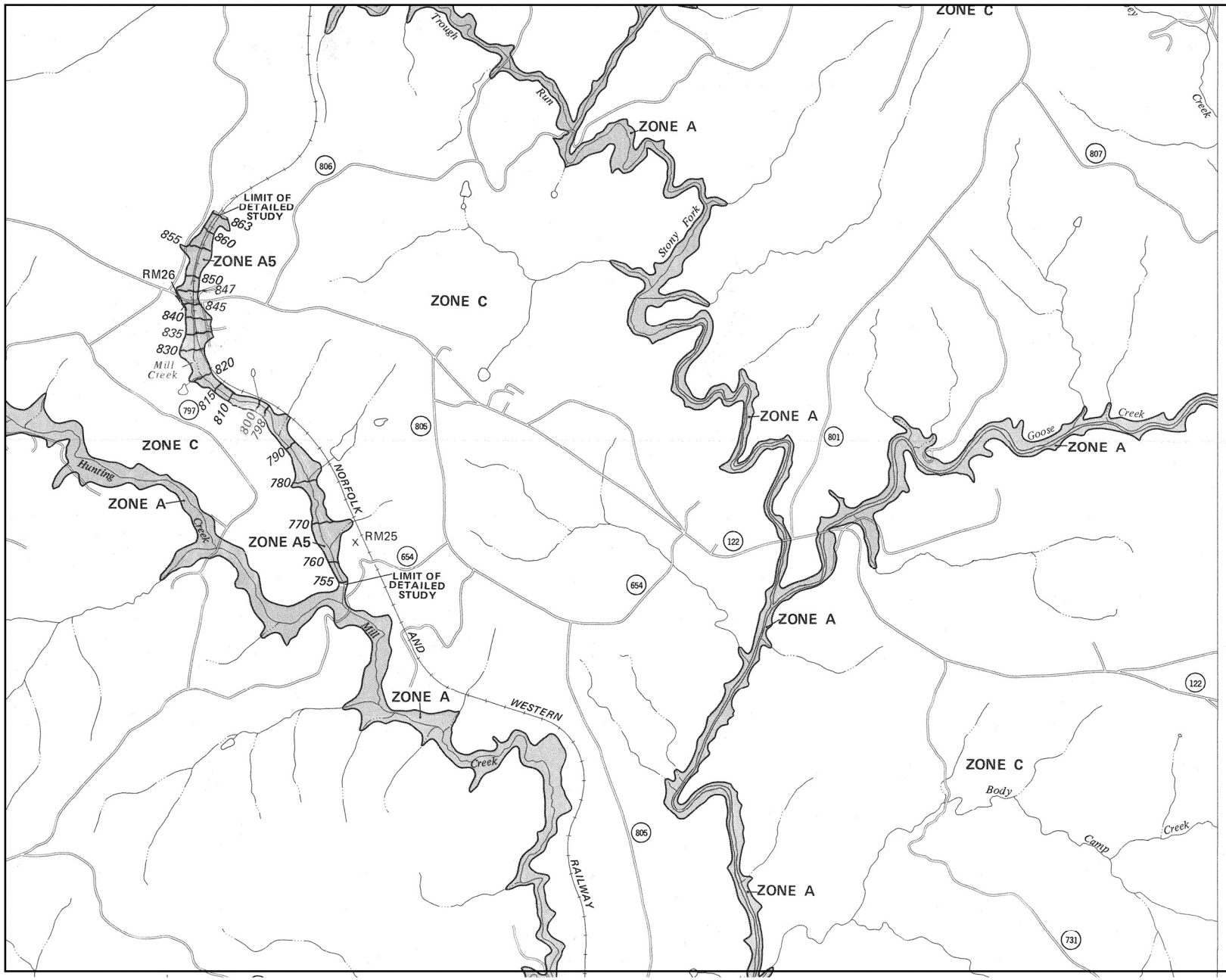

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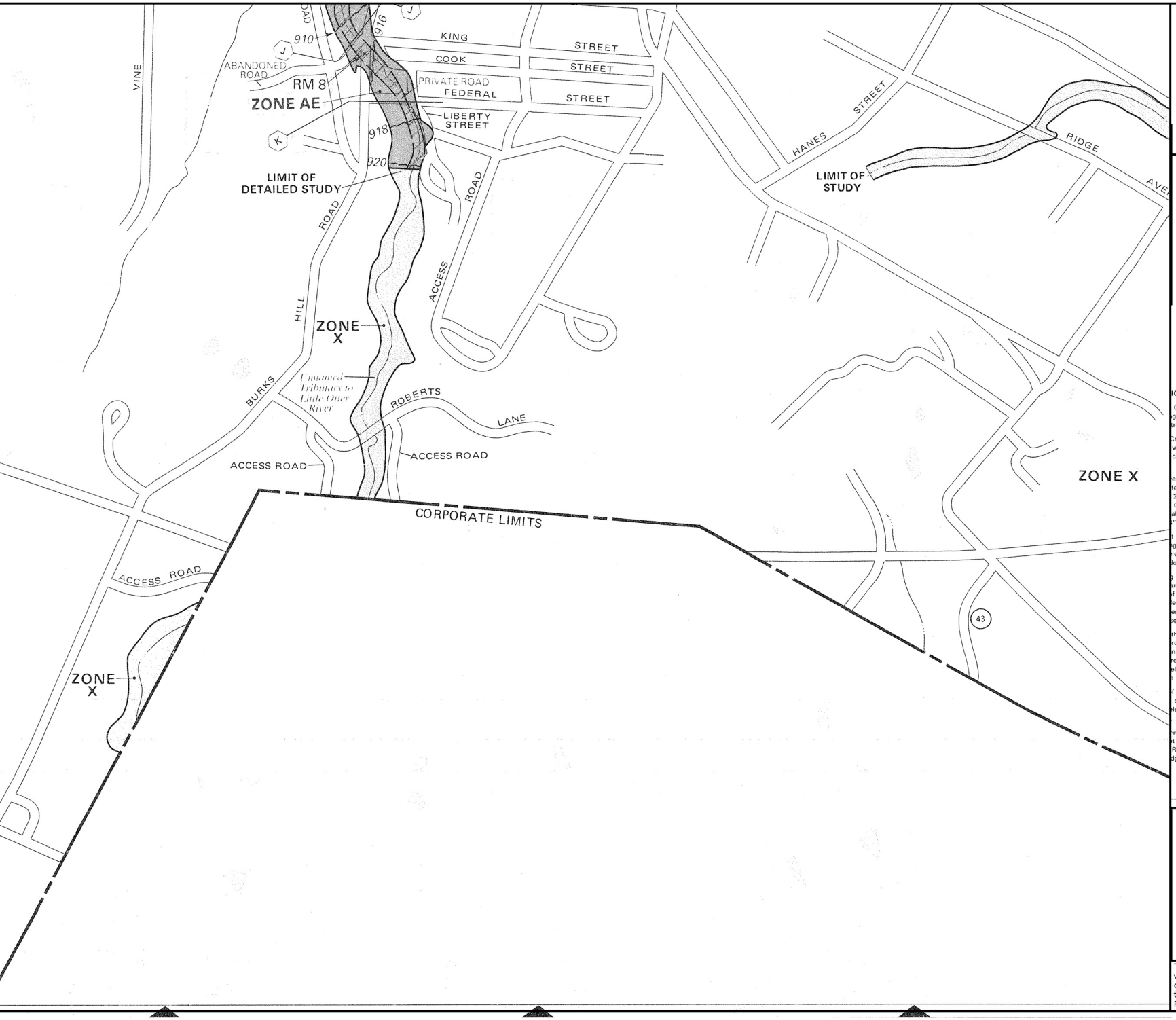

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CITY OF
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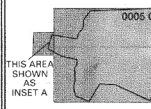
MAP LOCATOR DIAGRAM



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ION

Creek at station
g), a nail and cap
tree.

Creek, 62 feet left
west of a barbed
cap is in the root

est corner of the
feet southwest of
2 feet below the
Geodetic Survey
all of the viaduct

f the Bedford City
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downstream side.

the Norfolk and
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f the arch culvert
egree bend in the
ere is a chiseled
square iron bolt.

thwest along the
rd City Courthouse
nnamed Tributary
road bridge at the
led square in the
wheel guard.

f the Bedford City
of the Unnamed
led square in the

est of the Bedford
t crossing of the
River, a chiseled
dge, left upstream

This is an official copy of a portion of the above referenced flood
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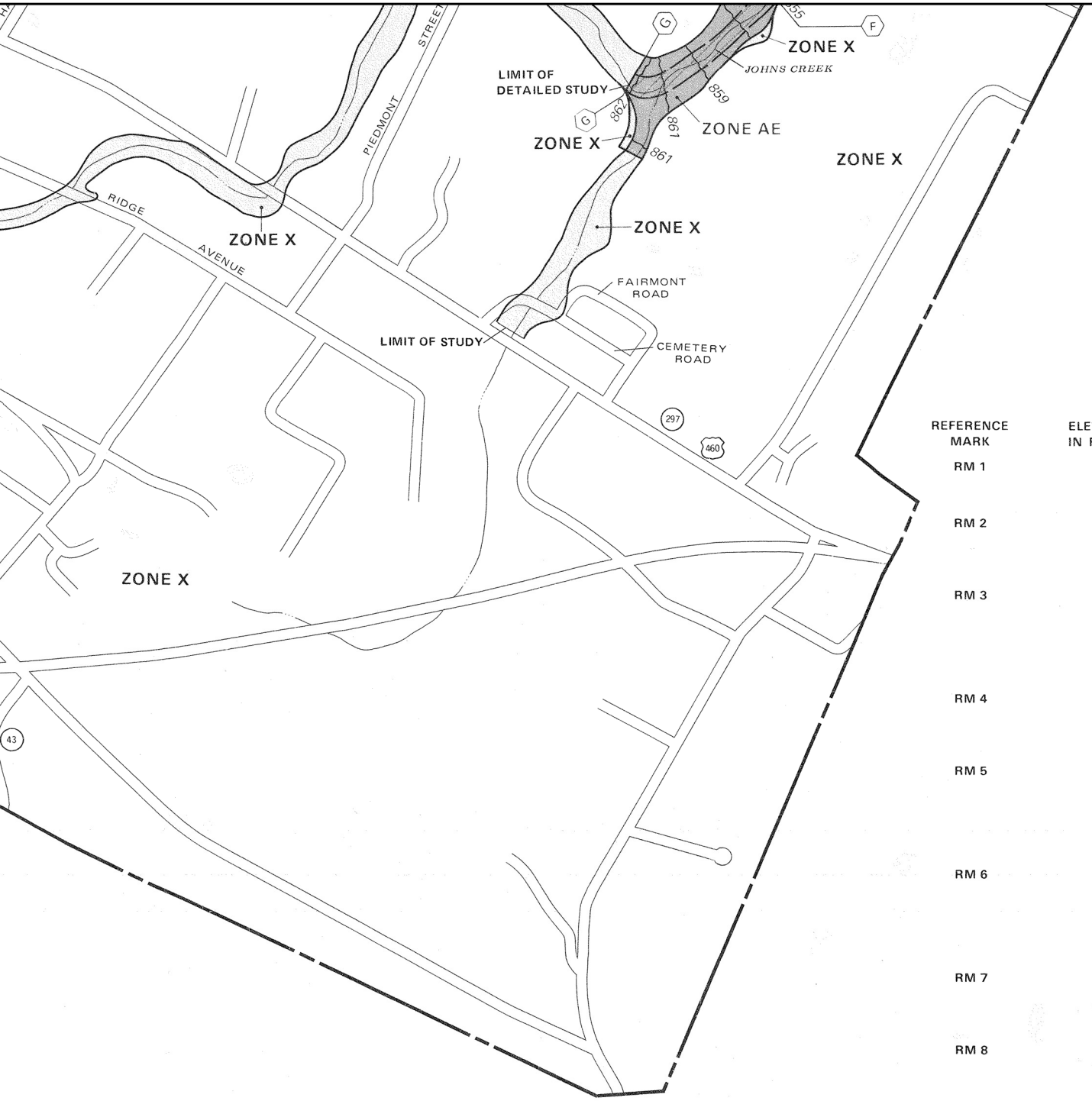

ELEVATION REFERENCE

REFERENCE MARK	ELEVATION IN FT. (NGVD)[1]	DESCRIPTION
RM 1	833.72	In Bedford, on t Creek at station 38+69 (City of Be gl, a nail and cap is in a 36-inch tree.
RM 2	856.71	In Bedford and o Creek, 62 feet left of sewerage sta west of a barbed wire fence line r cap is in the root of the 30-inch
RM 3	933.69	In Bedford, 180 est corner of the Norfolk and Wes feet southwest of the suthwest ra 2 feet below the level of the trac Geodetic Survey disk in the top c all of the viaduct over 4th Street
RM 4	896.58	In Bedford, appro f the Bedford City Courthouse, at th g of the Unnamed Tributary to the led square in the top of concrete downstream side.
RM 5	860.14	Approximately 1 the Norfolk and Western Railway urthouse and 125 feet south of the f the arch culvert under Macon Str egree bend in the 24-inch ductile ere is a chiseled square in the square iron bolt.
RM 6	860.60	In Bedford, appr thwest along the Norfolk and West rd City Courthouse and approximate nnamed Tributary to the Little Otte road bridge at the Elk's National He led square in the southwest corn wheel guard.
RM 7	897.13	In Bedford, appro f the Bedford City Courthouse, at t of the Unnamed Tributary to the led square in the top of concrete
RM 8	917.70	In Bedford, appro est of the Bedford City Courthouse t crossing of the Unnamed Tribut River, a chiseled square in the wh dge, left upstream side.

[1] National Geodetic Vertical Datum of 1929

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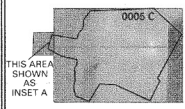

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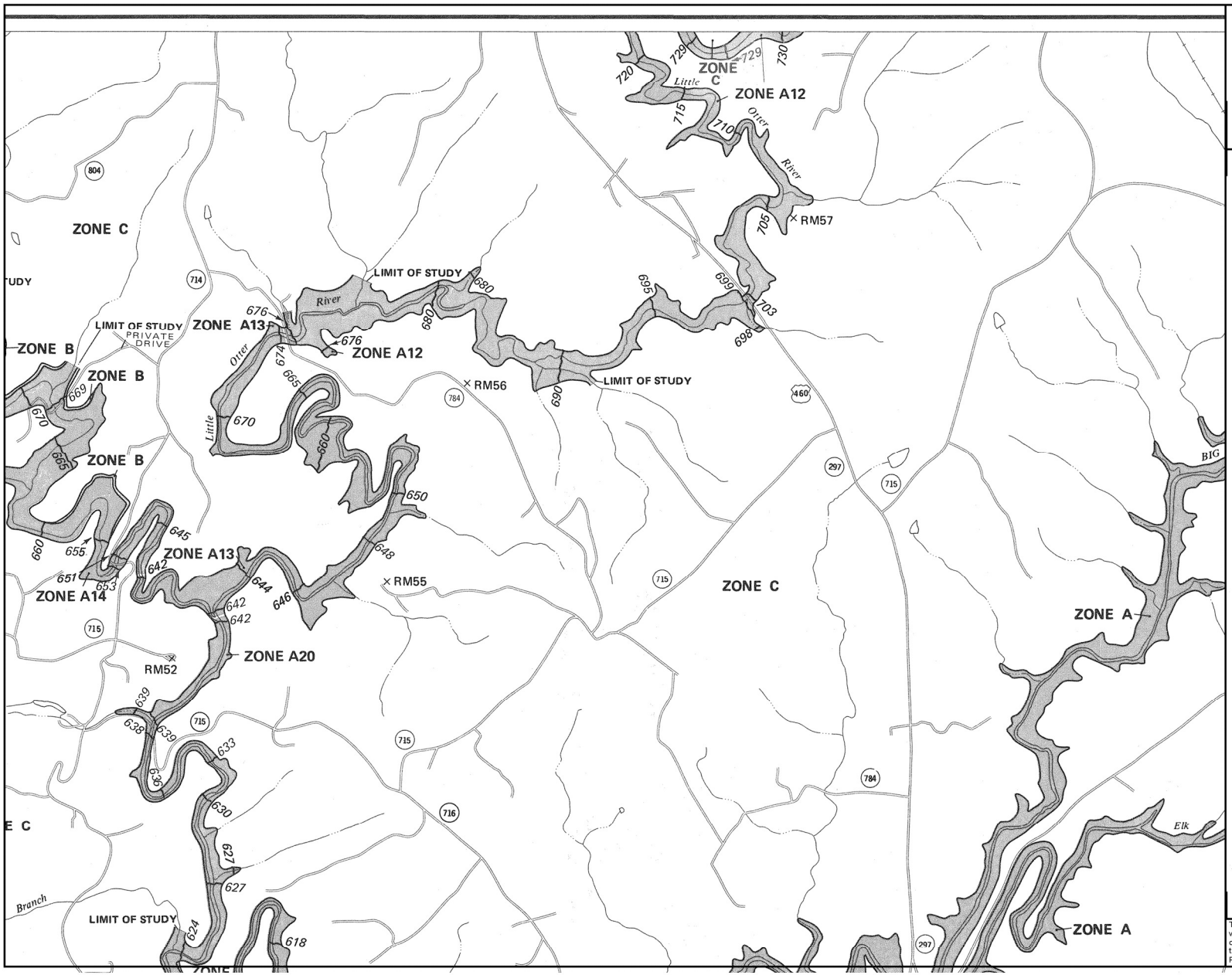

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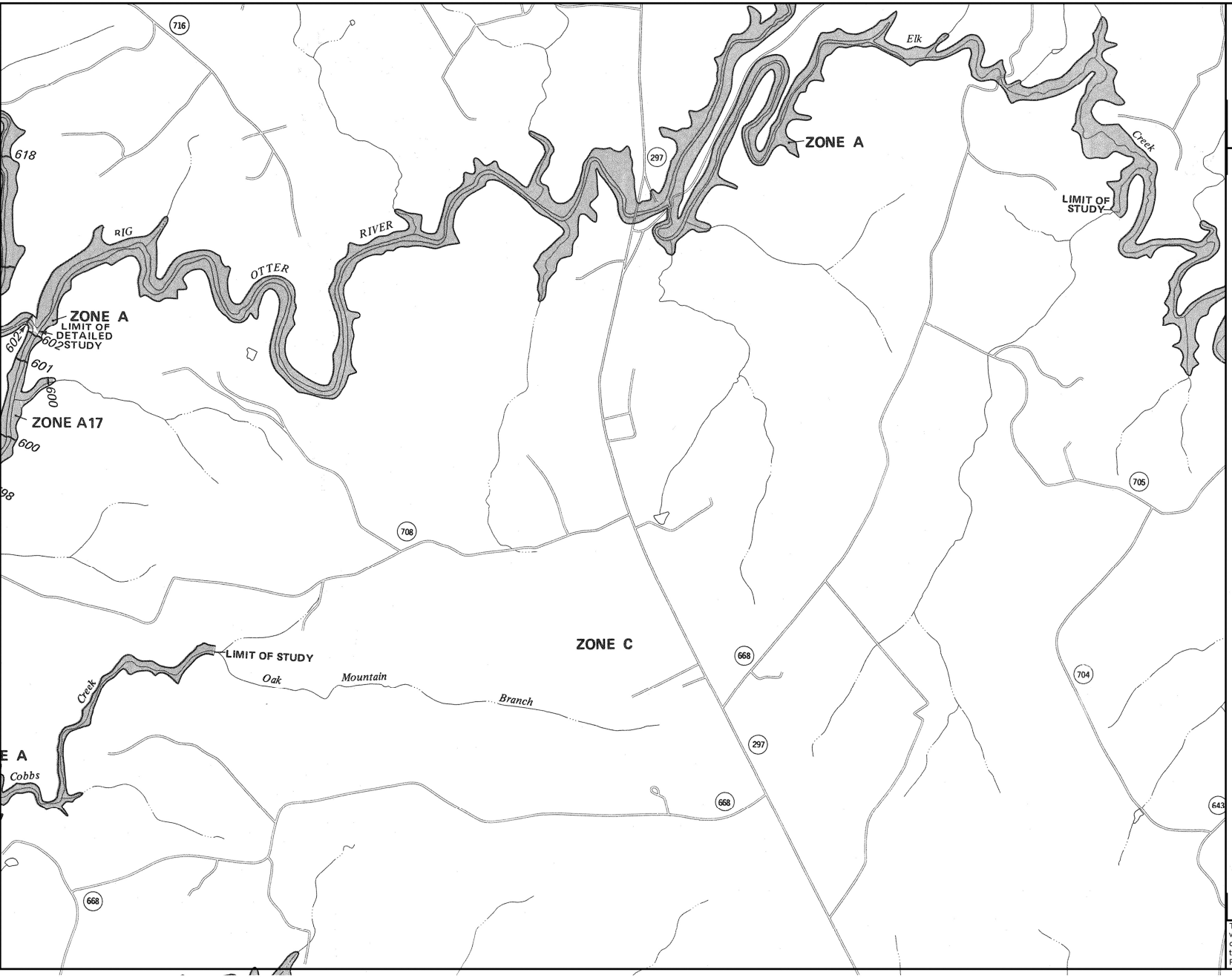

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