REGION 2000 LOCAL GOVERNMENT COUNCIL

REGIONAL WATER SUPPLY PLAN

Amherst County, Appomattox County, Bedford County, Campbell County, Nelson County
City of Bedford, City of Lynchburg, Town of Altavista, Town of Amherst,
Town of Appomattox, Town of Brookneal, Town of Pamplin

Prepared For:
Virginia's Region 2000 Local Government Council
828 Main Street, 12th Floor
Lynchburg, Virginia 24504

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Prepared By:

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3^{RD} PARTY REVIEW

This Report has been subjected to technical and quality reviews by:

Name: Carrie N. Blankenship, P.G. Project Geologist	Signature	Date

Name: Michael D. Lawless, P.G, C.P.G. Project Manager	Signature	Date

Name: Don C. Marickovich, P.E. Quality Reviewer	Signature	Date

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EXECUTIVE SUMMARY

Organization of the Region 2000 Regional Water Supply Plan (Plan) generally follows the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning. The major sections in the Plan include information on water sources, water use, and natural resources in the region; water demand management information including population and demand projections, water conservation practices, and drought response and contingency planning; a statement of need and alternatives analysis; and information on public participation. This executive summary provides a summary of the regional approach as well as a summary for each of the twelve participating jurisdictions. In addition, a separate table of contents is provided for each locality for ease in finding information regarding each locality.

The conclusions presented in the Plan are based upon information (current as of February 2009) provided by the twelve participating jurisdictions and four public water authorities, the Virginia Department of Health (VDH), and/or the Virginia Department of Environmental Quality (VDEQ). The projected water demands presented in the Plan are based on current water source and current water use information provided during the study and as described in the Plan. Future water needs for the region are based on the demand projections, which become more hypothetical as the demands are projected through the 50-year planning period. A projected potential water surplus or deficit in the future does not imply that such a surplus or deficit will actually occur but based on current information plans should be made for addressing this situation. This Plan will be reviewed every five years and resubmitted to VDEQ every 10 years; therefore, the projected water demands and future water needs presented in Plan will be revised as updated information becomes available to refine those projections and more accurately characterize future needs.

The Plan complies with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning, and is a functional plan supporting sustainable growth and economic development. The purpose of the regulation is to establish a comprehensive water supply planning process for the development of local, regional, and state water supply plans. This process is designed to:

- Ensure that adequate and safe drinking water is available to all citizens within the region;

- Encourage, promote, and protect all other beneficial uses of the region's water resources;
- Encourage, promote, and develop incentives for alternative water sources; and
- Promote conservation.

Local governments participating in the regional plan notified VDEQ of their intent to participate in the Plan before the November 2, 2008 deadline. The Plan was submitted to the VDEQ prior to the November 2, 2011 deadline. A public hearing was held by each participating jurisdiction and the local governments passed resolutions approving the Plan and adopting other policies or ordinances that were developed during the planning process.

The Region 2000 regional water supply planning group (Region 2000) is made up of twelve local governments. Participating jurisdictions include the counties of Amherst, Appomattox, Bedford, Campbell, and Nelson; cities of Bedford and Lynchburg; and the towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin. The Amherst County Service Authority (ACSA), Bedford County Public Service Authority (BCPSA), Campbell County Utilities and Service Authority (CCUSA), and Nelson County Service Authority (NCSA) also participate.

Region 2000 recognized the benefits of a regional plan and began developing their Plan in January 2006. Region 2000 was one of the first regions in the Commonwealth of Virginia to begin developing a Plan. Beginning in April 2006 through August 2006, the Region 2000 Local Government Council conducted a series of four workshops with representatives from the Region 2000 participants. The representatives for the Region 2000 participants included utility directors, water plant operators, county administrators, and city and town managers. The purpose of the workshops was to develop a consensus scope of services, work plan, and budget for completing the Plan.

Many of the participants in the region are already working together on water supply issues; therefore, it made sense for the region to continue to work together. One of the most important benefits to result from this regional planning effort is continued communication between participants. Many of the utility directors and water plant operators in the region are getting together on a regular basis (once a month or at least once a quarter) to share information with one another.

Region 2000 is located in the central portion of Virginia in the Blue Ridge Mountains and western piedmont region. According to an estimate provided by the U.S. Census Bureau, the total population for the region in 2000 was estimated to be 243,068, but has increased to an estimated 258,125 in 2007. The region is served by both surface water and groundwater sources. The major streams utilized in the region as water sources include the James River, Big Otter River, Buffalo River, Harris Creek, Reed Creek, and Staunton River. The major reservoirs in the region utilized as water sources include Smith Mountain Lake, Pedlar Reservoir, Graham Creek Reservoir, Black Creek Reservoir, Stoney Creek Reservoir, and Phelps Creek Reservoir. Much of the region is also dependent upon groundwater as well as several springs. The City of Lynchburg is one of the major water providers in the region selling water to the ACSA, BCPSA, and CCUSA.

Overall the region is considered to be a water rich region. Based on projected demands and the total existing public community water system capacities for the each locality, Region 2000 is projected to experience a water supply surplus of approximately 2.0 MGD by the year 2060. It should be noted that there is some uncertainty associated with any point estimate of future deficit (or surplus) 50 years out into the future. This surplus is based on current limiting capacities and total demands (excluding sales to jurisdictions). The majority of this surplus is due to the large surplus from the City of Lynchburg, which provides support to potential alternatives that involve an interconnection with the Lynchburg system; however, several other localities (such as Amherst and Bedford Counties) are projected to experience large water supply deficits by the Year 2060.

Additional private demand (from groundwater and surface water sources) of approximately 17.0 MGD may be needed to supply residential and agricultural users outside the service areas of the public community water systems. It is important to note should any of the private community water systems become part of a public community water system; this may increase the future public community water system deficit projections.

Amherst County

Amherst County is located in the Blue Ridge Mountains in the north central portion of Region 2000. According to the U.S. Census Bureau the population in 2000 was 29,643.

The ACSA owns and operates the public community water system in Amherst County. The public community water systems' Henry L. Lanum, Jr. Water Filtration Plant (WFP) utilizes three surface water sources: Graham Creek Reservoir, a direct stream intake on Harris Creek, and an emergency intake on the James River. Amherst County also purchases water from the City of Lynchburg for resale to the Central Virginia Training Center (CVTC). The system serves approximately 15,774 people in the southeastern portion of the county. The system has an average daily withdrawal of 1.27 MGD. In addition, there are two private community water systems within the County, which are served by groundwater wells. The private community water systems serve approximately 194 people.

Based on the current public water systems, a water supply deficit can be expected between 2018 and 2020. However, plans for the expansion of the Henry L. Lanum, Jr. WFP will provide sufficient water supply until 2050. This deficit is eliminated by the 2050 plans to replace the interconnecting water lines with the City of Lynchburg.

Please note that the Plan generally follows the Regional Water Supply Planning regulation (9 VAC 25-780). The major sections in the Plan, in order, are as follows: information on water sources, water use, and natural resources in the region; water demand management information including population and demand projections, water conservation practices, and drought response and contingency planning; a statement of need and alternatives analysis; and information on public participation. A separate table of contents (including figures and tables) is supplied for Amherst County for ease in finding information specific to Amherst County.

Appomattox County

Appomattox County is located in the western portion of Region 2000. According to the U.S. Census Bureau the population in 2000 was 11,752. There are no public community water systems in Appomattox County and only one private community water system; therefore, the county residents rely on individual groundwater wells.

Based on current plans for future growth (particularly along the Route 460 corridor), the county will experience a water deficit beginning around year 2009. The County currently has plans to purchase water from the CCUSA through an interconnection at Concord. However, without the development of a public community water system or additional purchases from another jurisdiction, the total deficit expected by the year 2060 is approximately 1.0 MGD. In addition, it is estimated that an additional 0.4 MGD of supply will be required for the private community water systems in the county by the year 2060.

A potential alternative that has been previously investigated and would address the deficit expected by year 2060 of approximately 1.0 MGD is a new reservoir site. In 2003, Wiley & Wilson performed an investigative study to evaluate potential water supply source scenarios to provide up to 2.0 MGD for a future water system. The Study, titled *Water Source Study for the Appomattox Area* (August 2003), evaluated nine prospective reservoir sites and recommended two potential reservoir sites to meet the future needs of Appomattox County as well as the Town of Appomattox. In addition, the County and Town of Appomattox have evaluated a new intake on the James River near Bent Creek as a potential water source alternative.

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Bedford County

Bedford County is located in the Blue Ridge Mountains in the southwestern portion of Region 2000. According to the U.S. Census Bureau, the population in 2000 was 60,371. The BCPSA owns and operates the public community water systems in Bedford County. There are three major public community water systems operated by the BCPSA: Forest and New London system, High Point Water Treatment Plant (WTP), and Stewartsville

Consecutive. The Forest and New London system serves the eastern portion of the county using water purchased from the City of Lynchburg. The High Point WTP serves the southern portion of the county and utilizes water from Smith Mountain Lake. Stewartsville Consecutive serves the western portion of the county using water purchased from the Western Virginia Water Authority (WVWA). In addition, the BCPSA operates several smaller community water systems which rely on groundwater wells. The BCPSA serves approximately 18,225 people. In addition, there are 25 private community water systems utilizing groundwater in Bedford County and one private community water system utilizing surface water. These private systems serve approximately 3,523 people. The remaining residents within the County are served by individual groundwater wells.

Without current water purchasing agreements, the BCPSA would already be experiencing a water supply shortage. The current capacity for the BCPSA is 0.79 MGD, which includes water purchased from the WVWA but does not include water purchased from the City of Lynchburg. Based on this capacity, the total deficit by 2060 is projected to be 3.0 to 3.5 MGD. The BCPSA currently purchases approximately 1.4 MGD from the City of Lynchburg and assuming the amount of water purchased remains the same, BCPSA is expected to experience a shortage around 2015.

The BCPSA is currently working to increase their permitted withdrawal capacity at Smith Mountain Lake which will reduce the deficit expected around 2015. Based on the size of Smith Mountain Lake and its use along with Leesville Lake as a pump-back electrical power generation/storage facility, additional water could be withdrawn for water supply in the surrounding area without impacting downstream flows. Additional water withdrawal from Smith Mountain Lake in the future would help address the deficit expected around 2015. However, an expansion of the existing BCPSA or construction of a new WTP would be required to treat additional Smith Mountain Lake withdrawals. The *2000 Update to the 1994 Comprehensive Water and Wastewater Study for Bedford County, Virginia* (Anderson & Associates, December 2000) looked at four potential options for utilizing Smith Mountain Lake water as a source for all areas of the County. These potential alternatives included upgrade of the existing High Point WTP and three options for construction of a new Regional WTP.

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Campbell County

Campbell County is located in the south-central portion of Region 2000. According to the U.S. Census Bureau, the population in 2000 was 46,394. The CCUSA owns and operates the public community water systems in Campbell County. The main community water system operated by the CCUSA is the Central Water System. The system consists of an intake on the Big Otter River and a water treatment facility. The system serves approximately 18,000 people in the central and western portions of the county. In addition, the CCUSA owns and operates one community water system utilizing surface water and four public community water systems utilizing groundwater. The CCUSA also has a water purchase agreement with the City of Lynchburg. The CCUSA as a whole serves approximately 20,160 people with a total average daily withdrawal of 1.79 MGD. In addition, there are nine private community water systems utilizing groundwater serving approximately 1,058 people in Campbell County. The remaining residents in Campbell County rely on individual groundwater wells.

The CCUSA currently sells water to the Town of Altavista. When the water sales to the Town of Altavista are included in the demand projections, CCUSA is projected to experience a shortage of water around the year 2057. If sales to the Town of Altavista are excluded from the demand projections, CCUSA is expected to have a surplus of approximately 0.6 MGD by 2060. CCUSA is also projected to need an additional 0.60 MGD for the private community water systems in the county by the year 2060.

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Nelson County

Nelson County is located in the Blue Ridge Mountains in northeastern portion of Region 2000. According to the U.S. Census Bureau, the population in 2000 was 14,445. The NCSA owns and operates the public community water systems in Nelson County. There are four major water systems operated by the NCSA: Gladstone, Lovingston, Schuyler, and Wintergreen Mountain Village. The Gladstone water system utilizes water from a series of springs. The Lovingston water system serves the central part of the county and utilizes the Black Creek Reservoir as well as groundwater wells. The Schuyler water system serves the eastern portion of the county and utilizes a small reservoir on Johnson's Branch. Finally, Wintergreen Mountain Village serves the northern portion of the county and utilizes Lake Monacan as well as groundwater wells. The NCSA, as a whole, serves approximately 5,090 residents and has an average daily withdrawal of 0.436 MGD. In addition, there are three private community water systems utilizing groundwater in Nelson County, which serve approximately 936 residents. The remaining residents within the County are served by individual groundwater wells.

Nelson County is expected to experience a water supply shortage starting around 2058 with total water deficit of approximately 0.02 MGD by the 2060. It is estimated that an additional 0.4 MGD of supply will be required by 2060 to meet growing private water supply needs within Nelson County.

The Black Creek Reservoir is one of the current water supply sources for the NCSA. Black Creek is a small watershed, therefore the reservoir has a low safe yield. The

NCSA has investigated options for additional water supply to supplement the Black Creek Reservoir. Originally the NCSA submitted a water withdrawal permit for a direct intake on the Tye River, the only significant water source within reasonable proximity to the Black Creek facility. However, the NCSA opted to withdraw the application due to public concerns regarding the lack of available water from the Tye River. NCSA is considering two options to increase water supply capacity in the future. These long term water supply options involve pumping from the Tye River during high water events in order to fill the reservoir which will provide equalization during droughts. The two options that are being considered are a new water line along Route 56 from the Tye River to the Black Creek Reservoir or a new water line following Black Creek to the confluence with the Tye River.

In addition, several reservoir sites have been evaluated that would address the long-term needs of the Rockfish Valley corridor. The *Rockfish Valley/Wintergreen Resort Water Source and Capacity Study* (August 2007) concluded that Nelson County may construct one large reservoir to satisfy demands or incrementally construct several smaller reservoirs as the growth in the Rockfish Valley Corridor increases.

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City of Bedford

The City of Bedford is located at the center of Bedford County along Route 460. According to the U.S. Census Bureau the population in 2000 was 6,299. The major water sources for the City of Bedford include the Stoney Creek Reservoir and five groundwater wells. The City of Bedford Water Treatment Facility serves approximately 7,500 people and has an average daily withdrawal of 1.21 MGD.

Based on the City of Bedford's current capacity of 2.0 MGD (based on a safe yield of water sources), the City of Bedford is projected to have sufficient public water source capacity to satisfy demand through 2060. The City's WTP has a capacity of 3.0 MGD, so additional water supply is possible if a new raw water source was identified. In addition, the City of Bedford has explored two potential interconnections with the City of Lynchburg via the Forest and New London system operated by the BCPSA.

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City of Lynchburg

The City of Lynchburg is located in the heart of Region 2000 at the intersections of Route 29 and Route 460. According to the U.S. Census Bureau, the population in 2000 was 65,269. The two major water sources for the City of Lynchburg are the Pedlar Reservoir, located in Amherst County, and the James River. The College Hill WTP and Abert WTP both receive raw water from the Pedlar Reservoir. Additionally, each WTP can withdraw water from the James River from the Abert raw water pump station. The College Hill WTP can also receive raw water from the Dowtown Pump Station.

The City of Lynchburg serves approximately 66,000 people and has an average daily withdrawal of 11.25 MGD. In addition, the City of Lynchburg sells water to the ACSA, BCPSA, and CCUSA. The City of Lynchburg is water rich and will have sufficient water supply through 2060, even when including current sales to the ACSA, BCPSA, and CCUSA.

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Town of Altavista

The Town of Altavista is located on the southern border of Campbell County along Route 29. The current population of the Town is 3,425 residents. There are four water sources utilized by the Town of Altavista: Reed Creek, Staunton River, McMinnis Spring, and Reynolds Spring. In addition, the Town of Altavista purchases water from the CCUSA. The Town of Altavista WTP serves approximately 3,850 people and has an average daily withdrawal of 1.77 MG. It is important to note that some of the residents within the Town are still served by individual groundwater wells.

The Town of Altavista is expected to experience a water supply deficit around 2052, when projected public water system demands exceed the current public water system capacity of 3.0 MGD. Without the development of a public water system source, or purchase agreement to buy water from another community, the Town of Altavista is expected to experience a total water deficit of approximately 0.3 MGD by 2060. It is estimated that an additional 0.02 MGD of supply will be required by 2060 to meet growing private water supply needs within the Town.

Please note that the Plan generally follows the Regional Water Supply Planning regulation (9 VAC 25-780). The major sections in the Plan, in order, are as follows: information on water sources, water use, and natural resources in the region; water demand management information including population and demand projections, water conservation practices, and drought response and contingency planning; a statement of need and alternatives analysis; and information on public participation. A separate table of contents (including figures and tables) is supplied for the Town of Altavista for ease in finding information specific to the Town of Altavista.

Town of Amherst

The Town of Amherst is located in Amherst County at the intersections of Route 29 and Route 60. The current population of the Town is 2,251 residents. The major water source for the Town is an intake on the Buffalo River. The Town of Amherst WTP serves 2,185 residents and has an average daily withdrawal of 0.47 MGD. It is also important to note that some residents in the Town are still served by individual groundwater wells.

The Town of Amherst currently provides water to residences and businesses in portions of Amherst County, which is included as part of their residential and employment demand. In addition, they sell water to Sweet Briar College, on the order of 21 MG per year. When these water sales are excluded from the projected demands, the Town is projected to experience a surplus of approximately 0.03 MGD in 2060. This is based on a total demand of 0.97 MGD in 2060 and a total public water system capacity of 1.0 MGD. However, when peak demands are considered (1.2 MGD peak day demand in 2060), the Town would be unable to supply enough water from its existing sources to meet the max day demand. If sales are included into the projected demands (increasing the average day demand to 1.14 MGD in 2060), the Town is still projected to experience a deficit of approximately 0.14 MGD by the year 2060.

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Town of Appomattox

The Town of Appomattox is located in the central portion of Appomattox County along Route 460. The current population of the Town is 1,760 residents. The Town of Appomattox is served by groundwater wells. The Town of Appomattox public water system serves approximately 2,476 people and has an average daily withdrawal of 0.23 MGD.

The Town of Appomattox is expected to experience a water supply shortage around 2051, when projected public water system demands exceed the current public water system capacity of 0.33 MGD. Without the development of a public water source, or purchase agreement to buy water from another jurisdiction, the Town of Appomattox is expected to experience a total water deficit of approximately 0.03 MGD by the year 2060. Please note the projected deficit starting in 2051 is based on the Town's ability to continue use of all of their existing groundwater wells. Based on recent water quality issues associated with some of the Town's wells, this assumption may not be realistic, meaning that the Town could experience a water supply shortage much sooner than projected. The Town is considering installing additional wells or a new intake along the James River to supplement the current supply. In addition, it is estimated that an additional 0.03 MGD of supply will be required by 2060 to meet growing private water supply needs within the Town.

Another potential alternative that has been previously investigated and would address the deficit expected by year 2060 of approximately 0.03 MGD is a new reservoir site. In 2003, Wiley & Wilson performed an investigative study to evaluate potential water supply source scenarios to provide up to 2.0 MGD for a future water system. The Study, titled *Water Source Study for the Appomattox Area* (August 2003), evaluated nine prospective reservoir sites and recommended two potential reservoir sites to meet the future needs of the Town of Appomattox as well as Appomattox County.

Please note that the Plan generally follows the Regional Water Supply Planning regulation (9 VAC 25-780). The major sections in the Plan, in order, are as follows: information on water sources, water use, and natural resources in the region; water demand management information including population and demand projections, water conservation practices, and drought response and contingency planning; a statement of need and alternatives analysis; and information on public participation. A separate table of contents (including figures and tables) is supplied for the Town of Appomattox for ease in finding information specific to the Town of Appomattox.

Town of Brookneal

The Town of Brookneal is located in the southeastern corner of Campbell County along Route 501. The current population of the Town is 1,259 residents. The water source for the Town of Brookneal is the Phelps Creek Reservoir. The Town of Brookneal WTP serves approximately 1,259 people and has an average daily withdrawal of 0.16 MGD.

The Town of Brookneal is projected to have sufficient public water source capacity to satisfy demand through 2060, based on their current capacity of 0.38 MGD. By 2060, the Town is expected to have a surplus of approximately 0.14 MGD. It is estimated that an additional 0.81 MGD of supply will be required by 2060 to meet growing private water supply needs within the Town.

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Town of Pamplin

The Town of Pamplin is located on the southeastern border of Appomattox County along Route 460. The current population of the Town is 199 residents. The Town of Pamplin is served by three groundwater wells. The Town of Pamplin Community Water System serves 199 people and has an average daily withdrawal of 0.011 MGD. It is important to note that some residents in the Town are still served by individual groundwater wells.

Based on the projected demands for the Town of Pamplin, the public water source demand projections are only expected to increase by approximately 0.86 MG per year between now and 2060, therefore the Town is projected to have a surplus of approximately 0.02 MGD in 2060. It is estimated that an additional 0.15 MG per year of supply will be required by 2060 to meet growing private water supply needs within the Town.

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1.0 INTRODUCTION

The Region 2000 regional water supply planning group is made up of twelve (12) local governments. Participating jurisdictions include the counties of Amherst, Appomattox, Bedford, Campbell, and Nelson; the cities of Bedford and Lynchburg; and the towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin. The Amherst County Service Authority (ACSA), Bedford County Public Service Authority (BCPSA), Campbell County Utilities and Service Authority (CCUSA), and Nelson County Service Authority (NCSA) also participate.

1.1 Purpose of the Study and Regulation

The Region 2000 Regional Water Supply Plan (Plan) complies with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning, and is a functional plan supporting sustainable growth and economic development. The purpose of the regulation is to establish a comprehensive water supply planning process for the development of local, regional, and state water supply plans. This process is designed to:

- Ensure that adequate and safe drinking water is available to all citizens within the region;
- Encourage, promote, and protect all other beneficial uses of the region's water resources;
- Encourage, promote, and develop incentives for alternative water sources; and
- Promote conservation.

Local governments participating in the regional plan notified VDEQ of their intent to participate in the Plan before the November 2, 2008 deadline. The Plan was submitted to the VDEQ prior to the November 2, 2011 deadline. A public hearing was held by each participating jurisdiction and the local governments passed resolutions approving the Plan and adopting other policies or ordinances that were developed during the planning process.

1.2 Regional Nature of the Study

Region 2000 recognized the benefits of a regional plan and began developing their Plan in January 2006. Region 2000 was one of the first regions in the Commonwealth of Virginia to begin developing a Plan. Beginning in April 2006 through August 2006, the Region 2000 Local Government Council conducted a series of four workshops with representatives from the Region 2000 participants. The representatives for the Region 2000 participants included utility directors, water plant operators, county administrators, and city and town managers. The purpose of the workshops was to develop a consensus scope of services, work plan, and budget for completing the Plan.

Many of the participants in the region are already working together on water supply issues; therefore it made sense for the region to continue to work together. One of the most important benefits to result from this regional planning effort is continued communication between participants. Many of the utility directors and water plant operators in the region are meeting on a regular basis (once a month or at least once a quarter) to share information.

1.3 General Location and Description

Region 2000 is located in the central portion of Virginia and includes the counties of Amherst, Appomattox, Bedford, Campbell, and Nelson; cities of Bedford and Lynchburg; and the towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin. According to an estimate provided by the U.S. Census Bureau, the total population for the region in 2000 was estimated to be 243,068, but has since increase to an estimated 258,125 in 2007. The region will continue to grow into the future; specifically, Bedford County is experiencing significant growth as a result of its location between Roanoke and Lynchburg as well as growth around Smith Mountain Lake. Figure 1.1 identifies the location of each jurisdiction in the Region 2000 regional water supply planning group.

Figure 1.3 – Regional Overview Map

2.0 EVALUATION OF EXISTING WATER SUPPLY

2.1 Existing Water Sources

The homes, businesses and other water users in the region receive water from a variety of sources including: public and private community water systems, private wells, stream or river intakes, and surface water reservoirs. As required by the Regulation[1], current information on existing water sources is detailed in the following sections.

A map showing the locations of the public community water systems in the region is included as Figure 2.1A. A map showing the locations of the private community water systems in the region is included as Figure 2.1B.

[1] 9 VAC 25-780-70 requires the following information on existing water sources.

Figure 2.1A – Public Community Water Systems

Figure 2.1B – Private Community Water Systems

2.1.1 Amherst County

Existing water sources in Amherst County include one public community water system owned and operated by the Amherst County Service Authority (ACSA) as well as two private community water systems. The public community water systems' Henry L. Lanum, Jr. Water Filtration Plant (WFP) utilizes three surface water sources: Graham Creek Reservoir, a direct stream intake on Harris Creek, and an emergency intake on the James River. Amherst County also purchases 140,000-180,000 gallons per day (gpd) of water from the City of Lynchburg for resale to the Central Virginia Training Center (CVTC). In addition, there are two private community water systems within the County. These private community water systems use groundwater wells as a water supply source. These wells are generally limited in capacity and vary in quantity throughout the year. Finally, there are homes and businesses within the County that are served by individual groundwater wells. A map showing the public community water system in Amherst County is presented as Figure 2.1.1.

Figure 2.1.1 – Amherst County Public Community Water System

2.1.2 Appomattox County

Existing water sources in Appomattox County include one private community water system using a groundwater well as a water supply. This well is generally limited in capacity and varies in quantity throughout the year. There are no public community water systems in Appomattox County. Finally, there are homes and businesses within the County that are served by individual groundwater wells.

Figure 2.1.2 – Appomattox County Public Community Water Systems

2.1.3 Bedford County

Existing water sources in Bedford County include public community water systems owned and operated by the Bedford County Public Service Authority (BCPSA), as well as privately owned community water systems. There are three major public community water systems operated by the BCPSA: Forest and New London System, High Point WTP, and Stewartsville Consecutive. The Forest and New London system serves the eastern portion of the county using water purchased from the City of Lynchburg. The High Point WTP serves the southern portion of the county and utilizes water from Smith Mountain Lake. Stewartsville Consecutive serves the western portion of the county using water purchased from the WVWA. In addition, the BCPSA operates smaller community water systems which rely on groundwater wells.

There are also 25 private community water systems utilizing groundwater in Bedford County and one private community water system utilizing a surface water reservoir. Finally, there are homes and businesses within the County that are served by individual groundwater wells. These wells are generally limited in capacity and vary in quantity throughout the year. A map showing the public community water systems in Bedford County is presented as Figure 2.1.3.

Figure 2.1.3 – Bedford County Public Community Water Systems

2.1.4 Campbell County

Existing water sources in Campbell County include public community water systems owned and operated by the Campbell County Utilities and Service Authority (CCUSA) as well as privately owned community water systems. The CCUSA owns and operates a community water system using a stream intake as well as purchasing water from the City of Lynchburg. In addition, the CCUSA operates four community water systems that rely on groundwater wells for a water supply. All of the private community water systems in Campbell County rely on groundwater wells for water supply. Finally, there are homes and businesses within the County that are served by individual groundwater wells. These wells are generally limited in capacity and vary in quantity throughout the year. A map showing the public community water systems in Campbell County is presented as Figure 2.1.4.

Figure 2.1.4 – Campbell County Public Community Water Systems

2.1.5 Nelson County

Existing water sources in Nelson County include public community water systems owned and operated by the Nelson County Service Authority (NCSA) as well as private community water systems. The NCSA owns and operates three public community water systems using surface water reservoirs, the Schuyler, Lovingston, and Wintergreen Mountain Village systems, as well as one public community water system using a stream intake, Gladstone. Two of these public community water systems also utilize groundwater wells as a water supply. In addition, all of the private community water systems rely on groundwater wells as a water supply. Finally, there are homes and businesses within the County that are served by individual groundwater wells. These wells are generally limited in capacity and vary in quantity throughout the year. A map showing the public community water systems in Nelson County is presented as Figure 2.1.5.

Figure 2.1.5 – Nelson County Public Community Water Systems

2.1.6 City of Bedford

Existing water sources in the City of Bedford include a public community water system owned by the City. Water is supplied to the residents by the City of Bedford Water Treatment Facility. The water sources for the City of Bedford include the Stoney Creek Reservoir and five groundwater wells. A map showing the City of Bedford public community water system is presented as Figure 2.1.6.

Figure 2.1.6 – City of Bedford Public Community Water Systems

2.1.7 City of Lynchburg

Water is supplied to the residents by the City of Lynchburg waterworks, a publically owned water system. This waterworks includes two water treatment plants, College Hill WTP and Abert WTP, and two surface water sources, the Pedlar Reservoir and the James River. A map showing the public community water system in the City of Lynchburg is presented as Figure 2.1.7.

Figure 2.1.7 – City of Lynchburg Public Community Water Systems

2.1.8 Town of Altavista

Existing water sources in the Town of Altavista include a public community water system owned and operated by the Town. Water is supplied to the residents by the Town of Altavista Water Treatment Facility. This community water system relies on two stream intakes and two springs for a water supply. In addition, the Town of Altavista purchases water from the CCUSA. A map showing the Town of Altavista public community water system is presented as Figure 2.1.8.

Figure 2.1.8 – Town of Altavista Public Community Water Systems

2.1.9 Town of Amherst

Existing water sources in the Town of Amherst include a public community water system owned and operated by the Town. Water is supplied to the residents by the Town of Amherst Water Treatment Facility. This community water system relies on a stream intake on the Buffalo River for a water supply source. A map showing the Town of Amherst public community water system is presented as Figure 2.1.9.

Figure 2.1.9 – Town of Amherst Public Community Water Systems

2.1.10 Town of Appomattox

Existing water sources in the Town of Appomattox include one public community water system utilizing groundwater which is owned and operated by the Town. A map showing the Town of Appomattox public community water system is presented as Figure 2.1.10.

Figure 2.1.10 – Town of Appomattox Public Community Water System

2.1.11 Town of Brookneal

Existing water sources in the Town of Brookneal include one public community water system utilizing a surface water reservoir (Phelps Creek Reservoir) and is owned and operated by the Town. A map showing the Town of Brookneal public community water source is presented as Figure 2.1.11.

Table 2.1.11 – Town of Brookneal Public Community Water System

2.1.12 Town of Pamplin

Existing water sources in the Town of Pamplin include one public community water system utilizing three groundwater wells and is owned and operated by the Town. A map showing the Town of Pamplin public community water system is presented as Figure 2.1.12.

Figure 2.1.12 – Town of Pamplin City Public Community Water System

2.2 Community Water Systems Using Groundwater[2]

2.2.1 Amherst County

Two community water systems within Amherst County utilize groundwater as a water source. Orchard Hill Estates and Woodland Mobile Home Park (MHP) are private community water systems. Each is discussed below.

2.2.1.1 *Orchard Hill Estates*

Orchard Hill Estates is a private community water system owned by the Orchard Hill Community Development Association, Inc. This community water system consists of one drilled 6-inch well. Well No. 2 was drilled to a depth of 320 feet and cased and grouted to a depth of 52 feet. The yield was estimated at approximately 17 gallons per minute (gpm). A chlorine solution is injected into the water for disinfection prior to entering the 6,000 gallon atmospheric-type storage tank. The design capacity of the system is limited to 30 equivalent residential connections (ERCs) or 12,000 gallons per day (gpd).

2.2.1.2 *Woodland MHP*

Woodland MHP is a private community water system owned by Mr. Charles Hammer. This community water system consists of one drilled 6-inch well. The well was drilled to a depth of 320 feet and cased and grouted to a depth of 52 feet. The yield was estimated at approximately 50 gpm. The water is stored in a 16,500 gallon standpipe as well as a 2,000 gallon pressure-type storage tank. The total effective storage capacity for the system is 17,167 gallons. The design capacity of the system is limited to 65 mobile home connections or 19,600 gpd.

2.2.2 Appomattox County

Appomattox County does not own a public community water system utilizing groundwater. Pineview Home for the Elderly is the only community water system utilizing groundwater in Appomattox County. This system is discussed below.

[2] 9 VAC 25-780-70 B.

2.2.2.1 *Pineview Home for the Elderly*

Pineview Home for the Elderly is a private community water system owned by Manor Care Management, Inc. This community water system consists of one drilled 6-inch well. The well was drilled to a depth of 82 feet and cased and grouted to a depth of 63 feet. The yield was estimated at approximately 30 gpm. The water is stored in a 40 gallon pressure tank with an effective storage capacity of 13.3 gallons. The design capacity of the system is limited to a home with 27 beds and a single family residence.

2.2.3 Bedford County

Many of the community water systems in Bedford County, both publicly and privately owned, rely on groundwater. The public community water systems owned by the BCPSA include the following: Ashton Ridge Subdivision, Forty Acres Subdivision, Gross Point Subdivision, Hillcrest Subdivision, Lake Estates Subdivision, Meadow Run MHP, Mountain View Shores Subdivision, Stallion Run Estates/Quesenberry MHP, Valley Mills Crossing, and Woodhaven Nursing Home.

The following community water systems are privately owned: Bedford Place No. 2, Cedar Hills MHP, Harbor Ridge Subdivision, Hardy Road MHP (sections one and two), Mariners Landing Subdivision, Paradise Point Estates, Timber Ridge Subdivision, Twin Oaks MHP, Virginia Ridge Subdivision, The Waterways Subdivision, Georgia Pacific Corporation, Big Island, Blue Ridge Heights, Clearview Estates, Cherry Hill Estates, Edwards MHP, Harbour Heights Subdivision, Homestead MHP, Lake Forest Subdivision, Landmark MHP, Liberty Apartments, Montvale Water Company, Inc., Snidow Subdivision, and Virginia Department of Transportation (VDOT). Each is discussed below.

2.2.3.1 *Forty Acres Subdivision*

Forty Acres Subdivision is a public community water system owned and operated by the BCPSA. This community water system consists of one drilled 6-inch well. The well was drilled to a depth of 320 feet and cased to a depth of 52 feet. The yield was estimated at approximately 18 gpm. The water is pumped to a ground storage tank with a 10,000 gallon capacity. The design capacity of this community water system is limited to 36 residential connections or 14,400 gpd. Please note that this community water system was connected to the High Point community water system in August 2008.

2.2.3.2 *Gross Point Subdivision*

Gross Point Subdivision is a public community water system owned and operated by the BCPSA. This community water system consists of three drilled 6-inch wells. Well No. 2 was drilled to a depth of 255 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 14 gpm. Well No. 3 was drilled to a depth of 360 feet. No other well construction information was available. The yield was estimated at approximately 13 gpm. Well No. 4 was drilled to a depth of 340 feet and cased and grouted to a depth of 75 feet. The yield was estimated at approximately 48 gpm. The water from the three wells is pumped into a 30,000 gallon atmospheric-type tank and a 30,000 gallon pressure tank. These tanks have a combined total effective storage of 40,000 gallons. The water is treated to remove iron and manganese with three 36 inch diameter filters. The filters can treat up to 64 gpm. The design capacity for this system is limited to 200 ERCs or 80,000 gpd. Please note that this community water system was connected to the High Point community water system in August 2008.

2.2.3.3 *Hillcrest Subdivision*

Hillcrest Subdivision is a public community water system owned and operated by the BCPSA. The system consists of two drilled 6-inch wells. Well No. 1 was drilled to a depth of 97 feet. No other well construction information was available. The yield was estimated at approximately 17.5 gpm. Well No. 2 was drilled to a depth of 180 feet. No other well construction information was available. The yield was estimated at approximately 23.5 gpm. The water is pumped into two 220 gallon pressure tanks with an effective storage of 147 gallons. The design capacity of the system is limited to the 34 existing mobile home connections.

2.2.3.4 *Lake Estates Subdivision*

Lake Estates Subdivision is a public community water system owned and operated by the BCPSA. This system consists of two drilled 6-inch wells. Well No. 1 was drilled to a depth of 185 feet and cased and grouted to a depth of 70 feet. The yield was estimated at approximately 30 gpm. Well No. 2 was drilled to a depth of 180 feet and cased and grouted to a depth of 54 feet. The yield was estimated at approximately 38 gpm. The system also includes two booster pumps with a combined capacity of 184 gpm. The system includes an atmospheric-type storage tank and a pressure tank with a combined effective storage capacity of 20,663 gallons. The design capacity of the system is 103 ERCs or 41,200 gpd. Please note that this community water system was connected to the High Point community water system in August 2008.

2.2.3.5 *Meadow Run MHP*

Meadow Run MHP is a public community water system owned and operated by the BCPSA. This system consists of one drilled 6-inch well. No well construction or yield information was available. System storage consists of two 86-gallon pressure tanks with an effective storage capacity of 57 gallons. The design capacity of the system is limited to the 14 mobile home connections.

2.2.3.6 *Mountain View Shores*

Mountain View Shores is a public community water system owned and operated by the BCPSA. This system consists of four drilled 6-inch wells. The yield for Well No. 2 was estimated at 40 gpm but no other well information was available. Well No. 4 was drilled to a depth of 360 feet and cased and grouted to a depth of 60 feet. The yield was estimated at approximately 35 gpm. Well No. 5 was drilled to a depth of 320 feet and cased and grouted to a depth of 56 feet. The yield was estimated at approximately 33 gpm. Well No. 6 was drilled to a depth of 320 feet and cased and grouted to a depth of 68 feet. The yield was estimated at approximately 36 gpm. Water pumped from wells No. 5 and No. 6 is treated for iron and manganese by two greensand filters. Water is stored in a 100,000 gallon standpipe. The design capacity of this system is unknown.

2.2.3.7 *Stallion Run Estates/Quesenberry MHP*

Stallion Run Estates/Quesenberry MHP is a public community water system owned and operated by the BCPSA. This system consists of one 6-inch well. The well was drilled to a depth of 225 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 12 gpm. The system includes three 120-gallon pressure tanks. The design capacity of the system is limited to the 17 existing connections.

2.2.3.8 *Valley Mills Crossing*

Valley Mills Crossing is a public community water system owned and operated by the BCPSA. The system consists of one 6-inch drilled well. The well was drilled to a depth of 300 feet and cased and grouted to a depth of 110 feet. The yield was estimated at approximately 16 gpm. The system includes an atmospheric tank with an effective storage capacity of 6,020 gallons. The design capacity of the system is limited to 30 ERCs or 12,000 gpd.

2.2.3.9 *Woodhaven Nursing Home*

Woodhaven Nursing Home is a public community water system owned and operated by the BCPSA. The system consists of one 6-inch well. The well was drilled to a depth of 213 feet and cased and grouted to a depth of 173 feet. The yield was estimated at approximately 143 gpm. The water is chlorinated with the addition of a liquid hypochlorite solution. Water is stored in a 30,000 gallon atmospheric type standpipe with an effective storage capacity of 24,875 gallons. The design capacity of the system is limited to 49,750 gpd.

2.2.3.10 *Bedford Place No. 2*

Bedford Place No. 2 is a private community water system owned by Shelton Waterworks, Inc. The system consists of one 6-inch well. The well was drilled to a depth of 200 feet and is cased to a depth of 88 feet. The yield was estimated at approximately 12 gpm. The system includes a 5,000-gallon pressure tank with an effective storage capacity of 1,670 gallons. The design capacity of the system is limited to the 17 existing connections.

2.2.3.11 *Cedar Hills MHP*

Cedar Hills MHP is a private community water system owned and operated by Mr. Charles Hammer. This system consists of two 6-inch wells. Well No. 1 was drilled to a depth of 200 feet and cased to a depth of 60 feet. The yield was estimated at approximately 30 gpm. Well No. 2 was drilled to a depth of 300 feet and cased to a depth of 60 feet. The yield was estimated at approximately 10 gpm. The water is pumped to a 2,000 gallon pressure tank with an effective storage capacity of 667 gallons. The design capacity of the system is limited to the 33 existing mobile home connections.

2.2.3.12 *Harbor Ridge Subdivision*

Harbor Ridge Subdivision is a private community water system owned by Mr. William F. Trinkle and operated by Terry and Ruthie Dooley. This system consists of one 6-inch well. Well No. 1 was drilled to a depth of 220 feet and cased and grouted to a depth of 52 feet. The yield was estimated at approximately 34 gpm. The water is stored in a 6,000-gallon atmospheric storage tank as well as a 2,500-gallon pressure tank. The system has an effective storage capacity of 6,833 gallons. A chlorinator is used to add chlorine to the water as a disinfectant. The design capacity of the system is limited to 34 ERCs or 13,600 gpd.

2.2.3.13 *Hardy Road MHP, Section I*

Hardy Road MHP, Section I is a private community water system owned by Mr. D. J. Cooper. This system consists of two 6-inch drilled wells. No well construction information was available. The yield for Well No. 1 was estimated at approximately 1-2 gpm. The yield for Well No. 2 was estimated at approximately 25 gpm. The water is stored in a 7,500-gallon concrete reservoir as well as four 120-gallon pressure tanks. The design capacity of the system is limited to the 43 existing connections.

2.2.3.14 *Hardy Road MHP, Section II*

Hardy Road MHP, Section II is a private community water system owned by Mr. D. J. Cooper. This system consists of two 6-inch drilled wells. No well construction information was available for Well No. 1. The yield was estimated at approximately 2 gpm. Well No. 5 was drilled to a depth of 205 feet and cased and grouted to a depth of 54 feet. The yield was estimated at approximately 60 gpm. System storage consists of a 10,000-gallon storage tank and five 44-gallon pressure tanks. The design capacity of the system is limited to the 66 existing connections.

2.2.3.15 *Mariners Landing Subdivision*

Mariners Landing Subdivision is a private community water system owned by J. W. Development, Inc. and is operated by Mr. Jeff Burdett. This system consists of five 6-inch wells. Well No. 5 was drilled to a depth of 320 feet and cased and grouted to a depth of 92 feet. The yield was estimated at approximately 25 gpm. Well No. 7 was drilled to a depth of 320 feet and cased and grouted to a depth of 98 feet. The yield was estimated at approximately 76 gpm. Well No. 8 was drilled to a depth of 405 feet and cased and grouted to a depth of 60 feet. The yield was estimated at approximately 5 gpm. Well No. 9 was drilled to a depth of 405 feet and cased and grouted to a depth of 53 feet. The yield was estimated at approximately 28 gpm. Well No. 10 was drilled to a depth of 365 feet and cased and grouted to a depth of 74 feet. The yield was estimated at approximately 17 gpm. The combined yield was estimated at approximately 151 gpm or 117,600 gpd. System storage consists of a 35,000-gallon and a 105,000-gallon atmospheric standpipe as well as a 2,500-gallon hydropneumatic tank. The total effective storage for the system is 136,633 gallons. The design capacity of the system is limited to 294 ERCs or 117,600 gpd.

2.2.3.16 *Paradise Point Estates*

Paradise Point Estates is a private community water system owned by Paradise Point Corporation and operated by Mr. Thomas J. Hughes. This system consists of one 6-inch well. The well was drilled to a depth of 425 feet and cased and grouted to a depth of 80 feet. The yield was estimated at approximately 12 gpm. The system contains a 6,000-gallon storage tank as well as a 1,000-gallon hydropneumatic tank. The effective storage is approximately 6,333 gallons. Soda ash is added for corrosion control and sodium hypochlorite is added for disinfection. The design capacity of the system is limited to the 24 existing residential connections.

2.2.3.17 *Timber Ridge Subdivision*

Timber Ridge Subdivision is a private community water system owned by Mayfore Water Company, Inc. This system consists of one 6-inch well. The well was drilled to a depth of 110 feet and was cased and grouted to a depth of 100 feet. The yield was estimated at approximately 26 gpm. The system contains a 10,000-gallon ground storage tank and a 500-gallon pressure tank. The system has an effective storage of approximately 10,166 gallons. The design capacity of the system is limited to 49 connections.

2.2.3.18 *Twin Oaks MHP*

Twin Oaks MHP is a private community water system owned by Alice Leonard. This system consists of one 6-inch well. The well was drilled to a depth of 205 feet and cased and grouted to a depth of 86 feet. The yield was estimated at approximately 20 gpm. The system contains a 2,000-gallon pressure tank with an effective storage capacity of 667 gallons. The design capacity of the system is limited to the 15 existing mobile home connections.

2.2.3.19 *Virginia Ridge Subdivision*

Virginia Ridge Subdivision is a private community water system owned and operated by the Virginia Ridge Water Company, Inc. The system consists of one 6-inch well. The well was drilled to a depth of 590 feet and cased and grouted to a depth of 65 feet. The yield was estimated at approximately 90 gpm. Hypochlorite and orthophosphate are added to the water for disinfection. Water is stored in a 102,785-gallon ground storage tank. The design capacity of the system is limited to 49 ERCs.

2.2.3.20 *The Waterways Subdivision*

The Waterways Subdivision is a private community water system owned by the Waterways Property Owners Association. The system consists of two 6-inch wells. Well No. 7 was drilled to a depth of 280 feet and cased and grouted to a depth of 52 feet. The yield was estimated at approximately 22 gpm. Well No. 8 was drilled to a depth of 380 feet and cased and grouted to a depth of 52 feet. The yield was estimated at approximately 25 gpm. Iron and manganese is removed using two 36-inch diameter pressure sand filters. The water is stored in two atmospheric tanks with capacities of 11,000 gallons and 10,800 gallons as well as one 2,500-gallon pressure tank. The total effective storage is 22,633 gallons. The design capacity of the system is limited to 84 ERCs or 33,600 gpd.

2.2.3.21 *Others*

Ashton Ridge Subdivision is public community water systems using groundwater owned and operated by the BCPSA; however, no information was available for this water system. Big Island, Blue Ridge Heights, Clearview Estates, Cherry Hill Estates, Edwards MHP, Georgia Pacific, Harbour Heights Subdivision, Homestead MHP, Lake Forest Subdivision, Landmark MHP, Liberty Apartments, Montvale Water Company, Inc., Snidow Subdivision, and VDOT are private community water systems using groundwater; however, no information was available for these water systems.

2.2.4 Campbell County

Many of the community water systems, both publicly and privately owned, rely on groundwater. The public community water systems owned by the CCUSA that rely on groundwater include the following: Carson/Lexington/Windsor Forest, Concord Village, Naruna, and 501 Trailer Court. The following community water systems are privately owned: Castle Craig Subdivision, Eastbrook Mobile Home Court, Knoll Woods/Ivy Acres, Lakeside MHP, Locust Gardens MHP, Mountain Rest Estates, Rustburg Correctional Unit No. 9, Suburban Trailer Town, and Trent's MHP. Each is discussed below.

2.2.4.1 *Carson/Lexington Park/Windsor Forest*

Carson/Lexington Park/Windsor Forest is a public community water system owned and operated by the CCUSA. This community water system consists of three 8-inch wells. Well No 1 (Carson Well) was drilled to a depth of 180 feet and cased and grouted to a depth of 105 feet. The yield was estimated at approximately 21.5 gpm. Well No. 2 (Lexington Park Well) was drilled to a depth of 300 feet and cased and grouted to a depth of 108 feet. The yield was estimated at approximately 20 gpm. Well No. 3 (Windsor Forest Well) was drilled to a depth of 200 feet and cased and grouted to a depth of 126 feet. The yield was estimated at approximately 87 gpm. Each well is disinfected using hypochlorination. The water is stored in a 225,000-gallon steel standpipe. The design capacity of the system is limited to 257 ERCs or 102,800 gpd.

2.2.4.2 *Concord Village*

Concord Village is a public community water system owned and operated by the CCUSA. This community water system consists of two 8-inch drilled wells. Well No. 1 was drilled to a depth of 300 feet and cased and grouted to a depth of 90 feet. The yield was estimated at approximately 20 gpm. Well No. 2 was drilled to a depth of 220 feet and cased and grouted to a depth of 90 feet. The yield was estimated at approximately 60 gpm. Sodium hypochlorite is injected into the water to disinfect, soda ash is added to raise the pH, and orthophosphate is injected downstream of the soda ash for corrosion control. The water is stored in an atmospheric-type storage tank with a storage capacity of 19,450 gallons as well as being stored in a 2,000-gallon pressure tank. The combined effective storage capacity of the tanks is 20,116 gallons. The design capacity of the system is limited to 100 connections.

2.2.4.3 *501 Trailer Court*

501 Trailer Court is a public community water system owned and operated by the CCUSA. This community water system consists of two 6-inch wells. Well No. 2 was drilled to a depth of 130 feet and cased and grouted to a depth of 50 feet. No information on well yield was available. Well No. 4 was drilled to a depth of 300 feet and cased and grouted to a depth of 113 feet. The yield was estimated at approximately 38 gpm. The water is stored in a 30,000-gallon atmospheric-type storage tank. The design capacity of the system is limited to 121 ERCs or 48,340 gpd.

2.2.4.4 *Castle Craig Subdivision*

Castle Craig Subdivision is a private community water system owned by English's, Inc. This community water system consists of two drilled wells. No well construction information was available for either well. Well No. 2 has an estimated yield of approximately 30 gpm. Well No. 3 has an estimated yield of approximately 12 gpm. The water is stored in four 120-gallon pressure tanks. The design capacity of this system is limited to the 41 existing residential connections.

2.2.4.5 *Eastbrook Mobile Home Court*

Eastbrook Mobile Home Court is a private community water system owned by Mr. Douglas Parker. This community water system consists of one 6-inch well. Well No. 3

was drilled to a depth of 400 feet and cased and grouted to a depth of 88 feet. The yield was estimated at approximately 20 gpm. The water is stored in an 80-gallon and a 1,000-gallon pressure tank. The total effective storage is 360 gallons. The design capacity of this system is limited to the 32 existing mobile home connections.

2.2.4.6 *Knoll Woods/Ivy Acres*

Knoll Woods/Ivy Acres is a private community water system owned by Mattie, Inc. This community water system consists of four 6-inch wells. Knoll Woods Well No. 1 was drilled to a depth of 300 feet and cased and grouted to a depth of 51 feet. The yield was estimated at approximately 37 gpm. Knoll Woods Well No. 2 was drilled to a depth of 320 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 15 gpm. Ivy Acres Well No. 1 was drilled to a depth of 500 feet and cased and grouted to a depth of 168 feet. The yield was estimated at approximately 7 gpm. Ivy Acres Well No. 2 was drilled to a depth of 475 feet and cased and grouted to a depth of 126 feet. The yield was estimated at approximately 18 gpm. Soda ash is added to the water from Knoll Woods Well Nos. 1 and 2 for corrosion control and pH adjustment. The water is stored in a 20,000-gallon and a 12,000-gallon atmospheric-type storage tanks as well as one 119-gallon hydropneumatic tank. The total effective storage is 32,039 gallons. The design capacity of the system is limited to 150 ERCs or 60,000 gpd.

2.2.4.7 *Lakeside MHP*

Lakeside MHP is a private community water system owned by D&C Enterprises, LLC. This system consists of two 6-inch wells. Well No. 1 was drilled to a depth of approximately 100 feet. No other well construction or yield information was available. No well construction or yield information was available for Well No. 2. The water is stored in a 220-gallon steel pressure tank with an effective storage capacity of 66 gallons. The design capacity of the system is limited to the 29 existing connections.

2.2.4.8 *Locust Gardens MHP*

Locust Gardens MHP is a private community water system owned by Mr. R. Lloyd Campbell. This system consists of one 6-inch well. The well was drilled to a depth of 140 feet and cased and grouted to a depth of 60 feet. The yield was estimated at approximately 20 gpm. The water is stored in four 120-gallon pressure tanks. The design capacity of the system is limited to the 67 existing mobile home connections.

2.2.4.9 *Mountain Rest Estates*

Mountain Rest Estates is a private community water system owned by Bennies Rentals, Inc. This system consists of two 6-inch wells. Well No. 2 was drilled to a depth of 260 feet and cased to a depth of 40 feet. No other well construction or yield information was available. Well No. 3 was drilled to a depth of 300 feet and cased and grouted to a depth of 160 feet. The yield was estimated at approximately 15 gpm. The water is stored in a 22,600 gallon steel standpipe. The design capacity of the system is limited to the 55 existing connections.

2.2.4.10 *Rustburg Correctional Unit No. 9*

Rustburg Correctional Unit No. 9 is a private community water system owned by the Commonwealth of Virginia. This system consists of two 6-inch wells. Well No.2 was drilled to a depth of 160 feet and cased and grouted to a depth of 70 feet. The yield was estimated at approximately 35 gpm. Well No. 3 was drilled to a depth of 250 feet and cased and grouted to a depth of 75 feet. The yield was estimated at approximately 37 gpm. Chemical additions include soda ash for corrosion control and a sodium hypochlorite solution for disinfection. The water is stored in a 30,000-gallon ground level storage tank as well as a 4,000-gallon hydropneumatic tank. The total effective storage capacity for the system is 31,300 gallons. The design capacity of the system is limited to 55,520 gpd.

2.2.4.11 *Suburban Trailer Town*

Suburban Trailer Town is a private community water system owned by Suburban Trailer Town, Inc. This system consists of six 6-inch wells. No well construction or yield information was available for Well Nos. 1, 2, and 3. Well No.4 was drilled to a depth of 225 feet and cased and grouted to a depth of 53 feet. The yield was estimated at approximately 15 gpm. Well No. 5 was drilled to a depth of 305 feet and cased and grouted to a depth of 61 feet. The yield was estimated at approximately 5 gpm. Well No. 6 was drilled to a depth of 405 feet and cased and grouted to a depth of 87 feet. The yield was estimated at approximately 14 gpm. The water is stored in a 10,000-gallon ground level storage tank as well as three 44-gallon hydropneumatic tanks. The total effective storage capacity for the system is 10,044 gallons. The design capacity of the system is limited to the 91 existing connections.

2.2.4.12 *Trent's MHP*

Trent's MHP is a private community water system owned by Cecil E. Trent. This system consists of one 6-inch well. Well No. 2 was drilled to a depth of 285 feet, cased to a depth of 66 feet, and grouted to a depth of 65 feet. The yield was estimated at approximately 28 gpm. The water is stored in a 2,200-gallon below grade concrete reservoir. The design capacity of the system is limited to the 22 existing mobile home connections.

2.2.5 Nelson County

Many of the community water systems, both publicly and privately owned, rely on groundwater. The NCSA owns and operates two community water systems relying on groundwater: Lovingston and Wintergreen Mountain Village. The following community water systems are privately owned: Johnson Senior Center, Wintergreen – Rhodes Farm, and Wintergreen – Stoney Creek Village. Each is discussed below.

2.2.5.1 *Lovingston*

Lovingston is a public community water system owned by the NCSA. This community water system consists of eight drilled wells and the Black Creek Reservoir. The system is broken down into three sections: the Lovingston Area, the Shipman Area, and the Colleen Area. Please refer to Section 2.3.5.2 in the surface water reservoir section of this report for information on Black Creek Reservoir.

The Lovingston Area consists of two wells. The Payne Well is a 6-inch well drilled to a depth of 300 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 28 gpm. The Dawson Well was drilled to a depth of 325 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 20 gpm. Water from the Lovingston Area is stored in a 100,000-gallon steel storage tank and a 307,000-gallon steel storage tank.

The Shipman Area consists of two wells. The State Shed Well is a 6-inch well drilled to a depth of 405 feet, cased to a depth of 55 feet, and grouted to a depth of 52 feet. The yield was estimated at approximately 16 gpm. The Brown Well is a 6-inch well drilled to a depth of 305 feet, cased to a depth of 58 feet, and grouted to a depth of 57 feet. The yield was estimated at approximately 16 gpm. Water from the Shipman Area is stored in a 130,420-gallon steel storage tank.

The Colleen Area consists of four wells. The Bowling Well No. 1 is an 8-inch well drilled to a depth of 300 feet, cased to a depth of 58 feet, and grouted to a depth of 57 feet. The yield was estimated at approximately 88 gpm. The Bowling Well No. 2 is an 8-inch well drilled to a depth of 300 feet, cased to a depth of 83 feet, and grouted to a depth of 82 feet. The yield was estimated at approximately 18 gpm. The Bowling Well No. 3 is an 8-inch well drilled to a depth of 300 feet, cased to a depth of 58 feet, and grouted to a depth of 57 feet. No yield information was available. Rainbow Well No. 2 is a 6-inch well drilled to a depth of 140 feet and cased and grouted to a depth of 40 feet. The water from the Bowling Wells is treated with a chlorine solution for disinfection. Water from the Colleen Area is stored in a 500,000-gallon bolted steel storage tank.

The system has an approximate total effective storage capacity of 1.0 MG. Storage for this system includes four storage tanks with storage capacity of a 100,000 gallons, 130,420 gallons, 307,000 gallons, and 500,000 gallons. The design capacity of the system is limited to 281,000 gpd due to combined source capacity.

2.2.5.2 *Wintergreen Mountain Village*

Wintergreen Mountain Village Water Treatment Facility is a public community water system owned and operated by the NCSA. The system consists of four drilled wells, a surface water reservoir (Lake Monacan) and a WTP. Please refer to Section 2.3.5.3 in the surface water reservoir section of this report for information on Lake Monacan.

Well No. 12 is a 6-inch well drilled to a depth of 335 feet and cased and grouted to a depth of 58.5 feet. The yield was estimated at approximately 93 gpm. Well No. 13 is an 8-inch well drilled to a depth of 143 feet and cased and grouted to a depth of 90 feet. The yield was estimated at approximately 106 gpm. Well No. 16 is a 6-inch well drilled to a depth of 345 feet and cased and grouted to a depth of 64 feet. The yield was estimated at approximately 47 gpm. Well No. 17 is a 7 7/8-inch well drilled to a depth of 218 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 31 gpm. The water from these wells is treated with a corrosion inhibitor and fluoride adjustment. Aqua-Mag is added as the corrosion inhibitor and sodium fluoride is added as a fluoride adjustment.

2.2.5.3 *Johnson Senior Center*

Johnson Senior Center is a private community water system owned by Mr. James M. Dolan. This community water system consists of two wells. Well No. 1 was drilled to a depth of 325 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 2 gpm. Well No. 2 was drilled to a depth of approximately 300 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 2 gpm. A chlorine solution is added to the raw water for disinfection before entering the storage tanks. The water is stored in a 45-gallon diaphragm tank as well as a 120-gallon pressure tank. The design capacity of the system is limited to 30 residents and 7 staff members.

2.2.5.4 *Wintergreen – Rhodes Farm*

Wintergreen – Rhodes Farm is a private community water system owned by the Rhodes Farm Property Owners Association, Inc. This system consists of one 6-inch drilled well. The well was drilled to a depth of 300 feet, cased to a depth of 70 feet, and grouted to a depth of 55 feet. The yield was estimated at approximately 30 gpm. A hypochlorite solution is added to the water for disinfection. The water is stored in a 5,000-gallon steel storage tank. The design capacity of the system is limited to 11,200 gpd.

2.2.5.5 *Wintergreen – Stoney Creek Village*

Wintergreen – Stoney Creek Village is a private community water system owned by the Wintergreen Valley Utility Company, L.P. This system consists of three drilled 8-inch wells. Well No. 22 was drilled to a depth of 270 feet, cased to a depth of 71 feet, and grouted to a depth of 70 feet. The yield was estimated at approximately 52 gpm. Well No. 24 was drilled to a depth of 297 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 89 gpm. Well No. 25 was drilled to a depth of 220 feet and cased and grouted to a depth of 45 gpm. The water is stored in a 400,000-gallon atmospheric type storage tank. The design capacity of the system is limited to 148,800 gpd.

2.2.6 City of Bedford

The City of Bedford owns and operates a public community water system using two water sources including groundwater. The system consists of five 8-inch wells, the Stoney Creek Reservoir, and the City of Bedford Water Treatment Facility.

Well No. 1 was drilled to a depth of 450 feet and cased and grouted to a depth of 101 feet. The yield was estimated at approximately 142 gpm. Well No. 2 was drilled to a depth of 450 feet and cased and grouted to a depth of 101 feet. The yield was estimated at approximately 183 gpm. Well No. 3 was drilled to a depth of 310 feet and cased and grouted to a depth of 101 feet. The yield was estimated at approximately 52 gpm. Well No. 4 was drilled to a depth of 400 feet and cased and grouted to a depth of 85 feet. The yield was estimated at approximately 78 gpm. Well No. 5 was drilled to a depth of 400 feet and cased and grouted to a depth of 75 feet. The yield was estimated at approximately 39 gpm. Water from these wells is pumped through a common header to a 13,900 gallon atmospheric type storage tank where chlorine and fluoride solutions are added to the water. The design capacity for the well system is limited to 0.6 MGD. Please refer to Section 2.3.6 in the surface water reservoir section of this report for a more detailed discussion on the Stoney Creek Reservoir.

2.2.7 City of Lynchburg

There are no public or private community water systems using groundwater in the City of Lynchburg.

2.2.8 Town of Altavista

There are no public or private community water systems using groundwater in the Town of Altavista.

2.2.9 Town of Amherst

There are no public or private community water systems using groundwater in the Town of Amherst.

2.2.10 Town of Appomattox

The Town of Appomattox owns and operates one public community water system using groundwater. There are no private community water systems using groundwater in the Town.

The Town of Appomattox public community water system consists of five wells. Well No. 1 is an 8-inch well drilled to a depth of 104 feet. No other well construction information was available. The yield was estimated at approximately 75 gpm. Well No. 5 is an 8-inch well drilled to a depth of 111 feet and cased and grouted to a depth of 50 feet. The yield was estimated at approximately 60 gpm. Well No. 6 is a 6-inch well drilled to a depth of 300 feet and cased and grouted to a depth of 51 feet. The yield was estimated at approximately 150 gpm. Well No. 9 is an 8-inch well drilled to a depth of 205 feet and cased and grouted to a depth of 90 feet. The yield was estimated at approximately 175 gpm. Well No. 15 is an 8-inch well drilled to a depth of 255 feet and cased and grouted to a depth of 72 feet. The yield was estimated at approximately 120 gpm. The storage facilities consist of a 30,000 gallon and 100,000 gallon elevated storage tank as well as a 1.0 MG ground storage tank. The design capacity for the system is limited to 820 ERCs or 328,000 gpd.

2.2.11 Town of Brookneal

There are no public or private community water systems using groundwater in the Town of Brookneal.

2.2.12 Town of Pamplin

The Town of Pamplin owns and operates one public community water system using groundwater. There are no private community water systems using groundwater in the Town.

The Town of Pamplin public community water system consists of three 6-inch wells. Well No. 2 was drilled to a depth of 305 feet and cased and grouted to a depth of 125 feet. The yield was estimated at approximately 15 gpm. Well No. 6 was drilled to a depth of 405 feet and cased and grouted to a depth of 95 feet. The yield was estimated at approximately 20 gpm. Well No. 9 was drilled to a depth of 405 feet and cased and grouted to a depth of 130 feet. The yield was estimated at approximately 8.5 gpm. The water is stored in a 75,100-gallon tripod elevated storage tank. The design capacity for the system is limited to 87 ERCs or 34,800 gpd.

2.3 Community Water Systems Using Surface Water Reservoirs[3]

2.3.1 Amherst County

The ACSA owns and operates a public community water system using three surface water sources including Graham Creek Reservoir. The Graham Creek Reservoir is a 57.5 acre raw water reservoir with an active storage volume of 232 MG that serves ACSA's Henry L. Lanum, Jr. WFP. Water flows by gravity to the flash mixer, and when the reservoir is low to the wet well of the Harris Creek pump station, where it is pumped by three variable speed vertical turbine pumps, capable of delivering 700-1050 gpm each, into the flash mix chamber at the WFP. The flash mix chamber provides a detention time of 65 seconds at the design treated water capacity of 2.0 MGD. Water then flows into four flocculation basins. Each flocculator has a vertical drive shaft with a variable speed motor. The combined volume of the four flocculation basins is 76,830 gallons. These basins provide a detention time of 55 minutes at the design treated water capacity of 2.0 MGD. The water moves from the flocculation basins to five sedimentation basins that allow for a detention time of 6.2 hours at the design treated water capacity of 2.0 MGD. The water is then filtered through four sand filters. Each filter is 18 feet by 10 feet and currently filters at a rate of 2.0 gpm/ft^2, at this design flow. The filtered water then

[3] 9 VAC 25-780-70 C.

moves into two 39,000 gallon clearwells to allow the final chlorine disinfectant solution to mix evenly throughout the water.

The water is treated with potassium permanganate, polyaluminum chloride, fluoride, soda ash, silicate corrosion inhibitor and chlorine gas for disinfection. Distribution system storage consists of a 1.2 MG standpipe, a 0.25 MG elevated tank, and two 0.7 MG standpipes. The distribution system total active storage for treated water is 1.14 MG. The design capacity for the ACSA system is currently limited to 2.0 MGD based on the filter rate of 2.0 gpm/ft^2 of the Lanum WFP; however, this facility is expandable to 4.0 MGD.

2.3.2 Appomattox County

Appomattox County does not own or operate a public community water system using a surface water reservoir.

2.3.3 Bedford County

The BCPSA does not own or operate a public community water system using a surface water reservoir. However, there is one private community water system, Eagle Eyrie Baptist Conference Center, which utilizes a surface water reservoir.

2.3.3.1 *Eagle Eyrie Baptist Conference Center*

The Eagle Eyrie Baptist Conference Center is a private community water system owned by the Virginia Baptist Mission Board of the Baptist General Association of Virginia and is operated by Mr. Paul Schnurer. The water system consists of a 5.0 MG surface water reservoir and chemical feed appurtenances. As water flows from the reservoir, soda ash is added in a mixing basin to increase the alkalinity of the raw water. No other information about the system or the reservoir was available.

2.3.4 Campbell County

Campbell County does not own or operate a public or private community water system using a surface water reservoir.

2.3.5 Nelson County

The NCSA owns and operates three public community water systems using a surface water reservoir: the Schuyler Water Treatment Facility, which utilizes the Johnson's Branch Reservoir; Lovingston, which utilizes the Black Creek Reservoir as well as eight groundwater wells and the Nelson County Regional Water Treatment Facility; and the Wintergreen Mountain Village Water Treatment Facility, which utilizes Lake Monacan and four drilled wells.

2.3.5.1 *Schuyler Water Treatment Facility - Johnson's Branch Reservoir*

Schuyler Water Treatment Facility is a public community water system owned and operated by the NCSA. The system consists of a small impoundment on Johnson's Branch Reservoir and a WTP. Johnson's Branch is spring fed and has a drainage area of approximately 0.65 square miles. The springs feeding Johnson's Branch have a combined capacity of approximately 75 gpm or 108,000 gpd. Water is collected in a small stone and concrete impoundment and then flows by gravity to the filtration facility.

The water is treated by dual microfiltration membrane units. Each filter contains a 50 micron in-line strainer, break tank, feed pump, and six membrane modules. Each unit is designed to filter a maximum of 35 gpm, for a total combined filter rate of 108,000 gpd. After the water is filtered, chlorine gas is injected into the finished water filtrate line. The chlorine contact time is provided in a 15,220-gallon welded steel storage tank. Water is then pumped into the system by dual, 6 stage vertical turbine pumps, each with a capacity of 240 gpm.

The water is stored in one 300,000-gallon steel storage tank. The design capacity of the system is limited to 108,000 gpd based on filtration capacity.

2.3.5.2 *Lovingston – Black Creek Reservoir*

Lovingston is a public community water system owned and operated by the NCSA. The system consists of eight drilled wells, Black Creek Reservoir, and the Nelson County Regional Water Treatment Facility. Please refer to Section 2.2.5.1 in the groundwater sources section of this report for information on the eight groundwater wells.

The Black Creek Reservoir provides approximately 14 MG of storage from a drainage area of 1,956 acres. A safe yield analysis performed by Draper Aden Associates indicated a safe yield of approximately 125,000 gpd based upon the drought of record which occurred in 2002.

The intake structure provides for water withdrawal from two locations, an upper withdrawal point that is at a depth of 6.5 feet and a lower withdrawal point that is at a depth of 11.8 feet. Both intakes are provided with a 16 inch diameter wire and slot screens with a 350 gpm flow through capacity at a head loss of 0.1 psi. An air burst cleaning system is also provided.

The raw water pump station is equipped with two submersible non-clog pumps each equipped with 10 HP motors. Each submersible pump is capable of delivering 357 gpm at 59.2 feet TDH to the WTP. The WTP is an Adsorption Clarification/Filtraction package unit designed to initially produce 140 gpm at a filtration rate of 2.0 gpm/ft^2. The WTP is designed to accommodate a second unit in the future.

Rapid mixing is provided by an in-line vortex mixer. Flocculation and clarification are provided by an upflow adsorption flocculation/clarification chamber. The chamber provides a surface area of 43.8 ft^2 with a resulting Surface Overflow Rate (SOR) of 4 gpm/ft^2 at the initial 2.0 gpm/ft^2 filtration rate. At the future maximum design capacity of 175 gpm (2.5 gpm/ft^2 filtration rate) the SOR will be 5 gpm/ft^2. Clarification is accomplished using buoyant adsorption media, which is retained in the chamber by a media retention screen. The adsorption flocculation/clarification chamber is equipped with an air scour system to aid in media cleaning. Filtration is provided by a mixed-media filter, which includes layers of anthracite coal, silica sand, and garnet. The underdrain system is designed for a water backwash and air scour.

The WTP has equipment to feed alum, soda ash, chlorine, and coagulant aid polymer to the raw water and soda ash, sodium fluoride, corrosion inhibitor, and chlorine to the finished water. Finished water is pumped by dual vertical turbine finished water pumps. Each pumping unit includes a 60 HP, multistage pump rated at 460 gpm at 345 THD. Each pump is equipped with a variable frequency control to vary pump speed and discharge. Standby power is provided by an existing on-site generator, which has the capacity to operate the WTP as well as the wastewater treatment plant.

The system has an approximate total effective storage capacity of 1.0 MG. Storage for this system includes four storage tanks with storage capacity of a 100,000 gallons, 130,420 gallons, 307,000 gallons, and 500,000 gallons. The design capacity of the system is limited to 281,000 gpd due to combined source capacity. The Black Creek WTP has a treatment capacity of 201,600 gpd and is limited to a maximum 2 gpm/ft^2 filtration rate.

2.3.5.3 *Wintergreen Mountain Village - Lake Monacan*

Wintergreen Mountain Village Water Treatment Facility is a public community water system owned and operated by the NCSA. The system consists of four drilled wells, Lake Monacan, and a WTP. Please refer to Section 2.2.5.2 in the groundwater sources section of this report for information on the four groundwater wells.

Lake Monacan is fed from two streams, Stoney Creek and Allen Creek and has a total drainage basin area of approximately 9.69 square miles. There are also several ponds that provide additional raw water storage. The raw water is pumped from the Lake into a 250,000 gallon raw water storage tank. The water flows from this tank, through a high pressure snow making line, into the WTP. Raw water can also be obtained directly from an intake on Stoney Creek. Alum, polymer, soda ash, and chlorine are fed immediately ahead of the static in-line mixer. Following chemical addition and rapid mixing, water enters the precipitator unit. The coagulation and settling processes takes place in a coagulation chamber with a capacity of approximately 4,000 gallons. This unit provides a 10 minute detention time at the 380 gpm design flow rate. From there the water flows into the filtration unit. The water is filtered through a single, dual media filter. The filter has an area of 95 square feet and a filtration rate of 4.0 gpm/ft^2. The filter media consists of 14 inches of sand overlain by 16 inches of anthracite coal.

Soda ash, corrosion inhibitor, sodium fluoride, and chlorine are added to the finished water. The finished water is then pumped into the 35,000 gallon clearwell. Three vertical turbine pumps capable of delivering 200 gpm each deliver water into the

Wintergreen distribution system. Storage consists of two 250,000 gallon steel storage tanks and one 500,000 gallon glass lined storage tank. The design capacity for the entire system is limited by the available source capacity to 540,000 gpd.

2.3.6 City of Bedford

The City of Bedford owns and operates one public community water system which includes a surface water reservoir (Stoney Creek Reservoir). The system consists of the Stoney Creek Reservoir, five 8-inch wells, and the City of Bedford Water Treatment Facility. Please refer to Section 2.2.6 in the groundwater sources section of this report for information on the five groundwater wells.

The WTP consists of a flash mixer, three flocculation basins, two sedimentation basins, two high rate gravity filters, a 63,500-gallon clearwell, and chlorination and fluorination facilities. The raw water flows by gravity from the 156 MG Stoney Creek Reservoir to the WTP. The water flows into the flash mixer where carbon, alum, fluoride, lime, and soda ash are added to the water. The flash mixer has a volume of 5,470 gallons with a detention time of 2.63 minutes at a design flow rate of 3.0 MGD. The water then flows to the three flocculation basins. Each basin has a vertical shaft agitator and a detention time of 27.7 minutes at the design flow rate of 3.0 MGD. The combined volume of the basins is 57,600 gallons.

The water flows from the flocculation basins into the two sedimentation basins. The sedimentation basins have a combined volume of 385,000 gallons with a detention time of 3.08 hours at the design flow rate. The water then flows through the two high rate gravity filters. These filters have a filtration rate of 4 gpm/ft^2 and a combined surface area of 520 ft^2. The water flows from the filters into the clearwell. As the water flows to the clearwell, lime, soda ash, chlorine gas, and fluoride are added. The design capacity of the WTP is limited to approximately 2.9 MGD.

Storage for the entire system includes a 1.0 MG steel storage tank, a 1.5 MG concrete reservoir, a 968,000-gallon concrete reservoir and a 13,900-gallon concrete water storage reservoir at the booster pump station for the wells. The total combined storage for the system is 3.5 MG. The booster pump station is comprised of two vertical turbine pumps with observed outputs of 555 gpm and 560 gpm. The design capacity for the entire system is limited to approximately 3.5 MGD.

2.3.7 City of Lynchburg

The City of Lynchburg owns and operates one community water system which includes a surface water reservoir (the Pedlar Reservoir). The City of Lynchburg Waterworks consists of the Pedlar Reservoir, two James River pump stations, two WTPs, storage tanks, pump stations, and approximately 460 miles of transmission and distribution system. The College Hill WTP and Abert WTP both receive raw water from the Pedlar Reservoir and/or the James River.

Raw water from the Pedlar Reservoir flows by gravity to both the Abert WTP and the College Hill WTP. Raw water from the James River can be pumped to either or both of the water treatment plants, solely or in combination with the reservoir water.

Water entering the College Hill WTP flows into two coagulation tanks. Each coagulation tank consists of a six flocculation basins and a sedimentation basin. All of the treated water is split proportionally between the two tanks. In each tank, water flows through the two parallel flocculation units. Each of these flocculation units has three basins in series and each basin is equipped with a paddle mixer. The water flows from the flocculation units downward through the settling chamber then upward over v-notch weirs. Coagulation Tank No. 1 has a settling chamber with a volume of 1.7 MG and Tank No. 2 has a settling chamber with a volume of 4.0 MG. The settled water from the two coagulation towers is combined and conveyed to the filter units.

There are seven 2.0 MGD high rate filters. These provide a surface area of approximately 361 square feet each with a maximum filter rate of 4 gpm/ft^2. From there the water flows into a 1.4 MG chlorine contact tank.

Chemical additions to the water may include: lime, which is added at Pedlar Dam, liquid alum, sodium hydroxide, dry alum, dry soda ash, powdered activated carbon, fluoride, corrosion inhibitor, and sodium hypochlorite, which are added at the water treatment plants. The finished water flows into the distribution system by gravity. Water stored in the 10.5 MG clearwell is pumped into the system using the booster pump station (two pumps, each rated at 4200 gpm) and the field pump station (three pumps, each rated at 2000 gpm). The design capacity for the College Hill WTP is 14.0 MGD.

Water entering the Abert WTP flows into four flocculation basins. From the four flocculation basins water flows into two sedimentation basins with a combined volume of 1.5 MG, which provide a detention time of three hours at the design flow rate. The settled water is then conveyed into the filter units. The water is then conveyed to four dual media 3.0 MGD high rate filters. These provide a surface area of approximately 2,112 square feet with a maximum filter rate of 4 gpm/ft^2. The water then flows into a small clearwell and then on to a 2.0 MG clearwell.

Chemical additions at the Abert plant are the same as at the College Hill plant. The design capacity for the Abert WTP is 12.0 MGD.

Water from both WTPs is conveyed to the distribution system. System storage consists of eleven ground storage tanks with a combined effective storage capacity of 30 MG. The total treatment capacity for the two treatment plants is 26.0 MGD.

2.3.8 Town of Altavista

The Town of Altavista does not own or operate a community water system using a surface water reservoir.

2.3.9 Town of Amherst

The Town of Amherst does not own or operate a community water system using a surface water reservoir.

2.3.10 Town of Appomattox

The Town of Appomattox does not own or operate a community water system using a surface water reservoir.

2.3.11 Town of Brookneal

The Town of Brookneal owns and operates one public community water system using a surface water reservoir (the Phelps Creek Reservoir). The Town of Brookneal system consists of a 40.8 MG Phelps Creek Reservoir, Phelps Creek, and the Brookneal WTP. The 40.8 MG reservoir receives water from Phelps Creek which has a catchment area of 3.8 square miles. Raw water from this reservoir flows by gravity through four different intake points to the WTP. The raw water is received by the flocculation basin, which has a volume of 11,900 gallons and provides a detention time of approximately 45 minutes. Alum and soda ash are added to the raw water in this flocculation basin. The water then moves through two sand filters. These filters have a combined surface area of 130 square feet and a filtration rate of 2 gpm/ft^2. Soda ash and chlorine are added to the filtered water as it enters the clearwell. The clearwell has a volume of approximately 35,000 gallons. Water is pumped from the clearwell into the distribution system by two vertical turbine finished water pumps rated at 250 gpm each. System storage consists of two elevated steel storage tanks with a combined capacity of 325,000 gallons. The design capacity for the system is limited to 375,000 gpd.

2.3.12 Town of Pamplin

The Town of Pamplin does not own or operate a community water system using a surface water reservoir.

2.4 Community Systems Using Stream Intakes[4]

2.4.1 Amherst County

In addition to Graham Creek Reservoir, ACSA's Henry L. Lanum, Jr. WFP is served by two stream intakes. One is on Harris Creek, equipped with three 700-1050 gpm variable speed turbine pumps, and a second intake, currently being permitted, is on the James River.

2.4.2 Appomattox County

Appomattox County does not own or operate a community water system using a stream intake.

2.4.3 Bedford County

The BCPSA owns and operates one public community water system (High Point WTP) using a stream intake (the Roanoke River arm of Smith Mountain Lake).

Raw water is pumped from the Roanoke River arm of Smith Mountain Lake and flows by gravity to the pumping station, which is equipped with two 15-HP submersible turbine pumps. The raw water flows through a screen upon entering the WTP followed by a series of strainers consisting of four units in parallel with either available 40-mesh or 100-mesh screens. Following screening, the water is delivered to the raw water storage tank.

Water from the raw water storage tank is then fed through membrane filter units using a feed pump integral to the membrane filter system. Following filtration, sodium hypochlorite is added and a corrosion inhibitor can be added if necessary before entering the chlorine contact storage tank. High service pumps then deliver the water from the chlorine contact storage tank into the distribution system. The two 75-HP centrifugal high service pumps are rated at 845 gpm. Two higher service pumps are provided at the WTP for future expansion. The storage system consists of a 1.0 MG elevated storage tank.

[4] 9 VAC 25-780-70 D.

The membrane filter units are the limiting factor in the production of potable water at this facility. The design capacity for the High Point WTP is 171,000 gpd.

2.4.4 Campbell County

The CCUSA owns and operates one public community water system (Central Water System) using a stream intake on the Big Otter River. The Central Water System consists of an intake on and the Big Otter River and the Big Otter River WTP. The Big Otter River has a drainage area of approximately 330 square miles. Raw water flows through a stainless steel intake screen and is conveyed though two 18-inch diameter lines to the raw water pumping station wet well. Water is pumped from the raw water wet well to a 15 MG terminal reservoir by two vertical turbine pumps. The water from this reservoir flows by gravity to the WTP.

The WTP consists of a flash mixing chamber that provides a detention time of 1.57 minutes, a baffled flocculator that provides a detention time of 27 minutes, three mechanical flocculation basins that provide a detention time of 30 minutes, three sedimentation basins that provide a detention time of 6 hours, and three dual media filters. Each filter has a layer of support gravel, torpedo sand, filter sand, and anthracite coal. Each filter has a 360 square foot surface area and filter at a rate of 2 gpm/ft^2.

Chemical additions to the water include: potassium permanganate, activated carbon, pre- and post-chlorine, liquid alum, pre- and post-sodium hydroxide, sodium fluorosilicate, polymer, phosphate compounds, and hydrated lime. The phosphate compounds and hydrated lime are added after filtration for corrosion control and pH adjustment.

The water is stored in six atmospheric storage tanks with a combined effective storage capacity of approximately 5.0 MG. The design capacity of the system is limited to 4.1 MGD based on filter capabilities.

2.4.5 Nelson County

The NCSA owns and operates one public community water system using a stream intake on Stoney Creek. The Stoney Creek - Gladstone system consists of a series of springs of unknown capacities. The water from these springs flows into a concrete collection box and reservoir. Surface water is diverted away from the springs by concrete aprons. The water flows from the reservoir by gravity to the distribution system. The spring water is chlorinated intermittently by the addition of chlorine tablets into the reservoir. The design capacity of the system is limited to the 24 existing single family residences.

2.4.6 City of Bedford

The City of Bedford community water system may utilize a stream intake on the Big Otter River. This stream intake is owned and operated by the City of Bedford and used in addition to Stoney Creek Reservoir as an additional water source during periods of drought.

2.4.7 City of Lynchburg

The City of Lynchburg Waterworks utilizes two stream intakes on the James River as an additional source of raw water. Water from the James River can be pumped to either of the two water treatment plants and is treated as described in Section 2.3.7.

City of Lynchburg Water Rights

The Commonwealth of Virginia was granted title to the James River from the English Crown. The grant gave Virginia the right to control and dispose of the waters of the James River. In 1784, the Virginia General Assembly created the James River Company, which later became the James River and Kanawha Company (the "Canal Company") to construct a canal along the James River for the purpose of improving navigation. In 1860, the Canal Company constructed the Water Works Canal, also known as the "Feeder Canal", to ensure that the City was provided with ample water supply. Upon the dissolution of the Canal Company, the Richmond and Alleghany Railroad Company (which eventually became the Chesapeake and Ohio Railroad Company) acquired the water rights in the James River.

It was the Railroad that conveyed one-fifth of the flow of the James River to the City of Lynchburg. The Railroad had previously agreed to take on the debts and liabilities of the Canal Company. The City later agreed to release the Railroad from these debts in exchange for the Railroad granting the City the right to withdrawal one-fifth of the flow of the James River from the Water Works Canal. This agreement replaced the City's 1835 right to withdraw up to 600,000 gallons per day of water. Also in the agreement, the Railroad agreed to construct a stone dam at or near the Water Works Dam. This dam became known as the Lynchburg Dam.

In 1940, the Appalachian Power Company (APCO) acquired the Water Works Canal and Lynchburg Dam from the Railroad. This transfer included the water rights the Railroad received from the Canal Company and relates back to the original grant by the Virginia General Assembly. The deed states that APCO's property and water rights are subject to the water rights of the City.

Finally, APCO, the City, and Griffin Pipe implemented an agreement in 1964, allowing the City to withdraw its one-fifth of the river flow from either the Water Works Canal or from the Reusens Dam Reservoir. In exchange, Griffin Pipe would be allowed to fill in a portion of the Water Works Canal. This agreement also granted the City an easement across Griffin Pipe's property to lay pipe in the Water Works Canal in the event water flows become insufficient to meet the City's needs at the pump station.

The City's use of these water rights is conditional on the water being taken from the Water Works Canal. The City is not currently withdrawing water from the Water Works Canal; therefore, it is important that the City preserve its water rights. Although an agreement with APCO gives the City the right to also take water from the impoundment behind the Reusens Dam, this right is not absolute and unconditional. Therefore, the City's unconditional right to one-fifth of the flow of the James River is dependent upon some portion of the Water Works Canal remaining intact and the City should ensure that the Water Works Canal is not completely filled in by Griffin Pipe.

Additional Water Rights

Similar to the City of Lynchburg water rights discussed above, Lumminaire Technologies, Inc. also has vested water rights for four-fifths of the flow in the James River. These water rights and the Lynchburg Dam were purchased by Lumminaire Technologies, Inc. from APCO in the 1990s.

2.4.8 Town of Altavista

The Town of Altavista owns and operates one public community water system using stream intakes on the Staunton River and Reed Creek. This community water system consists of intakes on the Staunton River and Reed Creek, two springs, and a WTP. The Staunton River has a drainage area of approximately 1,750 square miles and Reed Creek has a drainage area of approximately 12 square miles. Raw water from Reed Creek flows by gravity through a screened intake into a wet well. The water is pumped from the wet well by two 1,050 gpm and one 700 gpm vertical turbine pumps to the WTP. Water from the Staunton River flows by gravity into the raw water pumping station wet well which is equipped with two submersible pumps, each rated at 1,750 gpm that pump the raw water to the WTP.

The WTP consists of an in-line static mixer, ten flocculation basins, five sedimentation basins, five sand filters, a clearwell, chemical feed, and chlorination and fluoridation facilities. The raw water first flows into the static mixer. Alum, caustic, fluorosilic acid, and sodium hypochlorite are added to the water in the static mixer. The water flows from the static mixer into ten flocculation basins. These basins have a total volume of 87,500 gallons and a detention time of 42 minutes. From there the water flows into five sedimentation basins, which have a total volume of 512,000 gallons and a detention time of 4.1 hours. The water is then filtered through the five sand filters. These filters are comprised of four layers of graded gravel, one layer of filter sand, and one layer of anthracite coal. The filters have a combined surface area of 910 ft^2 with a filtration rate of 2.3 gpm/ft^2. Caustic and sodium hypochlorite are added to the filtered water as it enters the clearwell.

The clearwell consists of three chambers, one with a volume of 28,600 gallons, one with a volume of 14,400 gallons, and one with a volume of 90,000 gallons. Finished water is pumped into the system by four finished water pumps with capacities of 350 gpm, 700 gpm, and two with capacities of 1,050 gpm. The design capacity of the WTP is 3.0 MGD.

Two springs also feed into the public system: McMinnis Spring and Reynolds Spring. No yield information was available for either spring. Both springs are disinfected with the addition of a hypochlorite solution and fluorinated with the addition of fluorosilicic acid. Water from McMinnis Spring is pumped into a 700,000 gallon steel ground reservoir. Water from Reynolds Spring is pumped into a 300,000 gallon elevated storage tank. The design capacity of the spring system is limited to 600,000 gpd.

System storage consists of a 700,000 gallon covered steel ground storage tank, a 1.5 MG steel standpipe, an 800,000 gallon steel standpipe, and a 300,000 gallon elevated storage tank. The total system storage capacity is 3.3 MG.

The WTP capacity is 3.0 MGD and the design capacity for the entire system is 3.6 MGD.

2.4.9 Town of Amherst

The Town of Amherst owns and operates one public community water system using a stream intake on the Buffalo River. Raw water is obtained from the Buffalo River with a drainage area of approximately 85 square miles. A diversion dam is constructed across the river and the water is obtained through a floating intake design and pumped to the WTP by two vertical turbine pumps. Each pump has an output of approximately 480 gpm.

The WTP consists of flocculation, sedimentation, filtration, disinfection, fluoridation, and corrosion control. Fluorosilicic acid, alum, soda ash, lime, and chlorine are added to the water during the treatment process. The raw water is pumped into the flocculation basin, which has a volume of 17,175 gallons and provides a detention time of 49 minutes. The water then flows into a sedimentation basin, which has a volume of 96,100 gallons and provides a detention time of 4.6 hours. Water is then filtered through two sand filters, which have a total capacity of 350 gpm, before flowing into the 38,000 gallon concrete clearwell. As the water flows to the clearwell, chlorine gas is added again as a post-disinfectant.

Two vertical turbine finished water pumps pump the finished water into the distribution system. These pumps are rated at 175 gpm and 350 gpm. System storage consists of one

1.0 MG atmospheric type storage tank. The design capacity for the system is limited to 1.0 MGD.

2.4.10 Town of Appomattox

The Town of Appomattox does not own or operate a community water system using a stream intake.

2.4.11 Town of Brookneal

The Town of Brookneal does not own or operate a community water system using a stream intake.

2.4.12 Town of Pamplin

The Town of Pamplin does not own or operate a community water system using a stream intake.

2.5 Amount of Ground or Surface Water Purchased from Water Supply Systems Outside Geographic Boundaries[5]

2.5.1 Amherst County

The ACSA currently has a water purchase contract with the City of Lynchburg. This contract will be in effect for 15 years from July 1, 2007 through June 30, 2022. At the end of year 13, June 30, 2020, each party must notify the other of its intention to terminate or renew the contract at the end of year 15. If the intent is to renew the contract, the contract will automatically be renewed in ten year increments unless the parties provide written notice of their intention to terminate the contract two years prior to the end of the ten year renewal period.

The ACSA may not sell water purchased from the City of Lynchburg to residential customers at an amount that is less than the costs of purchasing water from the City of Lynchburg. In addition, the ACSA may not sell water to customers within the City of Lynchburg without permission from the City of Lynchburg and vice versa. The City of Lynchburg reserves the right to restrict ACSA water usage during drought conditions and

[5] 9 VAC 25-780-70 G.

other emergencies. Restrictions placed on water sold to the ACSA will be equivalent to those restrictions placed upon City of Lynchburg customers. Finally, the contract requires the ACSA to participate in a committee comprised of the Utility Directors or their representatives with the City of Lynchburg, BCPSA, and CCUSA. The purpose of the committee is to evaluate the feasibility, benefits, and drawbacks of forming a regional water and wastewater authority.

While the contract between the ACSA and the City of Lynchburg does not specify a specific or maximum amount that the ACSA may purchase from the City of Lynchburg, the ACSA currently purchases 140,000-180,000 gpd of water from the City of Lynchburg for resale to the Central Virginia Training Center (CVTC). The 10-inch service line from the City's meter belongs to the Commonwealth of Virginia and is hydraulically incapable of serving other customers in the ACSA service area. With significant ACSA distribution system replacement, including booster pumps, the wholesale purchase of City water for ACSA's service area will become a viable alternative in 2050.

2.5.2 Appomattox County

Appomattox County does not purchase water from water supply systems outside the geographic boundaries of the County.

2.5.3 Bedford County

2.5.3.1 *Forest Central Water System*

The Forest Central Water System is a public community water system operated by the BCPSA and served by water purchased from the City of Lynchburg. The BCPSA currently has a water purchase contract with the City of Lynchburg. This contract will be in effect for 15 years from July 1, 2007 through June 30, 2022. At the end of year 13, June 30, 2020, each party must notify the other of its intention to terminate or renew the contract at the end of year 15. If the intent is to renew the contract, the contract will automatically be renewed in ten year increments unless the parties provide written notice of their intention to terminate the contract two years prior to the end of the ten year renewal period.

The BCPSA may not sell water to customers within the City of Lynchburg without permission from the City of Lynchburg and vice versa. In addition, the BCPSA may not sell water purchased from the City of Lynchburg to residential customers at an amount that is less than the costs of purchasing water from the City of Lynchburg. The City of Lynchburg reserves the right to restrict BCPSA water usage during drought conditions and other emergencies. Restrictions placed on water sold to the ACSA will be equivalent to those restrictions placed upon City of Lynchburg customers. Finally, the contract requires the BCPSA to participate in a committee comprised of the Utility Directors or their representatives with the City of Lynchburg, ACSA, and CCUSA. The purpose of the committee is to evaluate the feasibility, benefits, and drawbacks of forming a regional water and wastewater authority.

While the contract between the BCPSA and the City of Lynchburg does not specify a specific or maximum amount that the BCPSA may purchase from the City of Lynchburg, the BCPSA currently purchases approximately 1.2 MGD from the City of Lynchburg for resale to the Forest Central Water System. The water is stored in a 1.2 MG atmospheric-type storage tank.

2.5.3.2 *Stewartsville Consecutive*

Stewartsville Consecutive is owned and operated by the BCPSA and served by water purchased from the WVWA. This water supply system consists of a 550,000 gallon atmospheric water storage tank and a hypo-chlorination system to re-chlorinate the finished water. The design capacity for the system is limited to 1.0 MGD.

2.5.4 Campbell County

2.5.4.1 *Campbell County East System*

The Campbell County East System is a public community water system operated by the CCUSA and served by water purchased from the City of Lynchburg. The CCUSA currently has a water purchase contract with the City of Lynchburg. This contract will be in effect for 20 years from July 1, 2007 through June 30, 2027. At the end of year 18, June 30, 2025, each party must notify the other of its intention to terminate or renew the contract at the end of year 20. If the intent is to renew the contract, the contract will automatically be renewed in ten year increments unless the parties provide written notice of their intention to terminate the contract two years prior to the end of the ten year renewal period.

The *First Supplement to Water Purchase Contract* dated May 30, 2002 is incorporated into this contract by reference. All terms and conditions described remain in effect with the exception of the methodology for determining "Water Rates and Charges" which are modified to the methodology described in the current contract.

The CCUSA may not sell water to customers within the City of Lynchburg without permission from the City of Lynchburg and vice versa. In addition, the CCUSA may not sell water purchased from the City of Lynchburg to residential customers at an amount that is less than the costs of purchasing water from the City of Lynchburg. The City of Lynchburg reserves the right to restrict CCUSA water usage during drought conditions and other emergencies. Restrictions placed on water sold to the CCUSA will be equivalent to those restrictions placed upon City of Lynchburg customers. Finally, the contract requires the CCUSA to participate in a committee comprised of the Utility Directors or their representatives with the City of Lynchburg, ACSA, and BCPSA. The purpose of the committee is to evaluate the feasibility, benefits, and drawbacks of forming a regional water and wastewater authority.

The contract between the CCUSA and the City of Lynchburg does not specify a specific or maximum amount that the CCUSA may purchase from the City of Lynchburg.

2.5.5 Nelson County

Nelson County does not purchase water from water supply systems outside the geographic boundaries of the County.

2.5.6 City of Bedford

The City of Bedford does not purchase water from water supply systems outside the geographic boundaries of the City.

2.5.7 City of Lynchburg

The City of Lynchburg does not purchase water from water supply systems outside the geographic boundaries of the City.

2.5.8 Town of Altavista

The Town of Altavista currently purchases water from the CCUSA. The Town of Altavista is allotted up to 300,000 gpd for purchase from the CCUSA.

2.5.9 Town of Amherst

The Town of Amherst does not currently purchase water from water supply systems outside the geographic boundaries of the Town; however, the Town of Amherst and ACSA have an interconnection which would allow the Town of Amherst to purchase water from the ACSA and vice versa.

2.5.10 Town of Appomattox

The Town of Appomattox does not purchase water from water supply systems outside the geographic boundaries of the Town.

2.5.11 Town of Brookneal

The Town of Brookneal does not purchase water from water supply systems outside the geographic boundaries of the Town.

2.5.12 Town of Pamplin

The Town of Pamplin does not purchase water from water supply systems outside the geographic boundaries of the Town.

2.6 Non-Agricultural, Self-Supplied Users of More than 300,000 Gallons per Month of Surface Water[6] and Ground Water[7]

Information on self-supplied, non-agricultural users using more than 300,000 gallons per month of water was limited. Available information was provided by the VDEQ through their Water Use Database. In addition, information was collected from VDH on non-transient, non-community and transient, non-community water users and these users are

[6] 9 VAC 25-780-70 E.
[7] 9 VAC 25-780-70 F.

considered self-supplied users. While the majority of these users do not use greater than 300,000 gallons per month of water, they are still included in this section as they were more similar to users in this category. Water use information was estimated for many of these users when available information was limited. It is also important to note for self-supplied, non-agricultural users not identified in VDEQ's Water Use Database and no information available, the user was considered to use less than 300,000 gallons per month of water. A map showing self-supplied users in the region is presented as Figure 2.6.

Figure 2.6 – Self Supplied Water Users

2.6.1 Amherst County

Grief Riverville, LLC is the only known self-supplied, non-agricultural user using more than 300,000 gallons per month of water in Amherst County. Information on the non-agricultural, self-supplied users of more than 300,000 gallons per month in Amherst County is presented in Table 2.6.1.1. Grief Riverville, LLC reads the meter for the groundwater well on a monthly basis; therefore, average daily withdrawal is estimated and maximum daily withdrawal information is unavailable.

Table 2.6.1.1 - Known Non-Agricultural, Self-Supplied Users Greater Than 300,000 Gallons per month in Amherst County

Water System	Source	Average Daily Withdrawal (MGD)	Maximum Daily Withdrawal (MGD)	Average Monthly Withdrawal (MG)	Average Annual Withdrawal (MG)
Grief Riverville, LLC	James River	6.5	6.782	198.00	2,372.5
Grief Riverville, LLC	Drilled Well	0.006	Not Available	0.198	2.372

There are five known self-supplied, non-agricultural users using less than 300,000 gallons per month of water in Amherst County. Information on the self-supplied, non-agricultural users of less than 300,000 gallons per month in Amherst County is presented in Table 2.6.1.2.

Table 2.6.1.2 - Known Non-Agricultural, Self-Supplied Users Less Than 300,000 Gallons per month in Amherst County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Camp Little Crossroads	Three Drilled Wells	12,230 gpd	Well No. 1 - 45 gpm Well No. 2 - 6 gpm Well No. 3 - 10 gpm	Unknown	22,000 Gallons
Pleasant View Elementary School	Drilled Well	176 Students	10 gpm	10 gpm	53 Gallons
Smitty's Restaurant	Drilled Well	2,750 gpd	Unknown	Unknown	Negligible
Temperance Elementary School	Drilled Well	125 Students	Unknown	Unknown	40 Gallons
Wildwood Campground	Drilled Well	Service to 100 persons per day	Unknown	Unknown	54 Gallons

2.6.2 Appomattox County

There are no known self supplied, non-agricultural users of greater than 300,000 gallons per month of water in Appomattox County. Founders Furniture was identified as a non-agricultural, self-supplied user in Appomattox County; however, no information was available for this user.

2.6.3 Bedford County

There are 15 known self-supplied, non-agricultural users using greater than 300,000 gallons per month of water in Bedford County. Information on the self-supplied non-agricultural users of greater than 300,000 gallons per month of water in Bedford County is presented in Table 2.6.3.1.

Table 2.6.3.1 - Known Non-Agricultural, Self-Supplied Users Greater Than 300,000 Gallons per month in Bedford County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Boonsboro Country Club	Surface Water	Unknown	Unknown	Unknown	Unknown
Boxley Materials Co.	Drilled Well and Surface Water	Unknown	Unknown	Unknown	Unknown
Colonial Hills Golf Course	Surface Water	Unknown	Unknown	Unknown	Unknown
Georgia Pacific Corporation	Four Drilled Wells	27,600 gpd	Well No. 1 - 9.0 gpm Well No. 2 - 4.0 gpm Well No. 3 - 2.0 gpm Well No. 4 - 21 gpm	Well No. 1 - 9.0 gpm Well No. 2 - 3.5 gpm Well No. 3 - 2.5 gpm Well No. 4 - 20 gpm	32,000 Gallons
Gunnoe Sausage Company	Drilled Well	Unknown	Unknown	Unknown	Unknown
Ivy Hills Golf Course	Surface Water	Unknown	Unknown	Unknown	Unknown
London Down Golf Course	Surface Water	Unknown	Unknown	Unknown	Unknown
Mariners Landing Golf Course	Surface Water	Unknown	Unknown	Unknown	Unknown
New London Academy	Drilled Well	Unknown	Unknown	Unknown	Unknown
Rainforest Nursery	Surface Water	Unknown	Unknown	Unknown	Unknown
Staunton River High School	Two Drilled Wells	10,000 gpd	Well No. 2 - Unknown Well No. 3 - 14 gpm	Well No. 2 - Unknown Well No. 3 - 18 gpm	5,014 Gallons
Smith Mountain Lake State Park (Picnic Area)	Smith Mtn. Lake Waterworks, Drilled Well	21,670 gpd	Existing Well - 12 gpm	Existing Well - 9 gpm	21,670 Gallons
Smith Mountain Lake State Park (Boat Launch Area)	Drilled Well	15,840 gpd	21 gpm	11 gpm	3,057 Gallons

Smith Mountain Lake State Park (Primitive Campground)	Drilled Well	9,216 gpd	Well No. 7 - 14 gpm	Well No. 7 - 6.4 gpm	50 Gallons
Smith Mountain Lake State Park (Visitor's Center)	Drilled Well	12,960 gpd	14.5 gpm	9 gpm	2,057 Gallons

There are 25 known self-supplied, non-agricultural users using less than 300,000 gallons per month of water in Bedford County. Information on self-supplied, non-agricultural users of less than 300,000 gallons per month of water in Bedford County is presented in Table 2.6.3.2.

Table 2.6.3.2 - Known Non-Agricultural, Self-Supplied Users Less Than 300,000 Gallons per month in Bedford County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Body Camp Elementary School	Two Drilled Wells	300 persons	Well No. 3 - 11.5 gpm Well No. 4 - 19.0 gpm	Well No. 3 -Unknown Well No. 4 - 19 gpm	10,000 Gallons
Big Island Elementary School	Drilled Well	Existing students and staff	Unknown	Unknown	Unknown
Huddleston Elementary School	Drilled Well	273 persons at school, 1 church	Unknown	12 gpm	400 Gallons
Moneta Elementary School	Drilled Well	330 persons	Unknown	20 gpm	685 Gallons
Otter River Elementary School	Drilled Well	350 persons	Unknown	16.5 gpm	Unknown
Thaxton Elementary School	Drilled Well	275 persons	Unknown	10.0 gpm	400 Gallons
Bedford Moose Lodge	Drilled Well	Unknown	Unknown	Unknown	Unknown
Bedford Motel	Drilled Well	11 motel rooms	Unknown	Unknown	Negligible
Bedford Restaurant	Drilled Well	52 restaurant seats	Unknown	Unknown	Negligible
Big Island Community	Drilled Well	Unknown	Unknown	Unknown	Unknown
Budget Inn	Drilled Well	Unknown	Unknown	Unknown	Unknown
Camp Loman	Three Drilled Wells	320 Dormitory beds, 1 support building	Unknown	Unknown	5,000 Gallons
Camp VA Jaycee	Drilled Well	188 dormitory beds, camp office/cafeteria, residence, other support buildings	Unknown	Unknown	80 Gallons
Campers Paradise	Drilled Well	Unknown	Unknown	Unknown	Unknown
H & H Food Market	Drilled Well	50 Restaurant seats	Unknown	Unknown	Negligible
Lakehaven Marina	Drilled Well	Unknown	Unknown	Unknown	Unknown

Mama's Homecooking	Drilled Well	Unknown	Unknown	Unknown	Unknown
Millstone Tea Room	Drilled Well	Unknown	Unknown	Unknown	Unknown
Mitchell's Point Marina	Drilled Well	4 seat snack bar, 25 camper connection, marina	Unknown	Unknown	28 Gallons
Smith Mountain Lake Moose Lodge	Drilled Well	60 restaurant seats	Unknown	Unknown	Negligible
Tuck Away Campground	Drilled Well	23 camp sites and bathhouse	Unknown	Unknown	Negligible
Virginia Dare Cruises and Marina	Drilled Well	122 restaurant seats, 30 boat slips, marina office	Unknown	Unknown	Negligible
Waterfront Park	Drilled Well	100 camper connections	Unknown	Unknown	Negligible
White House Corner Store	Drilled Well	25 restaurant seats	Unknown	Unknown	Negligible
White House Restaurant	Drilled Well	130 restaurant seats	Unknown	Unknown	Negligible

2.6.4 Campbell County

There are two known self-supplied non-agricultural users of greater than 300,000 gallons per month of water in Campbell County. Information on self-supplied, non-agricultural users of greater than 300,000 gallons per month of water in Campbell County is presented in Table 2.6.4.1.

Table 2.6.4.1 - Known Non-Agricultural, Self-Supplied Users Greater Than 300,000 Gallons per month in Campbell County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Intermet-Archer Creek Plant	Drilled Well	74,880 gpd	236 gpm	156 gpm	75,000 Gallons
NNFD Plant BWX	Drilled Well	Unknown	Unknown	Unknown	Unknown

There are 19 known self-supplied, non-agricultural users using less than 300,000 gallons per month of water in Campbell County. Information on self-supplied, non-agricultural users of less than 300,000 gallons per month of water in Campbell County is presented in Table 2.6.4.2.

Table 2.6.4.2 - Known Non-Agricultural, Self-Supplied Users Less Than 300,000 Gallons per month in Campbell County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Gladys Elementary School	Drilled Well	3,760 gpd	Unknown	Unknown	18,000 Gallons
William Campbell High School	Drilled Well	Unknown	Unknown	Unknown	Unknown
Camp Hat Creek Lodge	Drilled Well	104 dormitory beds, bathhouses	Unknown	Unknown	Negligible
Camp Hat Creek Retreat Center	Drilled Well	40 bed retreat, 80 seat dining facility, 1 residence	Unknown	Unknown	Unknown
Cedar Hills Golf Club	Drilled Well	18 restaurant seats	Unknown	Unknown	Negligible
Colonial Motel	Drilled Well	14 room motel, 2 residential connections	Unknown	Unknown	Negligible
Fountain Motel	Two Drilled Wells	25 existing motel rooms	Unknown	Unknown	1,056 Gallons
Hud's Ice Cream	Drilled Well	28 restaurant seats	Unknown	Unknown	Negligible
Liberty Properties	Drilled Well	8 unit apartment building, 50 seat restaurant	22 gpm	Unknown	113 Gallons
Lightnin's Restaurant	Drilled Well	28 restaurant seats	Unknown	Unknown	Negligible
Lynchburg Livestock Market	Drilled Well	30 restaurant seats	Unknown	Unknown	Negligible
Marilyn's Hot Rod Café	Drilled Well	40 restaurant seats	Unknown	Unknown	Negligible
Master's Inn	Two Drilled Wells	286 dormitory beds	Unknown	Unknown	7,000 Gallons
Moore's Country Store	Drilled Well	52 restaurant seats	Unknown	Unknown	Negligible
Puckette's Place	Drilled Well	Unknown	Unknown	Unknown	Unknown
Spring House Restaurant	Drilled Well	150 restaurant seats, 1 residence	Unknown	Unknown	Negligible
Thousand Trails Resort	Drilled Well	51,840 gpd	88 gpm	36 gpm	41,833 Gallons
Trent’s Truck Plaza	Drilled Well	77 restaurant seats	Unknown	Unknown	Negligible
Village Market	Drilled Well	24 restaurant seats, 1 residence	Unknown	Unknown	Negligible

2.6.5 Nelson County

There are six known self-supplied, non-agricultural users of greater than 300,000 gallons per month of water in Nelson County. Information on self-supplied, non-agricultural users of greater than 300,000 gallons per month of water in Nelson County is presented in Table 2.6.5.1.

Table 2.6.5.1 - Known Non-Agricultural, Self-Supplied Users Greater Than 300,000 Gallons per month in Nelson County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
Tye River Elementary School	Two Drilled Wells	10,108 gpd	Well No. 1 - 7.5 gpm Well No. 2 - 12 gpm	Well No. 1 - 12 gpm Well No. 2 - 14 gpm	5,055 Gallons
Former Nelson County Middle School	Drilled Well	10,000 gpd	20 gpm	19 gpm	5,000 gallons
Mark Addy Inn	Two Drilled Wells	1,300 gpd	Unknown	Unknown	Negligible
Rockfish Community Center	Drilled Well	4,000 gpd	6 gpm	6 gpm	Negligible
Valley Green Center	Drilled Well	220 visitors per day	Unknown	Unknown	36 Gallons
Valleymont Market	Drilled Well	200 visitors per day	Unknown	Unknown	40 Gallons

There are 15 known self-supplied, non-agricultural users using less than 300,000 gallons per month of water in Nelson County. Information on self-supplied, non-agricultural users of less than 300,000 gallons per month of water in Nelson County is presented in Table 2.6.5.2.

Table 2.6.5.2 - Known Non-Agricultural, Self-Supplied Users Less Than 300,000 Gallons per month in Nelson County

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
American Fibers and Yarns	Drilled Well	100 persons	Unknown	Unknown	92 Gallons
Church of the Blue Ridge School	Drilled Well	120 students	4.5 gpm	4.5 gpm	29 Gallons
North Branch School	Drilled Well	95 students and staff	Unknown	Unknown	Negligible
Rockfish River Elementary School	Two Drilled Wells	8,488 gpd	Well No. 1 - 30 gpm Well No. 2 - 10 gpm	Well No. 1 - 45 gpm Well No. 2 - 13 gpm	4,244 Gallons
Camp Blue Ridge	Drilled Well	600 campers per day	Unknown	Unknown	50,000 Gallons
Crabtree Falls Campground	Drilled Well	150 campers per day	Unknown	Unknown	Negligible
Crossroads Market & Deli	Drilled Well	3,000 gpd	Unknown	Unknown	Negligible
D'Ambola's Restaurant	Drilled Well	100 persons per day	Unknown	Unknown	Negligible
Grille 151	Drilled Well	Unknown	Unknown	Unknown	Unknown
Lake Nelson Campground	Drilled Well	7,200 gpd	20 gpm	18 gpm	40 Gallons
Montebello Camping and Fishing	Drilled Well	2,750 gpd	Unknown	Unknown	Negligible
Tye River Restaurant	Drilled Well	16 seats	Unknown	Unknown	Negligible
Wintergreen - Reception Center	Drilled Well	6,400 gpd	Unknown	8 gpm	27 Gallons
The Monroe Institute	Drilled Well	50 participants and staff	Unknown	Unknown	12,057 Gallons
Old Schoolhouse Village	Drilled Well	100 seat restaurant	8.5 gpm	8.5 gpm	Negligible

2.6.6 City of Bedford

There are no known self supplied, non-agricultural users of greater than 300,000 gallons per month of water within the City of Bedford.

2.6.7 City of Lynchburg

Griffin Pipe is the only known non-agricultural, self supplied user of greater than 300,000 gallons per month of water within the City of Lynchburg; however, no additional information was available for this user.

2.6.8 Town of Altavista

Ross Products Division of Abbott Laboratories is the only known non-agricultural, self supplied user of greater than 300,000 gallons per month of water within the Town of Altavista; however, no additional information was available for this user.

2.6.9 Town of Amherst

The Glad Manufacturing Plant is a self supplied, non-agricultural user using greater than 300,000 gallons per month of groundwater. The groundwater wells that serve the Glad Manufacturing Plant are location within the Town of Amherst; however, the facility is located in Amherst County. Since the water source for the Glad Manufacturing Plant is located within the Town of Amherst limits, the Glad Manufacturing Plant is included with the Town of Amherst.

2.6.10 Town of Appomattox

There are no known self-supplied, non-agricultural users using greater than 300,000 gallons per month of water within the Town of Appomattox. However, there are eight known self-supplied, non-agricultural users using less than 300,000 gallons of water within the Town of Appomattox. Information on self-supplied, non-agricultural users of less than 300,000 gallons per month of water within the Town of Appomattox is presented in Table 2.6.10.1.

Table 2.6.10.1 - Known Non-Agricultural, Self-Supplied Users Less Than 300,000 Gallons per month in the Town of Appomattox

Water System	Source	Design Capacity	Well Yield (Approximate)	Well Pump Capacity	Effective Storage Capacity
C & E Grocery	Drilled Well	20 restaurant seats	Unknown	Unknown	Negligible
Falling River Country Club	Drilled Well	18 seat snack bar, 160 seat banquet room	Unknown	Unknown	Negligible
Holiday Lake 4-H Educational Center	Drilled Well	275 dormitory beds	22 gpm	Unknown	32,000 Gallons
Holiday Lake State Park	Two Drilled Wells	103 campground sites, 1 concession, 2 bathhouses, 1 park office	Well No. 1 - 12 gpm Well No. 2 - 13 gpm	Well No. 1 - 12 gpm Well No. 1 - 13 gpm	10,667 Gallons
Moose Lodge 975	Drilled Well	370 banquet seats	Unknown	Unknown	Negligible
Paradise Lake	Drilled Well	Unknown	Unknown	Unknown	Unknown
Spout Spring Ruritan Club	Drilled Well	400 banquet seats	Unknown	Unknown	Negligible
Spring Grove Farm	Drilled Well	1 Bed and Breakfast	Unknown	Unknown	2,540 Gallons

2.6.11 Town of Brookneal

Brookneal Plant is the only known self-supplied, non-agricultural user greater than 300,000 gallons per month using surface water within the Town of Brookneal; however, no additional information was available for this user.

2.6.12 Town of Pamplin

There are no known self-supplied, non-agricultural users using greater than 300,000 gallons per month of water within the Town of Pamplin service area.

2.7 Amount of Water Available to be Purchased from Outside each Jurisdiction from any Source with the Capacity to Withdraw more than 300,000 Gallons per Month of Surface and Ground Water[8]

2.7.1 Amherst County

The ACSA currently purchases water from the City of Lynchburg in order to provide water to the Central Virginia Training Center (CVTC) located in the southern portion of the county. The current contract between the ACSA and City of Lynchburg does not specify a maximum amount of water that may be purchased by the ACSA from the City

[8] 9 VAC 25-780-70 H.

of Lynchburg. Therefore, it may be feasible for the ACSA to purchase additional water from the City of Lynchburg in the future, after replacement of the Route 29 water line and the addition of a booster pump station, which is anticipated to occur in approximately 2050.

2.7.2 Appomattox County

While Appomattox County does not currently own or operate a community water system, the CCUSA or City of Lynchburg may be a feasible source available to purchase water from in the future. The County currently has plans to purchase water from the CCUSA through an interconnection at Concord.

2.7.3 Bedford County

The BCPSA currently purchases water from the City of Lynchburg in order to provide water to the Forest and New London area located in eastern portion of the county. The current contract between the BCPSA and City of Lynchburg does not specify a maximum amount of water that may be purchased by the BCPSA from the City of Lynchburg. Therefore, it may be feasible for the BCPSA to purchase additional water from the City of Lynchburg in the future.

In addition, the BCPSA currently purchases water from the WVWA in Roanoke County to provide water to the Stewartsville area located in the western portion of the county. It may be feasible for the BCPSA to purchase additional water from the WVWA in the future.

2.7.4 Campbell County

The CCUSA currently purchases water from the City of Lynchburg in order to provide water to the northwestern portion of the county. The current contract between the CCUSA and City of Lynchburg does not specify a maximum amount of water that may be purchased by the CCUSA from the City of Lynchburg. Therefore, it may be feasible for the CCUSA to purchase additional water from the City of Lynchburg in the future.

2.7.5 Nelson County

There are currently no known significant or feasible sources of water available to be purchased from outside the Nelson County limits in the near future.

2.7.6 City of Bedford

The BCPSA and City of Lynchburg are both feasible sources of water available to purchase water from in the future by the City of Bedford. The City of Bedford has evaluated two potential connections to the City of Lynchburg via the BCPSA Forest System, which currently purchases water from the City of Lynchburg. These potential connections are discussed in more detail in the alternatives analysis section of this report (Section 8.0).

2.7.7 City of Lynchburg

The City of Lynchburg currently sells water to the ACSA, BCPSA, and CCUSA; however, the ACSA, BCPSA, and CCUSA may also be feasible sources of water available to the City of Lynchburg

2.7.8 Town of Altavista

The Town of Altavista currently purchases water from the CCUSA and will continue to be a feasible source of water available to the Town of Altavista to purchase water from in the future.

2.7.9 Town of Amherst

Mill Creek Reservoir is located north of the Town of Amherst and owned by Amherst County. The reservoir is currently used as an emergency water source for the Town of Amherst during severe droughts. Amherst County has agreed to release up to 1.0 MGD during severe droughts to supplement flows in the Buffalo River to the Town's intake. The reservoir is being considered as a future water source by Amherst County/ACSA and the Town of Amherst and is discussed in more detail in alternatives analysis section of this report (Section 9.0).

2.7.10 Town of Appomattox

There are currently no known significant or feasible sources of water available to be purchased from outside the Town of Appomattox limits in the near future.

2.7.11 Town of Brookneal

There are currently no known significant or feasible sources of water available to be purchased from outside the Town of Brookneal limits in the near future.

2.7.12 Town of Pamplin

There are currently no known significant or feasible sources of water available to be purchased from outside the Town of Pamplin limits in the near future.

2.8 Estimate of Agricultural Users Who Utilize More than 300,000 Gallons per Month[9]

The Virginia Cooperative Extension (VCE) agents for each county within the region were originally contacted in order to collect available information on agricultural users utilizing more than 300,000 gallons of groundwater or surface water. The VCE agents were not cooperative and would not provide available information. In addition, water usage records from the VDEQ Water Use Database were reviewed; however, no data concerning individual agricultural users for livestock or crops was available. Therefore, agricultural information was collected from the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS). General agricultural information for each county, including number of farms, total farm land acreage, and average size of farm, was collected from the 2002 Census of Agriculture and is discussed below. In addition, information on livestock (e.g., number of head of cattle) and crops (e.g., type of crop planted, total acres harvested) for the region was available for 2002. Please note that the USDA 2002 Census of Agriculture and NASS does not provide information for cities and towns. While this information does not provide information on specific agricultural users within the region, it provides a good starting point for providing estimates on agricultural use in the region.

[9] 9 VAC 25-780-70 I.

2.8.1 Amherst County

According to the 2002 Census of Agriculture, there are approximately 460 farms in Amherst County, which use approximately 99,863 acres of land. The average size of the farms in Amherst County is approximately 217 acres.

Table 2.8.1.1 presents the type and amount of livestock in Amherst County.

Table 2.8.1.1: Amherst County Livestock Information.

Type of Livestock	# in 2002	Number of Farms
Beef Cattle & Calves	9,939	312
Milk Cows	20	9
Hogs & Pigs	78	9
Sheep & Lambs	105	11
Poultry Layers	343	21
Poultry Broilers	0	0
Horses	591	68
Goats	259	30

Table 2.8.1.2 presents the type and amount of crops in Amherst County.

Table 2.8.1.2: Amherst County Crop Information.

Type of Crop	Acres in 2002	Number of Farms
Corn for Grain	196	15
Corn for Silage	295	10
Forage	14,915	283
Wheat for Grain	0	0
Oats for Grain	0	0
Barley for Grain	0	0
Cotton	0	0
Soybean	0	0
Tobacco	0	0
Vegetables	7	7
Potatoes	0	0
Unknown	144	14

2.8.2 Appomattox County

According to the 2002 Census of Agriculture, there are approximately 389 farms in Appomattox County, which use approximately 84,971 acres of land. The average size of the farms in Appomattox County is approximately 218 acres. Table 2.8.2.1 presents the type and amount of livestock in Appomattox County.

Table 2.8.2.1: Appomattox County Livestock Information.

Type of Livestock	# in 2002	Number of Farms
Beef Cattle & Calves	9,412	231
Milk Cows	513	8
Hogs & Pigs	102	7
Sheep & Lambs	75	9
Poultry Layers	0	15
Poultry Broilers	0	0
Horses	0	0
Goats	359	0
Colonies of Bees	0	0

Table 2.8.2.2 presents the type and amount of crops in Appomattox County.

Table 2.8.2.2: Appomattox County Crop Information.

Type of Crop	Acres in 2002	Number of Farms
Corn for Grain	614	32
Corn for Silage	585	16
Forage	18,289	259
Wheat for Grain	922	16
Oats for Grain	92	8
Barley for Grain	291	10
Cotton	0	0
Soybean	0	0
Tobacco	118	2
Vegetables	41	5
Potatoes	0	0
Unknown	507	3

2.8.3 Bedford County

According to the 2002 Census of Agriculture, there are approximately 1,289 farms in Bedford County, which use approximately 199,244 acres of land. The average size of the farms in Bedford County is approximately 155 acres.

Table 2.8.3.1 presents the type and amount of livestock in Bedford County.

Table 2.8.3.1: Bedford County Livestock Information.

Type of Livestock	# in 2002	Number of Farms
Beef Cattle & Calves	23,500	857
Milk Cows	1,838	26
Hogs & Pigs	1,461	14
Sheep & Lambs	343	21
Poultry Layers	1,217	57
Poultry Broilers	1,750	5
Horses	2,104	0
Goats	919	0

Table 2.8.3.2 presents the type and amount of crops in Bedford County.

Table 2.8.3.2: Bedford County Crop Information.

Type of Crop	Acres in 2002	Number of Farms
Corn for Grain	746	15
Corn for Silage	2,574	49
Forage	48,146	913
Wheat for Grain	441	11
Oats for Grain	103	9
Barley for Grain	386	11
Cotton	0	0
Soybean	0	0
Tobacco	32	6
Vegetables	15	15
Potatoes	3	3
Unknown	676	57

In Addition, Duis Nursery and Hawkins Brothers Farm were identified in the VDEQ Water Use Database as self-supplied agricultural users of greater than 300,000 gallons per month. Duis Nursery is served by groundwater wells; however, no other information was available. No information for Hawkins Brothers Farm was available.

2.8.4 Campbell County

According to the 2002 Census of Agriculture, there are approximately 644 farms in Campbell County, which use approximately 138,716 acres of land. The average size of the farms in Campbell County is approximately 209 acres. Table 2.8.4.1 presents the type and amount of livestock in Campbell County.

Table 2.8.4.1: Campbell County Livestock Information.

Type of Livestock	# in 2002	Number of Farms
Beef Cattle & Calves	13,738	371
Milk Cows	1,300	18
Hogs & Pigs	0	1
Sheep & Lambs	912	13
Poultry Layers	845	18
Poultry Broilers	0	3
Horses	685	0
Goats	0	0
Colonies of Bees	211	0

Table 2.8.4.2 presents the type and amount of crops in Campbell County.

Table 2.8.4.2: Campbell County Crop Information.

Type of Crop	Acres in 2002	Number of Farms
Corn for Grain	904	23
Corn for Silage	2,300	30
Forage	24,992	408
Wheat for Grain	1,074	30
Oats for Grain	206	20
Barley for Grain	779	16
Cotton	0	0
Soybean	1,499	28
Tobacco	666	61
Vegetables	42	15
Potatoes	0	3
Unknown	1,328	71

2.8.5 Nelson County

According to the 2002 Census of Agriculture, there are approximately 456 farms in Nelson County which use approximately 84,691 acres of land. The average size of the farms in Nelson County is approximately 186 acres. Table 2.8.5.1 presents the type and amount of livestock in Nelson County.

Table 2.8.5.1: Nelson County Livestock Information.

Type of Livestock	# in 2002	Number of Farms
Beef Cattle & Calves	6,524	235
Milk Cows	9	7
Hogs & Pigs	259	9
Sheep & Lambs	0	8
Poultry Layers	520	26
Poultry Broilers	0	0
Horses	484	0
Goats	732	0

Table 2.8.5.2 presents the type and amount of crops in Nelson County.

Table 2.8.5.2: Nelson County Crop Information.

Type of Crop	Acres in 2002	Number of Farms
Corn for Grain	173	9
Corn for Silage	0	2
Forage	14,759	285
Wheat for Grain	208	10
Oats for Grain	0	0
Barley for Grain	0	1
Cotton	0	0
Soybean	0	1
Tobacco	0	0
Vegetables	281	16
Potatoes	0	2
Unknown	796	49

In addition, Buck Creek Nursery, Saunders Brothers Inc., Critzer Family Farm, Thomas Wheaton, Edible Landscaping, Drumheller's Orchard, Glen Mary Nursery, Glenthrone Berry Farm, Tuck Farms, and Waynesboro Nurseries were identified in the VDEQ Water Use Database as self-supplied agricultural users of greater than 300,000 gallons per month; however, no additional information was available.

2.8.6 City of Bedford

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the City of Bedford; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the City of Bedford.

2.8.7 City of Lynchburg

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the City of Lynchburg; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the City of Lynchburg.

2.8.8 Town of Altavista

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the Town of Altavista; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the Town of Altavista.

2.8.9 Town of Amherst

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the Town of Amherst; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the Town of Amherst.

2.8.10 Town of Appomattox

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the Town of Appomattox; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the Town of Appomattox.

2.8.11 Town of Brookneal

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the Town of Brookneal; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the Town of Brookneal.

2.8.12 Town of Pamplin

Agricultural information from the USDA 2002 Census of Agriculture and NASS was not available for the Town of Pamplin; however, there are no known self-supplied, agricultural users utilizing more than 300,000 gallons per month of groundwater or surface water in the Town of Pamplin.

2.9 Residences and Businesses that are Self-Supplied and Individual Wells Withdrawing less than 300,000 Gallons per Month[10]

To determine an estimate of residences and businesses that are self-supplied and served by individual groundwater wells withdrawing less than 300,000 gallons per month, the population served by both public and private community water systems was determined. Population served by public community water systems was provided by each jurisdiction and is based on 2006 data. Population served by private community water systems was estimated based on review of VDH Engineering Description Sheets and/or community water system lists from the EPA Safe Drinking Water Information System (SDWIS). The total population for each county and city was provided by the 2000 US Census Bureau. The total population for each town was provided by the town and subtracted from the county population.

The population served by individual wells was estimated by subtracting the population served by public and private community water systems from the total population. It is important to note for the City of Bedford, City of Lynchburg, and Town of Appomattox, the 2006 population served by the public community water system provided by the jurisdiction was greater than the 2000 US Census Bureau population estimate; therefore it was assumed that the estimated population served by individual wells is zero. The

[10] 9 VAC 25-780-70 J.

estimated population served by individual wells for the towns of Altavista and Pamplin was provided by each town. A summary of population served by individual wells by jurisdiction is included in Table 2.9.

Table 2.9: Estimated Population Served by Individual Residential Wells by Jurisdiction.

Jurisdiction	Total Population	Population Served by Public CWS	Estimated Population Served by Private CWS	Estimated Population Served by Individual Wells
Amherst County	29,643	15,774	192	13,677
Appomattox County	11,752	0	27	11,725
Bedford County	60,371	17,500	3,067	39,804
Campbell County	46,394	20,160	1,058	25,176
Nelson County	14,445	4,553	864	9,028
City of Bedford	6,299	7,500	0	0
City of Lynchburg	65,269	66,000	0	0
Town of Altavista	3,425	3,850	0	172
Town of Amherst	2,251	2,184	0	67
Town of Appomattox	1,761	2,476	0	0
Town of Brookneal	1,259	1,259	0	0
Town of Pamplin	199	199	0	25
Total	**243,068**	**141,455**	**5,208**	**99,674**

2.10 Summary of Findings and Recommendations from Source Water Assessment Plans and Wellhead Protection Plans[11]

2.10.1 Amherst County

In 2001 Amherst County upgraded and expanded its Watershed Protection Ordinance as part of the Code of Amherst County. The Watershed Protection Ordinance is included in Appendix C-1, Zoning and Subdivisions, of the Code of Amherst County.

Section 710 describes the watershed district, which is designed to protect against and minimize the pollution of, and deposition of sediment in, the public drinking water supply sources located in Amherst County in order to protect the health, safety, and general welfare of the citizens using the water supply source. The watershed district divides watersheds within the county into two types: Primary Water Supply Districts and Secondary Water Supply Districts.

[11] 9 VAC 25-780-70 K.

A Primary Water Supply District is defined as watersheds upstream from a current or proposed water supply intake structure, which is expected to supply 50% or more of a water treatment facility's untreated water source. The Primary Water Supply Districts in Amherst County include the Graham Creek Watershed, Mill Creek Watershed, all lands within the Buffalo River, and the Mill Creek Watershed upstream from the water intakes for the Town of Amherst Filtration Plant and the Harris Creek and Graham Creek Watershed, upstream from the water intakes of the Henry L. Lanum, Jr. WFP.

A Secondary Water Supply District is defined as those watersheds upstream from a current or proposed water supply intake structure which is expected to supply less than 50% of a water treatment facility's untreated water source.

Prohibited uses within the watershed district are broken down into five categories: (1) prohibited uses, (2) prohibited uses except by special exceptions, (3) prohibited uses within 400 feet of permanent tributaries or reservoirs, (4) prohibited uses within 50 feet of permanent tributaries or reservoirs, and (5) special use modification to minimize erosion and sedimentation. Please refer to Section 710 for a complete list of prohibited uses.

In addition, the ordinance discusses special requirements within the Primary and Secondary Water Supply Districts, including stream and reservoir setback requirements, minimum lot area for both residential and commercial uses, and on-site sewer systems. Please refer to Section 710 for a full description of each special requirement.

A copy of the Watershed Protection Ordinance for Amherst County is included in Appendix C-1.

2.10.2 Appomattox County

Appomattox County does not own or operate a community water system; therefore there is no Source Water Assessment Plan (SWAP) or Wellhead Protection Plan for the county.

2.10.3 Bedford County

As part of the zoning ordinance for Bedford County, the county has included a Wellhead Protection Overlay District. The Wellhead Protection Overlay District is included as Section 30-76 in Article III – District Regulations. The purpose of Wellhead Protection (WHP) is to prevent contamination of public wells, public wellfields, and other groundwater resources that are used as sources of public drinking water. This district is designed to promote the health, safety, and general welfare of the community by protecting the groundwater supply within the county. The wellhead protection overlay district includes specifications on use of agricultural and household chemicals, uses permitted in the WHP overlay district, and uses prohibited within the WHP overlay district. A copy of the Wellhead Protection Overlay District is included in Appendix C.

2.10.4 Campbell County

There are currently no Wellhead Protection Plans for Campbell County. Information on SWAPs for Campbell County is not available at this time.

2.10.5 Nelson County

Information on SWAPs or Wellhead Protection Plans for Nelson County is not available at this time.

2.10.6 City of Bedford

The Virginia Department of Health (VDH) completed a SWAP for the City of Bedford. The City of Bedford SWAP noted that the wells are highly susceptible to contamination, based on surrounding land use and lack of an aquitard. The plan recommended the use of best management practices in these areas. The plan further noted that the Stony Creek Reservoir and Big Otter River intakes are exposed to potential impact based on the nature of surface water sources, and factors including varying hydrologic, hydraulic, and atmospheric conditions influenced by the land uses in the associated watersheds. The plan recommended the use of best management practices in these areas as well. A copy of the SWAP for the City of Bedford is included in Appendix C.

2.10.7 City of Lynchburg

Information on SWAPs or Wellhead Protection Plans for the City of Lynchburg is not available at this time.

2.10.8 Town of Altavista

Information on SWAPs or Wellhead Protection Plans for the Town of Altavista is not available at this time.

2.10.9 Town of Amherst

The Robert E. Lee Soil and Water Conservation District completed a Source Water Protection Plan Progress Report for the Buffalo River Watershed for February 2004 through January 2008. The report was completed by a Watershed Coordinator who is in charge of conducting watershed assessments in order to find impairments and prioritize where conservation measures or best management practices (BMP) should be installed to most benefit the protected watershed. The Buffalo River watershed was broken down into manageable sub-watersheds, which are named after the main stream of that particular sub-area, to complete the watershed assessment. The sub-area watersheds include: Mill Creek, Muddy Branch, Franklin Creek, Forks of Buffalo, Puppy Creek, and Long Branch.

Based on the findings of the watershed assessments completed in the Buffalo River Watershed, the report recommends the following for the Town of Amherst:

- Continued implementation of conservation measures such as livestock exclusion fencing, riparian buffer plantings, and alternative watering systems to reduce livestock from accessing streams, which increases the amount of bacteria, nutrients, and sediment runoff.
- Support for programs, such as the Willos for LIFE riparian planting program, which assists landowners with re-planting their land next to streams.
- Continued implementation of cross fencing to create rotational grazing systems which increases forage production and reduces the chance for over grazing.
- Utilization of no till practices, planting crop covers, crimping methods to kill cover crops and increase riparian buffer widths along waterways near croplands to increase the filtration of runoff before it enters the waterway.
- Stronger mechanism to carry out the enforcement of violations found within the watershed.

- Maintaining or re-planting riparian areas as well as maintaining and re-foresting lands to create healthy functioning riparian buffers and absorbent landscapes.
- Conducting regular watershed assessments and stream surveys.
- Continued support for local educational workshops, programs, articles, and mailings that address watershed protection and conservation programs.

A copy of the Source Water Protection Plan Progress Report for the Buffalo River Watershed is included in Appendix C.

In addition, the Amherst County Watershed Protection Ordinance included in Appendix C-1, Zoning and Subdivisions, of the Code of Amherst County applies to the Town of Amherst. The Amherst County Watershed Protection Ordinance is included in Appendix C-1 of this report and is discussed in greater detail in Section 2.10.1

2.10.10 Town of Appomattox

Information on SWAPs or Wellhead Protection Plans for the Town of Appomattox is not available at this time.

2.10.11 Town of Brookneal

In June 2002, a SWAP for the Town of Brookneal was completed by VDH. The Town of Brookneal SWAP noted that Phelps Creek Reservoir is highly susceptible to contamination, based on surrounding land use. The plan recommended the use of best management practices in these areas to include protective cover for specialty crops, sod waterway, and grazing land protection. A copy of the SWAP for the Town of Brookneal is included in Appendix C.

2.10.12 Town of Pamplin

In October 2002, VDH completed a SWAP for the Town of Pamplin. The Town of Pamplin SWAP noted that the town’s groundwater wells are highly susceptible to contamination, based on surrounding land use. The plan recommended the use of best management practices in these areas.

In March 2006, the Town of Pamplin developed a Wellhead Protection Plan with assistance from a Virginia Rural Water Association (VRWA) Groundwater Protection

Specialist. During development of the Wellhead Protection Plan, the Town of Pamplin followed a 5-Step Plan, which included forming a steering committee, delineating the recharge area, identifying potential sources of contamination, and creating a management plan as well as a contingency plan.

The Steering Committee members include Mayor Robert G. Mitchell, Town Clerk Debbie Happel, and VRWA Groundwater Specialist Nancy Carr.

Delineation of the recharge areas for the town's three groundwater wells and identification of potential sources for contamination was completed by VDH as part of the SWAP completed in October 2002.

The Steering Committee created a management plan to handle potential sources of contamination identified in the SWAP. The management plan includes action items such as promotion of town sewer to residents to reduce risks from on-site septic systems (OSSS), public education by providing education materials at regional planning meetings, mailing conservation fliers as well as information on on-site septic systems (OSSS); and promoting the Wellhead Protection Plan at regional planning meetings as well as in two local newspapers, the *Appomattox Times Virginian* and the *Farmville Herald*.

Finally, the Town of Pamplin completed a contingency plan to establish procedures necessary to utilize alternative water supply sources in the event of contamination or loss of the existing sources. The plan was developed as part of the five step planning process as developed by the USEPA and National Rural Water Association (NRWA) under the Wellhead Protection Program of the Safe Drinking Water Act.

A copy of the Town of Pamplin Wellhead Protection Plan is included in Appendix C.

3.0 EXISTING WATER USE INFORMATION

3.1 Community Water Systems

3.1.1 Population[12]

Based on the 2000 Census, the total population of the region is approximately 243,068. Table 3.1.1 presents the 2000 Census population information for each locality within the region. Please note that the population information for each county does not include the cities and towns within the respective county. A map showing the population density for the region is included as Figure 3.1.1A. In addition, a map showing the household density for the region is included as Figure 3.1.1B

Table 3.1.1: Population by Locality Based on 2000 Census.

Name of Locality	Population
Amherst County	29,643
Appomattox County	11,752
Bedford County	60,371
Campbell County	46,394
Nelson County	14,445
City of Bedford	6,299
City of Lynchburg	65,269
Town of Altavista	3,425
Town of Amherst	2,251
Town of Appomattox	1,761
Town of Brookneal	1,259
Town of Pamplin	199
Total Population for Region	**243,068**

[12] 9 VAC 25-780-80 B.1.

Figure 3.1.1A – Population Density Map

Figure 3.1.1B – Household Density Map

3.1.2 Amherst County

3.1.2.1 *Public Community Water Systems*

The ACSA operates the public community water system in Amherst County. The ACSA public community water system consists of Graham Creek Reservoir, Harris Creek pump station, the Henry L. Lanum, Jr. WFP, and 160 miles of distribution mains. The ACSA serves approximately 15,774 people with approximately 6,412 connections. The Henry L. Lanum, Jr. WFP average daily withdrawal is approximately 1.27 MGD with a maximum daily withdrawal of approximately 1.86 MGD. The Henry L. Lanum, Jr. WFP average monthly water use is approximately 38.75 MG with an annual average water use of approximately 465.00 MG. The estimated water demand for the ACSA disaggregated into categories of use is provided in Table 3.1.2.1.

Table 3.1.2.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for ACSA

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
ACSA	26.82	2.24	0.00	0.00	5.81	3.88	0.00	0.00	38.75

* Water use information was provided by the ACSA and/or DEQ and is based on data reported during calendar year 2006.

3.1.2.2 *Private Community Water Systems*

There are two privately owned community water systems in Amherst County: Orchard Hills Estates and Woodland MHP. Both community water systems utilize groundwater and serve residential customers. The two private community water systems serve approximately 192 people and have a total of 64 connections. Table 3.1.2.2A summarizes population and connection information for each private community water system in Amherst County.

Table 3.1.2.2A: Summary of Private Community Water Systems in Amherst County

Water System Name	Owner	Source	Population Served	Number of Connections
Woodland MHP	Charles Hammer	Groundwater	102	34
Orchard Hills Estates	Orchard Hills Community Development Association	Groundwater	90	30
		Total	**192**	**64**

The combined average daily withdrawal for the private community water systems in Amherst County is approximately 0.033 MGD. Maximum daily withdrawal information was not available for either system. Table 3.1.2.2B summarizes water withdrawal information for each private community water system in Amherst County.

Table3.1.2.2B: Summary of Water Withdrawal Information for Private CWS in Amherst County

Water System Name	Owner	Source	Average Daily Withdrawal (MGD)	Maximum Daily Withdrawal (MGD)
Woodland MHP	Charles Hammer	Groundwater	0.014	Not Available
Orchard Hills Estates	Orchard Hills Community Development Association	Groundwater	0.019	Not Available
		Total	**0.033**	**Not Available**

The combined average monthly water use is approximately 1.0 MG with an annual average of approximately 12.0 MG. Table 3.1.2.2C summarizes water use information for each private community water system in Amherst County.

Table3.1.2.2C: Summary of Water Use Information for Private CWS in Amherst County

Water System Name	Owner	Source	Average Monthly (MG)	Annual Average (MG)
Woodland MHP	Charles Hammer	Groundwater	0.426	5.11
Orchard Hills Estates	Orchard Hills Community Development Association	Groundwater	0.578	6.94
		Total	1.004	12.05

3.1.3 Appomattox County

3.1.3.1 *Public Community Water Systems*

Appomattox County does not own or operate a public community water system.

3.1.3.2 *Private Community Water Systems*

There is only one private community water system in Appomattox County. Pineview Home for the Elderly is a nursing home serving approximately 30 people. No water use information was available for this community water system.

3.1.4 Bedford County

3.1.4.1 *Public Community Water Systems*

The BCPSA operates the public community water systems in Bedford County. The BCPSA consists of twelve community water systems using groundwater and three community water systems using surface water. The BCPSA serves approximately 18,225 people with approximately 7,689 known connections. Table 3.1.4.1A summarizes each system owned and operated by the BCPSA.

Table 3.1.4.1A: Summary of Public Community Water Systems in Bedford County

Water System Name	Owner	Source	Population Served	Number of Connections
Ashton Ridge Subdivision	BCPSA	Groundwater	Not Available	20
Forest and New London Area	BCPSA	Surface	15,666	6,581
Forty Acres Subdivision	BCPSA	Groundwater	90	36
Gross Point Subdivision	BCPSA	Groundwater	255	100
High Point	BCPSA	Surface	618	483
Hillcrest Subdivision	BCPSA	Groundwater	182	52
Lake Estates	BCPSA	Groundwater	235	96
Meadow Run MHP	BCPSA	Groundwater	34	Not Available
Mountain View Shores	BCPSA	Groundwater	460	186
Park Shores	BCPSA	Groundwater	56	23
Stallion Run/Quesenberry	BCPSA	Groundwater	35	Not Available
Stewartsville Consecutive	BCPSA	Surface	294	85
Turner Stone Park (Formerly Peaksview MHP)	BCPSA	Groundwater	175	Not Available
Valley Mills Crossing	BCPSA	Groundwater	54	27
WoodHaven Nursing Home	BCPSA	Groundwater	70	Not Available
Total			18,225	7,689

The total average daily withdrawal for the BCPSA systems is approximately 1.67 MGD with a maximum daily withdrawal of approximately 2.01 MGD, assuming a peak factor of 1.2. Table 3.1.4.1B summarizes water withdrawal information for the public community water systems operated by the BCPSA.

Table 3.1.4.1B: Summary of Water Withdrawal Amounts for Public CWS in Bedford County

Water System Name	Owner	Source	Average Daily Withdrawal (MGD)	Maximum Daily Withdrawal (MGD)
Ashton Ridge Subdivision	BCPSA	Groundwater	Not Available	Not Available
Forest and New London Area	BCPSA	Surface	Not Available	Not Available
Forty Acres Subdivision	BCPSA	Groundwater	0.004903	Not Available
Gross Point Subdivision	BCPSA	Groundwater	0.014019	Not Available
High Point	BCPSA	Surface	0.307350	Not Available
Hillcrest Subdivision	BCPSA	Groundwater	0.008559	Not Available
Lake Estates	BCPSA	Groundwater	0.012361	Not Available
Meadow Run MHP	BCPSA	Groundwater	Not Available	Not Available
Mountain View Shores	BCPSA	Groundwater	0.032472	Not Available
Park Shores	BCPSA	Groundwater	0.002197	Not Available
Stallion Run/Quesenberry	BCPSA	Groundwater	Not Available	Not Available
Stewartsville Area	BCPSA	Surface	Not Available	Not Available
Turner Stone Park (Formerly Peaksview MHP)	BCPSA	Groundwater	0.013	Not Available
Valley Mills Crossing	BCPSA	Groundwater	0.001205	Not Available
WoodHaven Nursing Home	BCPSA	Groundwater	Not Available	Not Available

The total average monthly usage for the BCPSA is approximately 50.14 MG with an annual average water usage information of approximately 601.62 MG. Available water use information for the BCPSA community water systems is provided in Table 3.1.4.1C.

Table 3.1.4.1C: Summary of Water Use Information for Public CWS in Bedford County

Water System Name	Owner	Source	Average Monthly (MG)	Annual Average (MG)
Ashton Ridge Subdivision	BCPSA	Groundwater	Not Available	Not Available
Forest and New London Area	BCPSA	Surface	Not Available	Not Available
Forty Acres Subdivision	BCPSA	Groundwater	0.141	1.7
Gross Point Subdivision	BCPSA	Groundwater	0.283	3.39
High Point	BCPSA	Surface	4.31	51.73
Hillcrest Subdivision	BCPSA	Groundwater	0.276	3.32
Lake Estates	BCPSA	Groundwater	1.27	15.3
Meadow Run MHP	BCPSA	Groundwater	Not Available	Not Available
Mountain View Shores	BCPSA	Groundwater	0.51	6.12
Park Shores	BCPSA	Groundwater	0.117	1.41

Stallion Run/Quesenberry	BCPSA	Groundwater	Not Available	Not Available
Stewartsville Area	BCPSA	Surface	0.20	2.41
Turner Stone Park (Formerly Peaksview MHP)	BCPSA	Groundwater	0.40	4.79
Valley Mills Crossing	BCPSA	Groundwater	0.037	0.44
WoodHaven Nursing Home	BCPSA	Groundwater	Not Available	Not Available

The estimated water demand for the BCPSA disaggregated into categories of use is provided in Table 3.1.4.1D.

Table 3.1.4.1D: Estimated Monthly Water Demand Disaggregated into Categories of Use for the BCPSA

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
BCPSA	36.98	1.95	0.91	0.00	1.50	4.86	1.50	2.43	50.13

* Water use information was provided by the BCPSA and/or DEQ and is based on data reported during calendar year 2006.

3.1.4.2 *Private Community Water Systems*

There are 26 known private community water systems in Bedford County. All of the private community water systems in Bedford County rely on groundwater except the Eagle Eyrie Baptist Conference Center, which relies on a surface water reservoir. Table 3.1.4.2 summarizes the available population and connection information for the private community water systems in Bedford County.

The estimated annual water use for the private community water systems in Bedford County is approximately 94.27 MG. The annual average water use for Eagle Eyrie Baptist Conference Center was estimated based on the average daily design capacity for the system. The annual average water use for Cedar Hills MHP, Harbor Ridge Subdivision, Hardy Road MHP Section I, Hardy Road MHP Section II, Virginia Ridge Subdivision, and Paradise Point Estates was estimated assuming 75 gpd per person. Finally, the annual average water use for Bedford Place No. 2, Cherry Hill Estates, Edwards MHP, Georgia Pacific, Harbor Heights Subdivision, and VDOT was estimated assuming 2.52 persons per connection at 75 gpd per person. The estimated annual average water use for private community water systems is provided in Table 3.1.4.2.

Table 3.1.4.2: Summary of Private Community Water Systems in Bedford County

Water System Name	Owner	Source	Population Served	Number of Connections	Annual Average (MG)
Bedford Place No. 2	Shelton Waterworks, Inc.	Groundwater	Not Available	17	1.17
Big Island: Main	Not Available	Groundwater	380	Not Available	Not Available
Blue Ridge Heights	Aqua Va - Div of Aqua America	Groundwater	Not Available	Not Available	Not Available
Cedar Hills MHP	James Perkins	Groundwater	60	33	1.64
Cherry Hill Estates	Cherry Hill Water Co.	Groundwater	Not Available	49	3.38
Clearview Estates	Aqua Va - Div of Aqua America	Groundwater	Not Available	Not Available	0.99
Eagle Eyrie Baptist Conference Center	Virginia Baptist General Board Dept. of Assemblies	Surface	1,000	Not Available	58.44
Edwards MHP	Roderick Edwards	Groundwater	Not Available	11	0.76
Georgia Pacific	Georgia Pacific Corporation	Groundwater	Not Available	14	0.97
Harbour Heights Subdivision	Smith Mountain Lake Development Corporation	Groundwater	115	40	2.76
Harbor Ridge Subdivision	James L. Trinkle	Groundwater	115	34	3.15
Hardy Road MHP, Section I	D.J. Cooper	Groundwater	60	43	1.64
Hardy Road MHP, Section II	D.J. Cooper	Groundwater	260	66	7.12
Homestead MHP	Karl Bates & Larry Mullins	Groundwater	Not Available	20	Not Available
Lake Forest Subdivision	Not Available	Groundwater	Not Available	Not Available	Not Available
Landmark MHP	Dan & Wanda Ramsey	Groundwater	Not Available	103	Not Available
Liberty Apartments	Liberty Partners Inc	Groundwater	Not Available	22	Not Available
Mariners Landing Subdivision	J.W. Development	Groundwater	430	49	42.95
Montvale	Montvale Water Company Inc.	Groundwater	725	350	Not Available
Paradise Point Estates	Paradise Point Estates	Groundwater	60	24	1.64
Snidow Subdivision	Steve McKinney	Groundwater	Not Available	21	Not Available
Timber Ridge Subdivision	Aqua Va - Div of Aqua America	Groundwater	71	Not Available	7.60
Twin Oaks MHP	Not Available	Groundwater	32	15	5.84
Virginia Ridge Subdivision	Virginia Ridge Water Co.	Groundwater	150	Not Available	4.11
VDOT	VDOT	Groundwater	Not Available	65	4.49
Waterways Subdivision	Waterways Subdivision	Groundwater	65	84	13.73
		Total	**3,523**	**1,060**	**162.38**

3.1.5 Campbell County

3.1.5.1 *Public Community Water Systems*

The CCUSA operates the public community water systems in Campbell County. The CCUSA consists of four community water systems using groundwater and two community water systems using surface water. The CCUSA serves approximately 20,160 people with approximately 7,200 known connections. Table 3.1.5.1A summarizes population and connection information for each system owned and operated by CCUSA.

Table 3.1.5.1A: Summary of Public Community Water Systems in Campbell County

Water System Name	Owner	Source	Population Served	Number of Connections
501 Trailer Court	CCUSA	Groundwater	290	Not Available
Central System	CCUSA	Both	18,000	6992
Concord Village	CCUSA	Groundwater	90	49
Lexington Park - Carson	CCUSA	Groundwater	317	155
Naruna	CCUSA	Groundwater	140	1
Vista, Liberty, Martin	CCUSA	Surface	1,323	Not Available

The total average daily withdrawal for the CCUSA is approximately 1.79 MG with a maximum daily withdrawal of approximately 2.38 assuming a peaking factor of 1.15. A summary of the water withdrawal information for the systems operated by the CCUSA is provided in Table 3.1.5.1B.

Table 3.1.5.1B: Summary of Water Withdrawal Amounts for Public CWS in Campbell County

Water System Name	Owner	Source	Average Daily Withdrawal (MGD)	Maximum Daily Withdrawal (MGD)
501 Trailer Court	CCUSA	Groundwater	0.048	Not Available
Central System	CCUSA	Both	1.997	Not Available
Concord Village	CCUSA	Groundwater	0.006713	Not Available
Lexington Park - Carson	CCUSA	Groundwater	0.03483	Not Available
Naruna	CCUSA	Groundwater	0.02968	Not Available
Vista, Liberty, Martin	CCUSA	Surface	Not Available	Not Available

The average monthly usage for the CCUSA is approximately 54.43 MG with an annual average of approximately 752.19 MG. A summary of available water use information for the systems operated by the CCUSA is provided in Table 3.1.5.1C

Table 3.1.5.1C: Summary of Water Use Information for Public CWS in Campbell County

Water System Name	Owner	Source	Average Monthly (MG)	Annual Average (MG)
501 Trailer Court	CCUSA	Groundwater	Not Available	Not Available
Central System	CCUSA	Both	60.768	729.216
Concord Village	CCUSA	Groundwater	0.2014	2.4168
Lexington Park - Carson	CCUSA	Groundwater	0.8229	9.8748
Naruna	CCUSA	Groundwater	0.8904	10.6848
Vista, Liberty, Martin	CCUSA	Surface	Not Available	Not Available

The estimated water demand for the CCUSA disaggregated into categories of use is provided in Table 3.1.5.1D.

Table 3.1.5.1D: Estimated Monthly Water Demand Disaggregated into Categories of Use for CCUSA

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-Water (MG)	Sales (MG)	Other (MG)	Total (MG)
CCUSA	33.84	2.55	0.75	0.00	2.72	5.44	9.13	0.00	54.43

* Water use information was provided by the CCUSA and/or DEQ and is based on data reported during calendar year 2007.

3.1.5.2 Private Community Water Systems

There are nine private community water systems in Campbell County and all are served by groundwater. The private community water systems serve approximately 1,058 people. No connection information was available for the private community water systems in Campbell County. The estimated annual average water use for the private community water systems in Campbell County is approximately 90.58 MG. The annual average water use for each private community water system is based on the average daily design capacity or the VDH permitted capacity. Table 3.1.5.2 summarizes the available water use information for the private community water systems in Campbell County.

Table 3.1.5.2: Summary of Private Community Water Systems in Campbell County

Water System Name	Owner	Source	Population Served	Number of Connections	Annual Average (MG)
Castle Craig Subdivision	Engllish's Inc.	Groundwater	78	Not Available	5.84
Eastbrook Mobile Home Court	Eastbrook Mobile Home Court	Groundwater	96	Not Available	4.38
Knoll Woods/Ivy Acres	Mattie, Inc.	Groundwater	250	Not Available	21.92
Lakeside MHP	D&C Enterprises, LLC	Groundwater	37	Not Available	4.02
Locust Gardens MHP	R. Lloyd Campbell	Groundwater	70	Not Available	9.86
Mountain Rest Estates	Bennie's Rental, Inc.	Groundwater	150	Not Available	8.04
Rustburg Correctional Unit No. 9	Commonwealth of Virginia	Groundwater	142	Not Available	20.45
Suburban Trailer Court	Suburban Trailer Town, Inc.	Groundwater	200	Not Available	13.15
Trent's MHP	Cecil E. Trent	Groundwater	35	Not Available	2.92
Total			**1,058**	**Not Available**	**90.58**

3.1.6 Nelson County

3.1.6.1 *Public Community Water Systems*

The NCSA operates the public community water systems in Nelson County. There are five public community water systems in Nelson County. The NCSA serves approximately 5,090 people with approximately 2,694 connections. Available population and connection information for each public community water system is provided in Table 3.1.6.1A

Table 3.1.6.1A: Summary of Public Community Water Systems in Nelson County

Water System Name	Owner	Source	Population Served	Number of Connections
Gladstone	NCSA	Groundwater	90	24
Lovingston	NCSA	Groundwater/Surface	900	Not Available
Schuyler	NCSA	Surface	300	Not Available
Wintergreen Mountain Village	NCSA	Groundwater/Surface	3,800	Not Available
Former Nelson County Middle School	NCSA	Groundwater	Not Available	4

The total average daily withdrawal for the NCSA is 0.436 MGD with a maximum daily withdrawal of 0.627 MGD. Average daily and maximum daily withdrawal amounts for each public community water system are provided in Table 3.1.6.1B.

Table 3.1.6.1B: Summary of Water Withdrawal Amounts for Public CWS in Nelson County

Water System Name	Owner	Source	Average Daily Withdrawal (MGD)	Maximum Daily Withdrawal (MGD)
Gladstone	NCSA	Groundwater	0.002	0.006
Lovingston	NCSA	Groundwater/Surface	0.071	0.151
Schuyler	NCSA	Surface	0.035	0.040
Wintergreen Mountain Village	NCSA	Groundwater/Surface	0.328	0.430
Former Nelson County Middle School	NCSA	Groundwater	0.010	Unavailable
Total			**0.446**	**0.627**

The total average monthly water use for the NCSA is 15.08 MG with an annual average of 180.99 MG. The average monthly water use and annual average water use for each public community water system is provided in Table 3.1.6.1C.

Table 3.1.6.1C: Summary of Water Use Information for Public CWS in Nelson County

Water System Name	Owner	Source	Average Monthly (MG)	Annual Average (MG)
Gladstone	NCSA	Groundwater	0.07	0.86
Lovingston	NCSA	Groundwater/Surface	3.60	43.25
Schuyler	NCSA	Surface	1.07	12.79
Wintergreen Mountain Village	NCSA	Groundwater/Surface	10.04	120.44
Former Nelson County Middle School	NCSA	Groundwater	0.30	3.65
Total			**15.08**	**180.99**

The estimated water demand for the NCSA disaggregated into categories of use is provided in Table 3.1.6.1D.

Table 3.1.6.1D: Estimated Monthly Water Demand Disaggregated into Categories of Use for NCSA

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Wintergreen	56.78	6.31	0.00	0.00	1.95	55.40	0.00	0.00	120.44
Lovingston	31.88	1.68	0.00	0.00	1.04	8.65	0.00	0.00	43.25
Schuyler	11.73	0.24	0.00	0.00	0.37	0.45	0.00	0.00	12.79
Gladstone	0.81	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.86
Total	101.20	8.23	0.00	0.00	3.39	64.52	0.00	0.00	177.34

* Water use information was provided by the NCSA and/or DEQ and is based on data reported during calendar year 2006.

3.1.6.2 *Private Community Water Systems*

There are three private community water systems in Nelson County and all three are served by groundwater. The private community water systems in Nelson County serve approximately 936 residential customers. Connection information was not available for the private community water systems in Nelson County. The estimated annual water use for the private community water systems in Nelson County is approximately 25.26 MG. The annual water use for Johnson Senior Center was estimated based on the Sewage Collection and Treatment (SCAT) regulation using 200 gpd per bed. The annual water use for Rodes Farm was estimated based on the VDH permitted capacity. Available water use information for each private community water system in Nelson County is provided in Table 3.1.6.2.

Table 3.1.6.2: Summary of Private Community Water Systems in Nelson County

Water System Name	Owner	Source	Population Served	Number of Connections	Annual Average (MG)
Johnson Senior Center	Johnson Senior Center	Groundwater	32	Not Available	2.19
Wintergreen - Rodes Farm	Wintergreen	Groundwater	40	Not Available	4.09
Wintergreen – Stoney Creek Village	Wintergreen	Groundwater	864	Not Available	18.98
Total			**936**	**Not Available**	**25.26**

3.1.7 City of Bedford

3.1.7.1 *Public Community Water Systems*

The City of Bedford owns and operates the public community water system in the City of Bedford. The City of Bedford serves approximately 7,500 people with approximately 3300 connections. The average daily water withdrawal is approximately 1.21 MGD with a maximum daily withdrawal of approximately 2.56 MGD. The monthly average water use is approximately 30.98 MG with an annual average of approximately 371.76 MG.

The estimated water demand for the City of Bedford disaggregated into categories of use is provided in Table 3.1.7.1.

Table 3.1.7.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for City of Bedford

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
City of Bedford	10.39	3.07	10.84	0.00	0.62	6.06	0.00	0.00	30.98

* Water use information was provided by the City of Bedford and/or DEQ and is based on data reported during calendar year 2006.

3.1.7 Private Community Water Systems

There are no known private community water systems in the City of Bedford.

3.1.8 City of Lynchburg

3.1.8.1 *Public Community Water Systems*

The City of Lynchburg owns and operates the public community water system in the City of Lynchburg. The City of Lynchburg water system includes the Pedlar Reservoir, James River, College Hill Water Treatment Plant, and the Abert Water Treatment Plant. The City of Lynchburg serves approximately 66,000 people with approximately 22,561 connections. The total average daily withdrawal is approximately 11.25 MGD with a maximum daily withdrawal of approximately 17.32 MGD. The total average monthly water use is approximately 337.50 MG with an annual average of approximately 4,106.25 MG.

The estimated water demand for the City of Lynchburg disaggregated into categories of use is provided in Table 3.1.8.1.

Table 3.1.8.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the City of Lynchburg

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
City of Lynchburg	91.80	103.50	42.00	0.00	3.30	30.90	66.00	0.00	337.50

* Water use information was provided by the City of Lynchburg and is based on data reported during calendar year 2006.

3.1.8.2 *Private Community Water Systems*

There are no known private community water systems in the City of Lynchburg.

3.1.9 Town of Altavista

3.1.9.1 *Public Community Water Systems*

The Town of Altavista owns and operates the public community water system in the Town of Altavista. The Town of Altavista community water system serves approximately 3,850 people with approximately 1,592 connections. The average daily withdrawal for the Town of Altavista water system is approximately 1.77 MGD. No maximum daily withdrawal information was available. The average monthly water use for the system is approximately 54.07 MG with an annual average of approximately 646.49 MG. The estimated water demand for the Town of Altavista disaggregated into categories of use is provided in Table 3.1.9.1.

Table 3.1.9.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the Town of Altavista

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Town of Altavista	5.39	1.08	0.00	0.00	1.08	5.39	41.13	0.00	54.07

* Water use information was provided by theTown of Altavista and/or DEQ and is based on data reported during calendar year 2006.

3.1.9.2 *Private Community Water Systems*

There are no known private community water systems in the Town of Altavista.

3.1.10 Town of Amherst

3.1.10.1 *Public Community Water Systems*

The Town of Amherst owns and operates the public community water system in the Town of Amherst. The Town of Amherst community water system serves approximately 2,184 people with approximately 1,092 connections. The average daily withdrawal for the water system is approximately 0.47 MGD. No maximum daily withdrawal information was available. The average monthly water use for the system is approximately 14.33 MG with an annual average of approximately 172.00 MG. The estimated water demand for the Town of Amherst disaggregated into categories of use is provided in Table 3.1.10.1. Please note that the catergory for sales (1.75 MG) only includes Sweet Briar College.

Table 3.1.10.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the Town of Amherst

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Town of Amherst	5.83	2.42	2.00	0.00	0.33	2.00	1.75	0.00	14.33

* Water use information was provided by the Town of Amherst and/or DEQ and is based on data reported during calendar year 2006.

3.1.10.2 *Private Community Water Systems*

There are no known private community water systems in the Town of Amherst

3.1.11 Town of Appomattox

3.1.11.1 *Private Community Water Systems*

The Town of Appomattox owns and operates the public community water system in the Town of Appomattox. The Town of Appomattox community water system serves approximately 2,476 people with approximately 971 connections. The average daily withdrawal for the water system is approximately 0.23 MGD. No maximum daily withdrawal information was available. The average monthly water use for the system is approximately 6.93 MG with an annual average of approximately 83.16 MG. The estimated water demand for the Town of Appomattox disaggregated into categories of use is provided in Table 3.1.11.1.

Table 3.1.11.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the Town of Appomattox

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Town of Appomattox	4.59	1.15	0.00	0.00	0.00	1.20	0.00	0.00	6.93

* Water use information was provided by the Town of Appomattox and/or DEQ and is based on data reported during calendar year 2006.

3.1.11.2 *Private Community Water Systems*

There are no known private community water systems in the Town of Appomattox.

3.1.12 Town of Brookneal

3.1.12.1 *Public Community Water Systems*

The Town of Brookneal owns and operates the public community water system in the Town of Brookneal. The Town of Brookneal community water system serves approximately 1,259 people with approximately 569 connections. The average daily withdrawal for the water system is approximately 0.16 MGD. No maximum daily withdrawal information was available. The average monthly water use for the system is approximately 4.73 MG with an annual average of approximately 56.88 MG. The estimated water demand for the Town of Brookneal disaggregated into categories of use is provided in Table 3.1.12.1.

Table 3.1.12.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the Town of Brookneal

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Town of Brookneal	2.82	1.45	0.00	0.00	0.14	0.32	0.00	0.00	4.73

* Water use information was provided by the Town of Brookneal and/or DEQ and is based on data reported during calendar year 2006.

3.1.12.2 *Private Community Water Systems*

There are no known private community water systems in the Town of Brookneal.

3.1.13 Town of Pamplin

3.1.13.1 *Public Community Water Systems*

The Town of Pamplin owns and operates the public community water system in the Town of Pamplin. The Town of Pamplin community water system serves approximately 199 people with approximately 99 connections. The average daily withdrawal for the water system is approximately 0.011 MGD. No maximum daily withdrawal information was available. The average monthly water use for the system is approximately 0.32 MG with an annual average of approximately 3.85 MG. The estimated water demand for the Town of Pamplin disaggregated into categories of use is provided in Table 3.1.13.1.

Table 3.1.13.1: Estimated Monthly Water Demand Disaggregated into Categories of Use for the Town of Pamplin

Water System Name	Residential (MG)	CIL (MG)	Heavy Industrial (MG)	Military (MG)	Production Process Water (MG)	Unaccounted-for-water (MG)	Sales (MG)	Other (MG)	Total (MG)
Town of Pamplin	0.32	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.33

* Water use information was provided by the Town of Pamplin and/or DEQ and is based on data reported during calendar year 2005.

3.1.13.2 *Private Community Water Systems*

There are no known private community water systems in the Town of Pamplin.

3.2 Estimate of Water Used by Self-Supplied Nonagricultural Users of More than 300,000 Gallons per Month of Surface and Ground Water Inside the Service Areas of the Community Water Systems[13]

Available water use information for self-supplied, non-agricultural users inside the service area of community water systems in the region was generally very limited. Available information is discussed in the following sections and presented in the tables below. Please note that self-supplied, non-agricultural users listed in *italics* use less than 300,000 gallons per month of water.

Information for self-supplied, non-agricultural users greater than 300,000 gallons of water per month was available through VDEQ's water use database. The information was based on calendar year 2006 data, the most recent year available at the time. Information for self-supplied, nonagricultural users less than 300,000 gallons per month was generally available on the VDH Engineering Description Sheet (EDS). The estimated water use for these users was based on the design capacity. However, many of the VDH-EDS only provided an approximate design capacity (e.g. 200 students and faculty, 20 restaurant seats, etc.) and did not provide a numerical design capacity. In this case, assumptions were made using the SCAT regulations. Self-supplied, non-agricultural users that did not have any water use information available were assumed to be using less than 300,000 gallons per month of water.

[13] 9 VAC 25-780-80 C.

3.2.1 Amherst County

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water inside the ACSA water system service area.

3.2.2 Appomattox County

Appomattox County does not own or operate a community water system; however, there are two private community water systems in Appomattox County. There are no self-supplied, non-agricultural users of more than 300,000 gallons per month of water inside the service areas of the private community water systems in Appomattox County.

3.2.3 Bedford County

There are two known self-supplied, non-agricultural users inside the BCPSA service area. Estimated water use information for each self-supplied, non-agricultural users inside the BCPSA service area is identified in Table 3.2.3. Unless noted below, available water use information was provided by the VDEQ Water Use Database.

Table 3.2.3: Estimated Water Use for Self-Supplied, Nonagricultural Users inside BCPSA service area

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
London Downs Golf Course	0.05845	21.35
New London Academy	*Unavailable*	*Unavailable*
Total	**0.05845**	**21.35**

3.2.4 Campbell County

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water inside the CCUSA water system service area.

3.2.5 Nelson County

The Tye River Elementary School is the only known self-supplied, non-agricultural user of more than 300,000 gallons per month of water inside the NCSA water system service area. The volume of water used by the Tye River Elementary School was estimated at approximately 3.65 MG per year.

3.2.6 City of Bedford

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month water inside the City of Bedford water system service area.

3.2.7 City of Lynchburg

Griffin Pipe is the only known self-supplied, non-agricultural users of more than 300,000 gallons per month of water within the City of Lynchburg service area. Water use for Griffin Pipe was estimated based on the average daily withdrawal design capacity. The estimated annual water use for Griffin Pipe is 24.47 MG per year.

3.2.8 Town of Altavista

Ross Products Division of Abbott Laboratories is the only known self-supplied, non-agricultural user using greater than 300,000 gallons per month of water within the Town of Altavista water system service area. The volume of water used by Ross Products Division is estimated to be approximately 6.26 MG per year.

3.2.9 Town of Amherst

Glad Manufacturing is the only known self-supplied, non-agricultural user within the Town of Amherst water system service area; however, no water use information is available at this time.

3.2.10 Town of Appomattox

There are eight known self-supplied, non-agricultural users within the Town of Appomattox water system service area. The total volume of water used by self-supplied, non-agricultural users within the Town of Appomattox water system service area was estimated at approximately 8.29 MG per year. Estimated water use information for self-supplied, non-agricultural users in the Town of Appomattox water system service area is presented in Table 3.2.10.

Table 3.2.10: Estimated Water Use for Self-Supplied, Nonagricultural Users Inside Town of Appomattox Service Area

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
C & E Grocery[3]	0.0010	0.37
Falling River Country Club[3]	0.0089	3.25
Holiday Lake 4H Educational Center[4]	0.0045	1.63
Holiday Lake State Park[5]	0.0013	0.47
Moose Lodge 975[7]	0.0026	0.96
Paradise Lake	Unavailable	Unavailable
Spout Spring Ruitan Club[7]	0.0028	1.04
Spring Grove Farm[2]	0.0016	0.57
Total	**0.0227**	**8.29**

The following assumptions were made to determine the estimated water used by self-supplied, non-agricultural users inside the Town of Appomattox service area. The estimated water used by a school[1] was based on SCAT regulations of 10 gpd per person, five days a week. The estimated water used by a motel[2] was based on SCAT regulations of 130 gpd per room. The estimated water used by a restaurant[3] was based on SCAT regulations of 50 gpd per seat. The estimated water used by a campground[4] was based on SCAT regulations of 65 gpd per bed for three months. The estimated water used by a banquet facility[7] was based on 52 events per year at 50 gallons per seat.

3.2.11 Town of Brookneal

Based on review of VDEQ's Water Use Database, there is one self-supplied user of more than 300,000 gallons per month of water within the Town of Brookneal water system service area. The volume of water used by the Brookneal Plant was estimated to be approximately 321.00 MG per year.

3.2.12 Town of Pamplin

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water within the Town of Pamplin water system service area.

3.3 Estimate of Water Used by Self-Supplied Nonagricultural Users of More than 300,000 Gallons per Month of Surface and Ground Water Outside the Service Areas of the Community Water Systems[14]

Available water use information for self-supplied, non-agricultural users outside the service area of community water systems in the region was generally very limited. Available information is discussed in the following sections and presented in the tables below. Please note that self-supplied, non-agricultural users listed in *italics* use less than 300,000 gallons per month of water.

Information for self-supplied, non-agricultural users greater than 300,000 gallons per month of water was available through VDEQ's water use database. The information was based on calendar year 2006 data, the most recent year available at the time. Information for self-supplied, nonagricultural users less than 300,000 gallons per month was generally available on the VDH-EDS. The estimated water use for these users was based on the design capacity. However, many of the VDH-EDS only provided an approximate design capacity (e.g. 200 students and faculty, 20 restaurant seats, etc.) and did not provide a numerical design capacity. In this case, assumptions were made using the SCAT regulations. Self-supplied, non-agricultural users that did not have any water use information available were assumed to be using less than 300,000 gallons per month of water.

3.3.1 Amherst County

There are six known self-supplied, non-agricultural users outside the ACSA service area. Estimated water use information for self-supplied, non-agricultural users outside the ACSA service area is presented in Table 3.3.1.

Table 3.3.1: Estimated Water Used by Self-Supplied Nonagricultural Users Outside ACSA Service Area

[14] 9 VAC 25-780-80 C.

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
Wildwood Campground[4]	*0.00163*	*0.594*
Temperance Elementary School[1]	*0.00089*	*0.326*
Pleasant View Elementary School[1]	*0.00126*	*0.459*
Camp Little Crossroads[4]	*0.00266*	*0.973*
Smitty's Restaurant[3]	*0.00274*	*1.00*
Greif Riverville LLC	6.50000	2,373
Total	**6.51**	**2,376**

The following assumptions were made to determine the estimated water used by self-supplied, non-agricultural users outside the ACSA service area: the estimated water used by a school[1] was based on SCAT regulation of 10 gpd per person, five days a week; the estimated water used by a restaurant[3] was based on SCAT regulation of 50 gpd per seat; and the estimated water used by a campground[4] was based on SCAT regulation of 65 gpd per bed for three months.

Estimated water use information for Greif Riverville LLC was provided by the VDEQ Water Use Database.

3.3.2 Appomattox County

Based on review of VDEQ's Water Use Database, Founders Furniture is a self-supplied, non-agricultural user of more than 300,000 gallons per month of water in Appomattox County; however, no water use information was available.

3.3.3 Bedford County

There are 39 known self-supplied, non-agricultural users outside the BCPSA service area. Estimated water use information for the self-supplied, non-agricultural users outside the BCPSA service area are presented in Table 3.3.3.

Table 3.3.3: Estimated Water Use for Self-Supplied, Nonagricultural Users Outside BCPSA service area

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
Staunton River High School	0.009993	3.65
Georgia Pacific	0.027600	10.00
Smith Mountain Lake State Park	0.015900	5.80
Smith Mountain Lake State Park	0.00931	3.40
Smith Mountain Lake State Park	0.02160	7.90
Smith Mountain Lake State Park	0.01290	4.70
Boonsboro Country Club	0.05298	19.35
Boxley Materials Co.	0.03255	11.89
Georgia Pacific	9.14716	3,341.00
Ivy Hill Golf Course	0.08961	32.73
Big Island Elementary School	*Unavailable*	*Unavailable*
Body Camp Elementary School[1]	*0.00214*	*0.78*
Huddleson Elementary School[1]	*0.00195*	*0.71*
Moneta Elementary School[1]	*0.00236*	*0.86*
Otter River Elementary School[1]	*0.00250*	*0.91*
Thaxton Elementary School[1]	*0.00197*	*0.72*
Bedford Moose Lodge	*Unavailable*	*Unavailable*
Bedford Motel[2]	*0.00143*	*0.52*
Bedford Restaurant[3]	*0.00260*	*0.95*
Big Island Community	*Unavailable*	*Unavailable*
Budget Inn	*Unavailable*	*Unavailable*
Camp Lowman[4]	*0.00520*	*1.90*
Camp Va Jaycee TES[4]	*0.00306*	*1.12*
Campers Paradise	*Unavailable*	*Unavailable*
Great Wall Restaurant	*Unavailable*	*Unavailable*
Gunnoe Sausage Co.	*Unavailable*	*Unavailable*
Waterfront Park[4]	*0.00124*	*0.45*
White House Corner Store[3]	*0.00125*	*0.46*
White House Restaurant[3]	*0.00650*	*2.37*
H&H Food Market[3]	*0.00250*	*0.91*
Lake Haven Marina	*Unavailable*	*Unavailable*
Mama's Home Cooking	*Unavailable*	*Unavailable*
Millstone Tea Room	*Unavailable*	*Unavailable*
Mitchells Point Marina[3]	*0.00125*	*0.46*
Smith Mountain Lake Moose Lodge[3]	*0.00300*	*1.10*
Tuck Away Campgroun4[5]	*0.00029*	*0.11*
Virginia Dare Cruises and Marina[3]	*0.00610*	*2.23*
Colonial Hills Golf Course	*Unavailable*	*Unavailable*
Mariners Landing Golf Course	*Unavailable*	*Unavailable*
Rainforest Nursery	*Unavailable*	*Unavailable*
Total	9.50	3,456.98

Unless noted below, the estimated water used for a self-supplied, non-agricultural user outside the BCPSA service area was based on the average daily design capacity. The following assumptions were made to determine the estimated water used by self-supplied, non-agricultural users outside the BCPSA service area: the estimated water used by a school[1] was based on SCAT regulation of 10 gpd per person, five days a week; the estimated water used by a motel[2] was based on SCAT regulations of 130 gpd per room; the estimated water used by a restaurant[3] was based on SCAT regulations of 50 gpd per seat; and the estimated water used by a campground[4] was based on SCAT regulations of 65 gpd per bed for three months.

3.3.4 Campbell County

There are 22 known self-supplied, non-agricultural users outside the CCUSA service area. Estimated water use information for the self-supplied, non-agricultural users outside the CCUSA service area are presented in Table 3.3.4.

Table 3.3.4: Estimated Water Use for Self-Supplied, Nonagricultural Users Outside CCUSA Service Area

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
Gladys Elementary School[6]	0.004	1.46
Intermet - Archer Creek Plant[6]	0.075	27.39
Archer Creek Foundry[6]	0.030	11.07
NNFD Plant – BWX[6]	0.077	28.11
Camp Hat Creek Lodge[4]	0.002	0.617
Camp Hat Creek Retreat Center[4]	0.001	0.237
Cedar Hills Golf Club[3]	0.001	0.329
Colonial Motel[2]	0.002	0.760
Fountain Motel[2]	0.003	1.187
Hud's Ice Cream[3]	0.001	0.511
Liberty Properties[7,3]	0.004	1.45
Lightnin's Restaurant[3]	0.001	0.511
Lynchburg Livestock Market[3]	0.002	0.548
Marilyn's Hot Rod Café[3]	0.002	0.731
Masters Inn[4]	0.005	1.70
Moore's County Store[3]	0.003	0.950
Puckette's Place	Unavailable	Unavailable
Spring House Restaurant[7,3]	0.008	2.81

Thousand Trails Resort[4]	0.006	2.11
Trent's Truck Plaza[3]	0.004	1.41
Village Market[3]	0.001	0.438
William Campbell High School	Unavailable	Unavailable
Total	**0.232**	**84.33**

Unless noted below, the estimated water used for a self-supplied, non-agricultural user outside the CCUSA service area was based on the average daily design capacity or provided by VDEQ's Water Use Database. The following assumptions were made to determine the estimated water used by self-supplied, non-agricultural users outside the CCUSA service area: the estimated water used by a school[1] was based on SCAT regulations of 10 gpd per person, five days a week; the estimated water used by a motel[2] was based on SCAT regulations of 130 gpd per room; the estimated water used by a restaurant[3] was based on SCAT regulations of 50 gpd per seat; the estimated water used by a campground[4] was based on SCAT regulations of 65 gpd per bed for three months; and the estimated water used by a residence[7] was based on 2.45 persons per residence using 75 gpd per resident.

3.3.5 Nelson County

There are 19 known self-supplied, non-agricultural users outside the NCSA service area. Estimated water use information for the self-supplied, non-agricultural users outside the NCSA service area are presented in Table 3.3.5.

Table 3.3.5: Estimated Water Use for Self-Supplied, Nonagricultural Users Outside the NCSA Service Area

Name	Average Daily Withdrawal (MGD)	Estimated Annual Average Use (MG)
American Fibers and Yarns[7]	0.0025	0.91
Church of the Blue Ridge School[1]	0.0009	0.31
North Branch School[1]	0.0007	0.25
Rockfish River School	0.0080	2.92
Camp Blue Ridge[4]	0.0097	3.56
Crabtree Falls Campground[4]	0.0024	0.89
Crossroads Market & Deli	0.0030	1.10
Dambola's Restaurant[3]	0.0050	1.84
Grille - 151	Unavailable	Unavailable
Lake Nelson Campground	0.0070	2.56
Mark Addy Inn	0.0130	4.75

Montebello Camping & Fishing Resort	0.003	1.10
Old Schoolhouse Village	0.005	1.83
Rockfish Valley Community Center	0.0122	4.46
Tye River Restaurant[3]	0.0008	0.29
Valley Green Center[3]	0.0111	4.05
Valleymont Market[3]	0.0101	3.68
Wintergreen-Reception Center	0.006	2.19
Monroe Institute	Unavailable	Unavailable
Total	**0.0482**	**17.6**

Unless noted below, the estimated water used for a self-supplied, non-agricultural user outside the NCSA service area was based on the average daily design capacity or provided by VDEQ's Water Use Database. The following assumptions were made to determine the estimated water used by self-supplied, non-agricultural users outside the NCSA service area: the estimated water used by a school[1] was based on SCAT regulations of 10 gpd per person, five days a week; the estimated water used by a motel[2] was based on SCAT regulations of 130 gpd per room; the estimated water used by a restaurant[3] was based on SCAT regulations of 50 gpd per seat; the estimated water used by a campground[4] was based on SCAT regulations of 65 gpd per bed for three months; and the estimated water used by a factory[7] was based on SCAT regulation of 25 gpd per person.

3.3.6 City of Bedford

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the City of Bedford water system service area.

3.3.7 City of Lynchburg

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the City of Lynchburg water system service area.

3.3.8 Town of Altavista

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the Town of Altavista water system service area.

3.3.9 Town of Amherst

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the Town of Amherst water system service area.

3.3.10 Town of Appomattox

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the Town of Appomattox water system service area.

3.3.11 Town of Brookneal

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the Town of Brookneal water system service area.

3.3.12 Town of Pamplin

There are no known self-supplied, non-agricultural users of more than 300,000 gallons per month of water outside the Town of Pamplin water system service area.

3.4 Estimate of Water Used by Self-Supplied Agricultural Users of More than 300,000 Gallons per Month of Surface and Ground Water Outside the Service Areas of the Community Water Systems[15]

Agricultural water usage information for users of more than 300,000 gallons per month of water outside the service areas of community water systems was limited or unavailable. General agricultural information as well as available information on livestock (e.g., number of head of cattle) and crops (e.g., type of crop planted) for the region was collected from the USDA NASS. This information was used to make a general estimate of water used by self-supplied agricultural users in the region. Please note that the USDA 2002 Census of Agriculture and NASS does not provide information for cities and towns. While this information does not provide information on specific agricultural users within the region, it provides a good starting point for providing estimates on agricultural use in the region.

[15] 9 VAC 25-780-80 D.

3.4.1 Amherst County

The estimated volume of water used by self-supplied, agricultural users in Amherst County is approximately 50.55 MG per year. The volume of water used by livestock was estimated at approximately 46.64 MG per year and the volume of water used for crop irrigation was estimated at approximately 3.91 MG per year. The volume of water estimated to be used for livestock in Amherst County is shown in Table 3.4.1.1.

Table 3.4.1.1: Amherst County Estimated Water Use for Livestock

Type of Livestock	# in 2002	Number of Farms	Gallons of Water Needed per Day per Animal	Estimated Monthly Usage (gal)	Estimated Annual Usage (gal)
Beef Cattle & Calves	9,939	312	12.00	3,630,518	43,566,215
Milk Cows	20	9	35.00	21,308	255,696
Hogs & Pigs	78	9	5.00	11,872	142,459
Sheep & Lambs	105	11	2.00	6,392	76,709
Poultry Layers	343	21	0.06	626	7,517
Poultry Broilers	0	0	0.06	0	0
Horses	591	68	12.00	215,880	2,590,566
Goats	259	30	0.00	0	0
				Total:	**46,639,162**

The volume of water estimated to be used for crops in Amherst County is shown in Table 3.4.1.2.

Table 3.4.1.2: Amherst County Estimated Water Use for Crop Irrigation

Type of Crop	Acres in 2002	Acres Irrigated	Number of Farms	Approximate Irrigation (in/acre)	Total Annual Irrigation (gal)
Corn for Grain	196	0	15	0	0
Corn for Silage	295	0	10	0	0
Forage	14,915	0	283	0	0
Wheat for Grain	0	0	0	0	0
Oats for Grain	0	0	0	0	0
Barley for Grain	0	0	0	0	0
Cotton	0	0	0	0	0
Soybean	0	0	0	0	0
Tobacco	0	0	0	25	0
Vegetables	7	7	7	15	190,067
Potatoes	0	0	0	15	0
Unknown	144	137	14	20	3,719,879
				Total:	**3,909,946**

3.4.2 Appomattox County

The estimated volume of water used by self-supplied, agricultural users in Appomattox County is approximately 61.82 MG per year. The volume of water used by livestock was estimated at approximately 48.06 MG per year and the volume of water used for crop irrigation was estimated at approximately 13.77 MG per year. The volume of water estimated to be used for livestock in Appomattox County is shown in Table 3.4.2.

Table 3.4.2.1: Appomattox County Estimated Water Use for Livestock

Type of Livestock	# in 2002	Number of Farms	Gallons of Water Needed per Day per Animal	Estimated Monthly Usage (gal)	Estimated Annual Usage (gal)
Beef Cattle & Calves	9,412	231	12.00	3,438,015	41,256,184
Milk Cows	513	8	35.00	546,550	6,558,602
Hogs & Pigs	102	7	5.00	15,524	186,293
Sheep & Lambs	75	9	2.00	4,566	54,792
Poultry Layers	0	15	0.06	0	0
Poultry Broilers	0	0	0.06	0	0
Horses	0	0	12.00	0	0
Goats	359	0		0	0
Colonies of Bees	0	0		0	0
				Total:	**48,055,872**

The volume of water estimated to be used for crops in Appomattox County is shown in Table 3.4.2.2.

Table 3.4.2.2: Appomattox County Estimated Water Use for Crop Irrigation

Type of Crop	Acres in 2002	Acres Irrigated	Number of Farms	Approximate Irrigation (in/acre)	Total Annual Irrigation (gal)
Corn for Grain	614	0	32	0	0
Corn for Silage	585	0	16	0	0
Forage	18,289	0	259	0	0
Wheat for Grain	922	0	16	0	0
Oats for Grain	92	0	8	0	0
Barley for Grain	291	0	10	0	0
Cotton	0	0	0	0	0
Soybean	0	0	0	0	0
Tobacco	118	59	2	25	1,601,992
Vegetables	41	41	5	15	1,113,248
Potatoes	0	0	0	15	0
Unknown	507	407	3	20	11,051,027
				Total:	**13,766,267**

3.4.3 Bedford County

The estimated volume of water used by self-supplied, agricultural users in Bedford County is approximately 505.54 MG per year. The volume of water used by livestock was estimated at approximately 138.71 MG per year and the volume of water used for crop irrigation was estimated at approximately 366.83 MG per year. In addition, information for Duis Nursery was available through VDEQ's Water Use Database. The estimated water use by Duis Nursery is approximately 43.91 MG per year. No information for the Hawkins Brothers Farm was available. The volume of water estimated to be used for livestock in Bedford County is shown in Table 3.4.3.1.

Table 3.4.3.1: Bedford County Estimated Water Use for Livestock

Type of Livestock	# in 2002	Number of Farms	Gallons of Water Needed per Day per Animal	Estimated Monthly Usage (gal)	Estimated Annual Usage (gal)
Beef Cattle & Calves	23,500	857	12.00	8,584,080	103,008,960
Milk Cows	1,838	26	35.00	1,958,205	23,498,462
Hogs & Pigs	1,461	14	5.00	222,364	2,668,370
Sheep & Lambs	343	21	2.00	20,882	250,582
Poultry Layers	1,217	57	0.06	2,223	26,673
Poultry Broilers	1,750	5	0.06	3,196	38,354
Horses	2,104	0	12.00	768,549	9,222,589
Goats	919	0	0.00	0	0
				Total:	**138,713,991**

The volume of water estimated to be used for crops in Bedford County is shown in Table 3.4.3.2.

Table 3.4.3.2: Bedford County Estimated Water Use for Crop Irrigation

Type of Crop	Acres in 2002	Acres Irrigated	Number of Farms	Approximate Irrigation (in/acre)	Total Annual Irrigation (gal)
Corn for Grain	746	0	15	0	0
Corn for Silage	2,574	0	49	0	0
Forage	48,146	0	913	0	0
Wheat for Grain	441	0	11	0	0
Oats for Grain	103	0	9	0	0
Barley for Grain	386	0	11	0	0
Cotton	0	0	0	0	0
Soybean	0	0	0	0	0
Tobacco	32	16	6	25	10,860,960
Vegetables	15	15	15	15	6,109,290
Potatoes	3	3	3	15	1,221,858
Unknown	676	642	57	20	348,636,816
				Total:	**366,828,924**

3.4.4 Campbell County

The estimated volume of water used by self-supplied, agricultural users in Campbell County is approximately 116.58 MG per year. The volume of water used by livestock was estimated at approximately 80.53 MG per year and the volume of water used for crop irrigation was estimated at approximately 36.06 MG per year. The volume of water estimated to be used for livestock in Campbell County is shown in Table 3.4.4.1.

Table 3.4.4.1: Campbell County Estimated Water Use for Livestock

Type of Livestock	# in 2002	Number of Farms	Gallons of Water Needed per Day per Animal	Estimated Monthly Usage (gal)	Estimated Annual Usage (gal)
Beef Cattle & Calves	13,738	371	12.00	5,018,217	60,218,600
Milk Cows	1,300	18	35.00	1,385,020	16,620,240
Hogs & Pigs	0	1	5.00	0	0
Sheep & Lambs	912	13	2.00	55,523	666,271
Poultry Layers	845	18	0.06	1,543	18,520
Poultry Broilers	0	3	0.06	0	0
Horses	685	0	12.00	250,217	3,002,602
Goats	0	0		0	0
Colonies of Bees	211	0		0	0
				Total:	**80,526,232**

The volume of water estimated to be used for crops in Campbell County is shown in Table 3.4.4.2.

Table 3.4.4.2: Campbell County Estimated Water use for Crop Irrigation

Type of Crop	Acres in 2002	Acres Irrigated	Number of Farms	Approximate Irrigation (in/acre)	Total Annual Irrigation (gal)
Corn for Grain	904	0	23	0	0
Corn for Silage	2,300	0	30	0	0
Forage	24,992	0	408	0	0
Wheat for Grain	1,074	0	30	0	0
Oats for Grain	206	0	20	0	0
Barley for Grain	779	0	16	0	0
Cotton	0	0	0	0	0
Soybean	1,499	0	28	0	0
Tobacco	666	333	61	25	9,041,749
Vegetables	42	42	15	15	1,140,401
Potatoes	0	0	3	15	0
Unknown	1,328	953	71	20	25,876,237
				Total:	**36,058,387**

3.4.5 Nelson County

The estimated volume of water used by self-supplied, agricultural users in Nelson County is approximately 320.37 MG per year. The volume of water used by livestock was estimated at approximately 31.32 MG per year and the volume of water used for crop irrigation was estimated at approximately 21.61 MG per year. In addition, information for Buck Creek Nursery, Critzer Family Farm, and Saunder's Brothers Inc. was available through VDEQ's Water Use Database. The estimated water use by Buck Creek Nursery, Critzer Family Farm, and Saunder's Brothers Inc. was estimated at approximately 6.60 MG per year, 4.00 MG per year and 256.84 MG per year, respectively. No information for the Thomas Wheaton, Edible Landscaping, Drumheller's Orchard, Glen Mary Nursery, Glenthrone Berry Farm, Tuck Farms, or the Waynesboro Nurseries was available. The volume of water estimated to be used for livestock in Nelson County is shown in Table 3.4.5.1.

Table 3.4.5.1: Nelson County Estimated Water Use for Livestock

Type of Livestock	# in 2002	Number of Farms	Gallons of Water Needed per Day per Animal	Estimated Monthly Usage (gal)	Estimated Annual Usage (gal)
Beef Cattle & Calves	6,524	235	12.00	2,383,087	28,597,041
Milk Cows	9	7	35.00	9,589	115,063
Hogs & Pigs	259	9	5.00	39,420	473,038
Sheep & Lambs	0	8	2.00	0	0
Poultry Layers	520	26	0.06	950	11,397
Poultry Broilers	0	0	0.06	0	0
Horses	484	0	12.00	176,796	2,121,546
Goats	732	0	0.00	0	0
				Total:	**31,318,084**

The volume of water estimated to be used for crops in Nelson County is shown in Table 3.4.5.2.

Table 3.4.5.2: Nelson County Estimated Water Use for Crop Irrigation

Type of Crop	Acres in 2002	Acres Irrigated	Number of Farms	Approximate Irrigation (in/acre)	Total Annual Irrigation (gal)
Corn for Grain	173	0	9	0	0
Corn for Silage	0	0	2	0	0
Forage	14,759	0	285	0	0
Wheat for Grain	208	0	10	0	0
Oats for Grain	0	0	0	0	0
Barley for Grain	0	0	1	0	0
Cotton	0	0	0	0	0
Soybean	0	0	1	0	0
Tobacco	0	0	0	25	0
Vegetables	281	281	16	15	7,629,824
Potatoes	0	0	2	15	0
Unknown	796	515	49	20	13,983,486
				Total:	**21,613,310**

3.4.5 City of Bedford

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the City of Bedford water system service area.

3.4.6 City of Lynchburg

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the City of Lynchburg water system service area.

3.4.7 Town of Altavista

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the Town of Altavista water system service area.

3.4.8 Town of Amherst

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the Town of Amherst water system service area.

3.4.9 Town of Appomattox

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the Town of Appomattox water system service area.

3.4.10 Town of Brookneal

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the Town of Brookneal water system service area.

3.4.11 Town of Pamplin

There are no known self-supplied, agricultural users of more than 300,000 gallons per month of water outside the Town of Pamplin water system service area.

3.5 Estimate of Water Used by Self-Supplied Users of Less than 300,000 Gallons per Month of Ground Water Outside the Service Areas of the Community Water Systems[16]

To determine an estimate of residences and businesses that are self-supplied and served by individual groundwater wells withdrawing less than 300,000 gallons per month, the population served by both public and private community water systems was determined. Population served by public community water systems was provided by each jurisdiction and is based on 2006 data. Population served by private community water systems was estimated based on review of VDH Engineering Description Sheets and/or community water system lists from EPA SDWIS. The total population for each county and city was provided by the 2000 US Census Bureau. The total population for each town was provided by the town and subtracted from the county population.

The population served by individual wells was estimated by subtracting the population served by public and private community water systems from the total population. It is important to note for the City of Bedford, City of Lynchburg, and Town of Appomattox, the 2006 population served by the public community water system provided by the jurisdiction was greater than the 2000 US Census Bureau population estimate; therefore, it was assumed that the estimated population served by individual wells is zero. The

[16] 9 VAC 25-780-80 E.

estimated population served by individual wells for the towns of Altavista and Pamplin was provided by each town.

Water used by self-supplied, individual well users was estimated based on the assumption of 75 gpd per person.

3.5.1 Amherst County

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in Amherst County is presented in Table 3.5.1.

Table 3.5.1: Estimated Water Use for Individual Residential Well Users in Amherst County

2000 Census Population	Population Served by ACSA	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
29,643	15,774	192	13,677	374.42

3.5.2 Appomattox County

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in Appomattox County is presented in Table 3.5.2.

Table 3.5.2: Estimated Water Use for Individual Residential Well Users in Appomattox County

Population 2000	Population Served by Appomattox County	Estimated Population Served By Private Community Water Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
11,752	0	27	11,725	321.19

3.5.3 Bedford County

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in Bedford County is presented in Table 3.5.3.

Table 3.5.3: Estimated Water Use for Individual Residential Well Users in Bedford County

Population 2000	Population Served by BCPSA	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
60,371	17,500	3,067	39,804	1090.38

3.5.4 Campbell County

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in Campbell County is presented in Table 3.5.4.

Table 3.5.4: Estimated Water Use for Individual Residential Well Users in Campbell County

Population 2000	Population Served by CCUSA	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
46,394	20,160	1,058	25,176	689.67

3.5.5 Nelson County

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in Nelson County is presented in Table 3.5.5.

Table 3.5.5: Estimated Water Use for Individual Residential Well Users in Nelson County

Population 2000	Population Served by NCSA	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
14,445	4,553	864	9,028	247.31

3.5.6 City of Bedford

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the City of Bedford is presented in Table 3.5.6.

Table 3.5.6: Estimated Water Use for Individual Residential Well Users in the City of Bedford

Population 2000	Population Served by City of Bedford	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
6,299	7,500	0	0	0.00

3.5.7 City of Lynchburg

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the City of Lynchburg is presented in Table 3.5.7.

Table 3.5.7: Estimated Water Use for Individual Residential Well Users in the City of Lynchburg

Population 2000	Population Served by City of Lynchburg	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
65,269	66,000	0	0	0.00

3.5.8 Town of Altavista

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the Town of Altavista is presented in Table 3.5.8.

Table 3.5.8: Estimated Water Use for Individual Residential Well Users in the Town of Altavista

Population 2000	Population Served by Town of Altavista	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
3,425	3,850	0	172	4.71

3.5.9 Town of Amherst

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the Town of Amherst is presented in Table 3.5.9.

Table 3.5.9: Estimated Water Use for Individual Residential Well Users in the Town of Amherst

Population 2000	Population Served by Town of Amherst	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
2,251	2,184	0	67	1.84

3.5.10 Town of Appomattox

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the Town of Appomattox is presented in Table 3.5.10.

Table 3.5.10: Estimated Water Use for Individual Residential Well Users in the Town of Appomattox

Population 2000	Population Served by Town of Appomattox	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
1,761	2,476	0	0	0.00

3.5.11 Town of Brookneal

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the Town of Brookneal is presented in Table 3.5.11.

Table 3.5.11: Estimated Water Use for Individual Residential Well Users in the Town of Brookneal

Population 2000	Population Served by Town of Brookneal	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
1,259	1,259	0	0	0.00

3.5.12 Town of Pamplin

Estimated water used by self-supplied, residential users on individual wells using less than 300,000 gallons per month of groundwater in the Town of Pamplin is presented in Table 3.5.12.

Table 3.5.12: Estimated Water Use for Individual Residential Well Users in the Town of Pamplin

Population 2000	Population Served by Town of Pamplin	Estimated Population Served by Private Community Systems	Estimated Population on Individual Wells	Estimated Annual Average Water Use (MG)
199	199	0	25	0.68

4.0 EXISTING RESOURCE INFORMATION

4.1 Geologic, Hydrologic and Meteorological Conditions[17]

The following geologic, hydrologic and meteorological information is compiled from a variety of US Geological Survey (USGS), Virginia Division of Mineral Resources (VDMR) publications, and the National Oceanic and Atmospheric Administration (NOAA).

Region 2000 spans multiple Physiographic Provinces in Virginia including the Piedmont, Blue Ridge, and limited portions of the Valley and Ridge. Geologic maps for each County (including towns and adjacent cities) are presented as Figures 4.1.1 through 4.1.5. The underlying geology affects the availability and quality of water resources. Both the Blue Ridge and Piedmont areas are primarily underlain by crystalline (igneous and metamorphic). Regolith, which consists of saprolite, colluvium, alluvium, and soil, overlies the crystalline rock throughout the region. Because of the varied nature of the regolith in thickness, composition, and grain size, its hydraulic properties also vary greatly. However, the regolith is more permeable than the underlying bedrock in which the only effective porosity is through fractures.

Recharge of aquifers is highly variable in the Blue Ridge and Piedmont provinces. Since recharge occurs through infiltration of precipitation, which is influenced by topography and intensity of precipitation events, which affect the amount of runoff that occurs. Average annual precipitation in the region ranges from 40 inches in areas of Bedford and Campbell Counties to 50 inches in some areas of Nelson County. Well yields for all types of crystalline rocks are generally small; however, coarse-textured crystalline rocks, such as gneiss and schist generally yield more water than fine-grained metavolcanic rocks. Regardless, water is primarily transported through fracture zones in these types of rocks. Groundwater is stored in the regolith (thick or thin), as well as bedrock fractures (which decrease with depth). The thicker the regolith, the greater the volume of water in storage, and the more likely the well can sustain its yield. Conversely, a well drilled in an area of thin regolith overlying crystalline rock is more likely to go dry during the summer

[17] 9 VAC 25-780-90 A.

months. Fracture traces or lineaments can often be identified using aerial photography to aid in siting higher yield wells.

The Piedmont Physiographic Province contains a diverse geology; therefore, there are wide variations in groundwater quality and well yields. In areas with hard crystalline rocks, groundwater occurs in faults and fractures within 300 ft of the surface; well yields in such areas are typically 3 to 20 gallons per minute. The quality of groundwater in areas of crystalline bedrock is generally good, although the groundwater at some localities may be acidic and have a high iron, manganese, or sulfate content. The pollution potential with such hydrogeology is moderate to low.

The Blue Ridge Physiographic Province is a relatively narrow, mountainous region underlain by granite, gneiss, and marble. The province is characterized by rapid surface runoff and low aquifer recharge. Groundwater use in the Blue Ridge is generally limited to domestic wells, which produce less than 20 gallons per minute. The groundwater is typically of good quality although it may be locally high in iron, manganese, or sulfur content. The groundwater pollution potential in this area is low.

The crystalline and undifferentiated sedimentary rocks of the Piedmont and Blue Ridge aquifers generally have low dissolved solids contents; water is considered soft. The median hydrogen ion concentration, measured in pH units, is 6.7; therefore, the groundwater tends to be slightly acidic.

The region spans the James and Roanoke River Basins. Smaller watersheds and notable rivers and streams are discussed in the following sections. Watershed information was retrieved through the EPA Surf Your Watershed, DCR Soil and Water Conservation, USDA Natural Resources Conservation Service (NRCS), and the USGS Water Resources of the United States. Watersheds are defined by Hydrologic Unit Codes (HUC). Major watersheds are identified by 8-digit HUCs. Each 2-digit piece of the HUC identifies the watersheds, region, sub-region, basin, and sub-basin. The major watersheds are then divided into smaller watersheds with 10-digit HUCs (also known as level 5). Level 5 watersheds are the basis for natural resource planning. Sub-watersheds (level 6 or 12-digit HUCs) help identify water sources such as rivers and streams that contribute within a watershed. Level 5 or 10-digit HUC watersheds are presented for the region on Figure 4.1.

Figure 4.1 – Watershed Map

Meteorological information was reviewed through the NOAA Satellite and Information Service, National Environmental Satellite, Data, and Information Service (NESDIS). The publication *Climatography of the United States No. 81, Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000* for the State of Virginia was referenced where appropriate in the following sections. Normals are a 30-year arithmetic mean, computed once per decade.

4.1.1 Amherst County Including the Town of Amherst

Geology

Amherst County is located primarily in the Piedmont Physiographic Province with a small portion of the County located in the eastern Blue Ridge Physiographic Province. Rock types found throughout Amherst County include stratified Cambrian age rocks of the Blue Ridge Anticlinorium (crystalline) and Middle Proterozoic (Grenville age) Plutonic Rocks of the Blue Ridge Basement Complex.

Figure 4.1.1 – Amherst County Geologic Map

Hydrology

The County is located in the James River Basin. Specifically the County is located in one major watershed, the Middle James-Buffalo (HUC 02080203). Level 5 watersheds include all or portions of the Upper Tye River, Lower Tye River, Pedlar River, James River-Reed Creek, Buffalo River, James River-Harris Creek, and the James River-Wreck Island Creek. The Town of Amherst is located within the Buffalo River Watershed. These watersheds in Amherst County include portions of the following major streams and rivers (based on Level 6 sub-watershed mapping): Pedlar River-Lynchburg Reservoir, Piney River-Little Piney River, Piney River-Naked Creek, Tye River-Brown Creek, Buffalo River-North Fork Buffalo River, Buffalo River-Stonewall Creek, Rutledge Creek, Buffalo River-Rocky Creek, James River-Allens Creek, James River-Christian Mill Creek, James River-Beck Creek, James River-Stonewall Creek, Harris Creek, James River-Judith Creek, James River-Beck Creek, Pedlar River-Horsley Creek, James River-Opossum Creek, Pedlar River-Browns Creek, and James River-Otter Creek.

Meteorological Conditions

No NOAA monitoring stations are located in the County of Amherst. Two stations are located near county boundaries at the Holcomb Rock Station and the Tye River Station. (These stations should provide an adequate estimate of temperature and precipitation normals for Amherst County.) Temperature normals were not available for the Holcomb Rock Station. Temperature normals for the Tye River Station show an average annual high of 67.6º, average annual low of 43.3º, and annual mean of 55.5º with the highest mean temperatures in July and the lowest in January. Annual precipitation is identified as 44.74” at the Holcomb Rock Station and 45.94” at the Tye River Station with the highest precipitation normals documented in May and July and the lowest precipitation normals documented in February.

4.1.2 Appomattox County including the Towns of Appomattox and Pamplin

Geology

Appomattox County is located in the Piedmont Physiographic Province. Rock types found throughout Appomattox County include stratified Cambrian age rocks of the Blue Ridge Anticlinorium (crystalline), stratified Cambrian age crystalline rocks of the Western Piedmont, and Ordovician age rocks of the Central Virginia Volcanic-Plutonic Belt.

Figure 4.1.2 – Appomattox County Geologic Map

Hydrology

The southern portion of the County is located in the Roanoke River Basin, while the remainder of the County is located in the James River Basin. Both the Towns of Pamplin and Appomattox are border line with the two basins. Specifically, the County is located in two major watersheds, the Upper Roanoke (HUC 03010101) and the Appomattox (HUC 02080207). Level 5 watersheds include all or portions of the James River-Wreck Island Creek, James River-David Creek, Appomattox River-Vaughans Creek, Buffalo Creek, and the Falling River. The Town of Appomattox is located in both the Appomattox River-Vaughans Creek and Falling River watersheds. The Town of Pamplin is located on the border between the Appomattox River-Vaughans Creek and Buffalo Creek watersheds. The watersheds located in Appomattox County include portions of the following major streams and rivers (based on Level 6 sub-watershed mapping): David Creek, Bent Creek, James River-Allens Creek, James River-Christian Mill Creek, James River-Stonewall Creek, James River-Beck Creek, Wreck Island Creek, Appomattox River-Wolf Creek, Appomattox River-Fishpond Creek, Appomattox River-Suanee Creek, Vaughans Creek, Little Cub Creek, Big Cub Creek, Falling River-Mulberry Creek, Little Falling River-Entry Creek, and Falling River-Reedy Creek.

Meteorological Conditions

One NOAA monitoring station is located in Appomattox County at the City of Appomattox. The mean annual temperature at this station is documented as 55.5º with an annual average high of 67.2º and average annual low of 43.7º. The highest temperatures are generally documented in July and the lowest temperatures in January. Annual precipitation is identified as 45.88” with the highest precipitation normals documented in May and the lowest precipitation normals documented in December.

4.1.3 Bedford County and the City of Bedford

Geology

Bedford County is located primarily in the Piedmont Physiographic Province; the western portion of the County is located in the Blue Ridge Physiographic Province. Rock types found throughout Bedford County include stratified Cambrian age rocks of the Blue Ridge Anticlinorium (crystalline), Middle Proterozoic (Grenville age) Plutonic Rocks and Middle Proterozoic Gneisses of the Blue Ridge Basement Complex, and a small portion of Cambrian age sedimentary rocks (shale, sandstone, siltstone, limestone, and dolostone) on the far western portion of the County.

Figure 4.1.3 – Bedford County Geologic Map

Hydrology

The majority of Bedford County is located in the Roanoke River Basin including the City of Bedford. A small portion located in the northeastern section of the County is located within the James River Basin. The county is located in two major watersheds, the Upper Roanoke (HUC 03010101) and the Middle Roanoke (HUC 03010102). Level 5 watersheds include all or portions of the Upper Big Otter River, Upper Goose Creek, Roanoke River-Smith Mountain Lake, Lower Goose Creek, Lower Big Otter River, and Roanoke River-Leesville Lake. The City of Bedford is located in the Upper Big Otter River Watershed. These watersheds in Bedford County include portions of the following major streams and rivers (based on Level 6 sub-watershed mapping): **City of Bedford** Little Otter River-Johns Creek; **Bedford County** Goose Creek-North Fork Goose Creek, Big Otter River-Stony Creek, North Otter River, Reed Creek, James River-Otter Creek, James River-Thomas Mill Creek, James River-Judith Creek, Ivy Creek-Cheese Creek, Blackwater Creek, Buffalo Creek, Elk Creek-Chestnut Branch, Big Otter River-Roaring Run, Little Otter River-Johns Creek, Goose Creek-Mill Creek, Machine Creek, Big Otter River-Orrix Creek, Big Otter River-Johnson Creek, Goose Creek-Back Creek, Carter Mill Creek, Roanoke River/Smith Mountain Lake-Lynville Creek, Roanoke River/Smith Mountain Lake-Stony Creek, Roanoke River/Smith Mountain Lake-Craddock Creek, Roanoke River/Smith Mountain Lake-Bettys Creek, Stony Fork, Goose Creek-Wolf Creek, Beaverdam Creek, and Bore Auger Creek.

Meteorological Conditions

Three NOAA monitoring stations are located in Bedford County at the Bedford, Holcomb Rock, and Huddleston Stations. Temperature normals were not available for the Holcomb Rock or Huddleston Stations. The mean annual temperature at the Bedford station is documented as 55.6º with an annual average high of 66.6º and average annual low of 44.5º. Highest temperatures are generally documented in July and the lowest temperatures in January. Annual precipitation ranges from 42.89” to 44.80” between the three stations with the highest precipitation normals documented in May, July, and September and the lowest precipitation normals documented in February and December.

4.1.4 Campbell County Including the Towns of Altavista and Brookneal and the City of Lynchburg

Geology

Campbell County is located in the Piedmont Physiographic Province. Rock types found throughout Campbell County include stratified Cambrian age rocks of the Blue Ridge Anticlinorium (crystalline), stratified Cambrian age crystalline rocks of the Western Piedmont, and Cambrian age igneous rocks of the Western Piedmont.

Figure 4.1.4 – Campbell County Geologic Map

Hydrology

A small portion of the northern section of the County including the City of Lynchburg is located in the James River Basin, while the remainder of the County is located in the Roanoke River Basin. Major watersheds in this region include the Middle Roanoke (HUC 03010102), the Upper Roanoke (HUC 03010101), and the Middle James-Buffalo (HUC 02080203) around the City of Lynchburg. Level 5 watersheds include all or portions of the James-River Harris Creek, Lower Big Otter River, Falling River, Cub Creek, Roanoke River-Seneca Creek, and Roanoke River-Leesville Lake. The City of Lynchburg is located in the James River-Harris Creek watershed. The town of Altavista is located primarily in the Roanoke River-Leesville Lake watershed while the Town of Brookneal spans the Roanoke River-Seneca Creek and Falling River watersheds. These watersheds in Campbell County include portions of the following major streams and rivers (based on Level 6 sub-watershed mapping): **City of Lynchburg** James River-Judith Creek, Ivey Creek-Cheese Creek, James River-Opossum Creek, Blackwater Creek; **Campbell County** James River-beck Creek, James River-Opossum Creek, Blackwater Creek, Buffalo Creek, Flat Creek, Beaver Creek, James River-Reedy Creek, South Fork Falling River-Button Creek, Falling River-Mulberry Creek, Little Falling River-Entry Creek, Turnip Creek, Roanoke River-Whipping Creek, Falling River-Hat Creek-Phelps Creek, Roanoke River-Buffalo Creek, Falling River-Suck Creek, Mollys Creek, Seneca Creek, Roanoke River-Beachtree Creek, Big Otter River-Troublesome Creek, Big Otter River-Johnson Creek, Roanoke River-Bishop Creek, Roanoke River-Reed Creek, Goose Creek-Back Creek.

Meteorological Conditions

Four NOAA monitoring stations are located in Campbell County at the Altavista, Brookneal, Concord, and Lynchburg Municipal Airport (Lynchburg MAP) Stations. Temperature normals were not available for the Altavista and Concord Stations. The mean annual temperature for the Brookneal Station is 54.8º and 55.4º for the Lynchburg MAP Station with the highest temperature normals documented in July and the lowest temperature normals in February. Average annual high and low temperatures at the

Brookneal Station are 66.4º and 43.1º respectively and 66.8º and 44.0º respectively at the Lynchburg MAP Station. Annual precipitation ranges from 39.96" to 44.75" among these four stations with the highest precipitation normals documented in May, June, and July and the lowest precipitation normals documented in December.

4.1.5 Nelson County

Geology

Nelson County is located in the Piedmont Physiographic Province except for portions of the western section of the County, which is located in the Blue Ridge Physiographic Province. Rock types found throughout Nelson County include stratified Cambrian age rocks of the Blue Ridge Anticlinorium (crystalline), and Late Proterozoic igneous rocks and Middle Proterozoic (Grenville age) Plutonic Rocks of the Blue Ridge Basement Complex.

Figure 4.1.5 – Nelson County Geologic Map

Hydrology

All of Nelson County is part of the James River Basin. Specifically, the County is located in one major watershed the Middle James-Buffalo (HUC 02080203). Level 5 watersheds include all or portions of the Upper Tye River, Lower Tye River, James River-David Creek, Lower Rockfish River, and Upper Rockfish River. These watersheds in Nelson County include portions of the following major streams and rivers (based on Level 6 sub-watershed mapping): Piney River-Little Piney River, Tye River-Cub Creek, Piney River-Naked Creek, Tye River-Black Creek, Tye River-Joe Creek, Rucker Run, Hat Creek, South Fork Rockfish River, Rockfish River-Buck Creek, Rockfish River-Dutch Creek, Cove Creek-Hickory Creek, North Fork Rockfish River, Rockfish River-Beaver Creek, James River-Sycamore Creek, Tye River-Brown Creek, James River-Alabama Creek, James River-Allens Creek, Buffalo River-Rocky Creek, and James River-Mallorys Creek.

Meteorological Conditions

Three NOAA monitoring stations are located in Nelson County at the Montebello, Rockfish, and Tye River Stations. Temperature normals were not available for the Montebello and Rockfish Stations. The mean annual temperature for the Tye River Station is 55.3º with the highest temperature normals documented in July and the lowest temperature normals in February. Average annual high temperatures are 67.6º and average annual low temperatures are 43.3º at the Tye River Station. Annual precipitation is identified as 45.88” with the highest precipitation normals documented in May, July, and September and the lowest precipitation normals documented in February and December.

4.2 Existing Environmental Conditions that Pertain to or May Affect In-Stream Flow, In-Stream Uses, and Sources that Provide the Current Supply[18]

Environmental conditions that may affect use of surface water sources include threatened and endangered species, habitats of concern, significant fisheries, recreational river segments, historical and archaeological sites, unusual geologic sites or special soil types, wetlands, riparian buffers and conservation easements, land use patterns, impaired streams, point source discharges, and other threats to water quantity and quality.

4.2.1 State or Federal Listed Threatened or Endangered Species or Habitats of Concern

Information on state or federal listed threatened or endangered species, or habitats of concern for the region was collected from the Virginia Fish and Wildlife Information Service (VAFWIS) whose database can be accessed by county. Species are listed as federal endangered (FE), federal threatened (FT), federal candidate (FC), federal species of concern (FS), state endangered (SE), state threatened (ST), and state special concern (SS). Federal species of concern (FS) and state special concern (SS) do not have legal status and the list is maintained by the United States Fish and Wildlife Service (USFWS) Virginia Field Office. The following table summarizes state and/or federal listed threatened or endangered species in Amherst, Appomattox, Bedford, Campbell, and Nelson counties including the City of Bedford and the City of Lynchburg.

Table 4.2.1A State or Federal Listed Threatened or Endangered Species

Species Code	Common Name	Scientific Name	Status
Amherst County (Including the Town of Amherst)			
060017	Spinymussel, James	*Pleurobema collina*	FE/SE
040292	Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	FS/ST
100248	Fritillary, regal	*Spayeria idalia idalia*	FS
040320	Warbler, cerulean	*Dendroica cerulea*	FS
010363	Darter, Appalachia	*Percian gymnocephala*	FS
050106	Cottontail, Appalachian	*Sylvilagus obscures*	FS
050081	Woodrat, Allegheny	*Neotoma magister*	FS
040096	Falcon, peregrine	*Falco peregrinus*	ST
040129	Sandpiper, upland	*Bartramia longicauda*	ST
040293	Shrike, loggerhead	*Lanius ludovicianus*	ST
040093	Eagle, bald	*Haliaeetus leucocephalus*	ST
010077	Shiner, bridle	*Notropis bifrenatus*	SS
040306	Warbler, golden winged	*Vermivora chrysoptera*	SS
040266	Wren, winter	*Troglodytes troglodytes*	SS

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Species Code	Common Name	Scientific Name	Status
040094	Harrier, northern	*Circus cyaneus*	SS
040040	Ibis, glossy	*Plegadis falcinellus*	SS
040204	Owl, barn	*Tyto alba pratincola*	SS
040264	Rattlesnake, timber	*Crotalus horridus*	SS
040364	Creeper, brown	*Certhia Americana*	SS
040032	Dickcissel	*Spiza Americana*	SS
040366	Egret, great	*Ardea alba egretta*	SS
040285	Finch, purple	*Carpodacus purpureus*	SS
040112	Kinglet, golden crowned	*Regulus satrapa*	SS
040262	Moorhen, common	*Gallinula chloropus cachinnans*	SS
040189	Nathatch, red-breasted	*Sitta Canadensis*	SS
040278	Tern, Caspian	*Sterna caspia*	SS
040314	Thrush, hermit	*Catharus guttatus*	SS
050045	Warbler, magnolia	*Dendroica magnolia*	SS
030012	Otter, northern river	*Lontra Canadensis lataxina*	SS
Appomattox County (Including the Towns of Appomattox and Pamplin)			
040292	Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	FS/ST
010174	Bass, Roanoke	*Ambloplites cavifrons*	FS/SS
040320	Warbler, cerulean	*Dendroica cerulean*	FS
010115	Sucker, rustyside	*Thoburnia hamiltoni*	FS/SS
010109	Sucker, Roanoke hog	*Hypentelium roanokense*	FS
040266	Wren, winter	*Troglodytes troglodytes*	SS
040094	Harrier, northern	*Circus cyaneus*	SS
040040	Ibis, glossy	*Plegadis falcinellus*	SS
040204	Owl, barn	*Tyto alba pratincola*	SS
040264	Creeper, brown	*Certhia americana*	SS
040364	Dickcissel	*Spiza americana*	SS
040032	Egret, great	*Ardea alba egretta*	SS
040366	Finch, purple	*Carpodacus purpureus*	SS
040285	Kinglet, golden crowned	*Regulus satrapa*	SS
040112	Moorhen, common	*Gallinula chloropus cachinnans*	SS
040262	Nuthatch, red-breasted	*Sitta cnadensis*	SS
040189	Tern, Caspian	*Sterna caspia*	SS
040278	Thrush, hermit	*Catharus guttatus*	SS
040314	Warbler, magnolia	*Dendroica magnolia*	SS
050045	Otter, northern river	*Lontra Canadensis lataxina*	SS
Bedford County and City of Bedford			
010214	Logperch, Roanoke	*Percina rex*	FE/SE
040379	Sparrow, Henslow's	*Ammodramus henslowii*	FS/ST
060173	Pigtoe, Atlantic	*Fusconaia masoni*	FS/ST
040292	Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	FS/ST
100248	Fritillary, regal	*Speyeria idalia idalia*	FS
010174	Bass, Roanoke	*Ambloplites cavifrons*	FS/SS
020039	Salamander, Peaks of Otter	*Plethodon hubrichti*	FS/SS
040320	Warbler, cerulean	*Dendroica cerulean*	FS
100154	Butterfly, Persius duskywing	*Erynnis persius persius*	FS
100256	Crescent, tawny	*Phyciodes batesii batesii*	FS
010110	Jumprock, bigeye	*Scartomyzon ariommus*	FS
010363	Darter, Appalachia	*Percina gymnocephala*	FS
010200	Darter, riverweed	*Etheostoma podostemone*	FS
010109	Sucker, Roanoke hog	*Hypertelium roanokense*	FS
050106	Cottontail, Appalachian	*Sylvilagus obscures*	FS
050081	Woodrat, Allegheny	*Neotoma magister*	FS
100001	Fritillary, Diana	*Speyeria Diana*	FS
040096	Falcon, peregrine	*Falco peregrines*	ST
040129	Sandpiper, upland	*Bartramia longicauda*	ST
040293	Shrike, loggerhead	*Lanius ludovicianus*	ST
040093	Eagle, bald	*Haliaeetus leucocephalus*	ST
010077	Shiner, bridle	*Notropis bifrenatus*	SS
040372	Crossbill, red	*Loxia curvirostra*	SS
040306	Warbler, golden-winged	*Vermivora chrysoptera*	SS
040266	Wren, winter	*Troglodytes troglodytes*	SS

Species Code	Common Name	Scientific Name	Status
040094	Harrier, northern	*Circus cyaneus*	SS
040040	Ibis, glossy	*Plegadis falcinellus*	SS
040036	Night-heron, yellow-crowned	*Nyctanassa violacea violacea*	SS
040204	Owl, barn	*Tyto alba pratincola*	SS
040264	Creeper, brown	*Certhia americana*	SS
040364	Dichcissel	*Spiza americana*	SS
040032	Egret, great	*Ardea alba egretta*	SS
040366	Finch, purple	*Carpodacus purpureus*	SS
040285	Kinglet, golden-crowned	*Regulus satrapa*	SS
040112	Moorhen, common	*Callinula chloropus cachinnans*	SS
040262	Nuthatch, red-breasted	*Sitta cnadensis*	SS
040189	Tern, Caspian	*Sterna caspia*	SS
040278	Thrush, hermit	*Catharus guttatus*	SS
040314	Warbler, magnolia	*Dendroica magnolia*	SS
050045	Otter, northern river	*Lontra Canadensis lataxina*	SS
Campbell County (Including the Towns of Altavista and Brookneal) and City of Lynchburg			
040379	Sparrow, Henslow's	*Ammodramus henslowii*	FS/ST
010353	Darter, Carolina	*Etheostoma collis*	FS/ST
040292	Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	FS/ST
010174	Bass, Roanoke	*Ambloplites cavifrons*	FS/SS
040320	Warbler, cerulean	*Dendroica cerulean*	FS
010115	Sucker, rustyside	*Thoburnia hamiltoni*	FS/SS
060029	Lance, yellow	*Elliptio lanceolata*	FS/SS
010200	Darter, riverweed	*Etheostomoa podostemone*	FS
010109	Sucker, Roanoke hog	*Hypentelium roanokense*	FS
040129	Sandpiper, upland	*Bartramia longicauda*	ST
040293	Shrike, loggerhead	*Lanius ludovicianus*	ST
040093	Eagle, bald	*Haliaeetus leucocephalus*	ST
020023	Salamander, mole	*Ambystoma talpoideum*	SS
040266	Wren, winter	*Troglodytes troglodytes*	SS
040094	Harrier, northern	*Circus cyaneus*	SS
040040	Ibis, glossy	*Plegadis falcinellus*	SS
040036	Night-heron, yellow-crowned	*Nyctanassa violacea violacea*	SS
040204	Owl, barn	*Tytoalba pratincola*	SS
040264	Creeper, brown	*Certhia americana*	SS
040364	Dickcissel	*Spiza americana*	SS
040032	Egret, great	*Ardea alba egretta*	SS
040366	Finch, purple	*Carpodacus purpureus*	SS
040285	Kinglet, golden crowned	*Regulus satrapa*	SS
040112	Moorhen, common	*Gallinula chloropus cachinnans*	SS
040262	Nuthatch, red-breasted	*Sitta cnadensis*	SS
040189	Tern, Caspian	*Sterna caspia*	SS
040278	Thrush, hermit	*Catharus guttatus*	SS
040314	Warbler, magnolia	*Dendroica magnolia*	SS
050045	Otter, northern river	*Lontra cnadensis lataxina*	SS
Nelson County			
060081	Floater, green	*Lasmigona subviridis*	FS/ST
040292	Shrike, migrant loggerhead	*Lanius ludovicianus migrans*	FS/ST
100248	Fritillary, regal	*Speyeria idalia idalia*	FS
040320	Warbler, cerulean	*Dendroica cerulean*	FS
010363	Darter, Appalachia	*Percina gymnocephala*	FS
050106	Cottontail, Appalachia	*Sylvilagus obscures*	FS
050081	Woodrat, Allegheny	*Neotoma magister*	FS
040096	Falcon, peregrine	*Falco peregrines*	ST
040129	Sandpiper, upland	*Bartramia longicauda*	ST
040293	Shrike, loggerhead	*Lanius ludovicianus*	ST
040306	Warbler, golden-winged	*Vermivora chrysoptera*	SS
040266	Wren, winter	*Troglodytes troglodytes*	SS
040094	Harrier, northern	*Circus cyaneus*	SS
040204	Owl, barn	*Tyto alba pratincola*	SS
040264	Creeper, brown	*Certhia americana*	SS
040364	Dickcissel	*Spiza americana*	SS

Species Code	Common Name	Scientific Name	Status
040366	Finch, purple	*Carpodacus purpureus*	SS
040285	Kinglet, golden-crowned	*Regulus satrapa*	SS
040112	Moorhen, common	*Gallinula chloropus cachinnans*	SS
040262	Nuthatch, red-breasted	*Sitta Canadensis*	SS
040189	Tern, Caspian	*Sterna caspia*	SS
040278	Thrush, hermit	*Catharus guttatus*	SS
040314	Warbler, magnolia	*Dendroica magnolia*	SS
050045	Otter, northern river	*Lontra Canadensis lataxina*	SS

Source: http://vafwis.org/fwis/?Menu=Home.Species+Information

Information on state listed threatened and endangered plant species was collected from the Virginia Department of Conservation and Recreation (DCR), Division of Natural Heritage (DNH). The following table summarizes federal and state listed threatened or endangered plant species for the state of Virginia. The database did not allow County specific search criteria.

Table 4.2.1B State and Federal Listed Threatened or Endangered Plant Species

Symbol	Common Name	Scientific Name	Status
ARSE9	Shale-barren rockcress	*Arabis serotina*	SE/FE
BAIN2	Tropical water-hyssop	*Bacopa innominata*	SE
BEUB	Virginia round-leaf birch	*Betula uber*	SE/FT
BUDI	Piratebush	*Buckleya distichophylla*	SE
CAPO4	Variable sedge	*Carex polymorpha*	SE
FIPE	Harper's fimbry	*Fimbristylis perpusilla*	SE
HEVI6	Virginia sneezeweed	*Helnium virginicum*	SE/FT
HEBU	Swamp-pink	*Helonias bullata*	SE/FT
ILCO2	Long-stalked holly	*Inex collina*	SE
ILRIR ILCO4	- Peter's Mountain mallow	*Iliamna rivularis* *Iliamna corei*	SE/FE
ISME2	Small whorled pogonia	*Isotria medeoloides*	SE/FT
NEUM	Nestronia	*Nestronia umbellula*	SE
SCAN5	Northeastern bulrush	*Scirpus ancistrochaetus*	SE/FE
SPVI2	Virginia spiraea	*Spiraea virginiana*	SE/FT
AEVI3	Sensitive joint-vetch	*Aeschynomene virginica*	FT
CAMI19	Small-anthered bittercress	*Cardamine micranthera*	FE
ECLA	Smooth coneflower	*Echinacea laevigata*	FE
PLLE2	Eastern prairie fringed orchid	*Plantanthera leucophaea*	FT
RHMI11	Michaux's sumac	*Rhus michauxii*	FE
SCAM	American chaffseed	*Schwalbea Americana*	FE

Source: http://plants.usda.gov/threat.html

DCR NHR also tracks natural heritage resources by County. These are outlined in the table below with special status species shaded.

Table 4.2.1C Natural Heritage Resources

Category	Common Name	Scientific Name	Status
Amherst County (Including the Town of Amherst)			
Amphibians	Mole salamander	*Ambystoma talpoideum*	
Birds	Bald eagle	*Haliaeetus leucocephalus*	ST
Bivalvia (Mussels)	Yellow lance	*Elliptio lanceolata*	
	Green floater	*Lasmigona subviridis*	ST

Table 4.2.1C Natural Heritage Resources

Category	Common Name	Scientific Name	Status
	James spinymussel	*Pleurobema collina*	FE/SE
Natural Communities	High-elevation Outcrop Barren	n/a	
	Mesic Mixed Hardwood Forest		
	Montane Mixed Oak/Oak-Hickory Forest		
	Mountain/Piedmont Basic Seepage Swamp		
	Riverside Prairie		
	Ultramafic Woodland		
	Upland Depression Swamp		
Reptiles	Southeastern crowned Snake	*Tantilla coronate*	
Vascular Plants	Great indian-plantain	*Amoglossum muehlenbergii*	
	Inflated sedge	*Carex vesicaria*	
	Smooth coneflower	*Echinacea laevigata*	FE/ST
	Spotted joe-pye weed	*Eupatorium maculatum var. maculatum*	
	Northern mannagrass	*Glyceria laxa*	
	Kankakee clobe-mallow	*Iliamna remota*	
	Starflower false solomon's seal	*Maianthemum stellatum*	
	Sword-leaved phlox	*Phlox buckleyi*	
	Large purple-fringe orchis	*Platanthera grandiflora*	
	Bog bluegrass	*Poa paludigena*	
	Common clammy-weed	*Polanisia dodecandra ssp. Dodecandra*	
	Dwarf chinquapin oak	*Quercus prinoides*	
	Prairie rose	*Rosa setigera*	
	Rand's goldenrod	*Solidago randii*	
	Bog goldenrod	*Solidago uliginosa var. uliginosa*	
	Freshwater cordgrass	*Spartina pectinata*	
	American purple vetch	*Vicia Americana ssp. Americana*	
Appomattox County (Including the Towns of Appomattox and Pamplin)			
Bivalvia (Mussels)	Green floater	*Lasmigona subviridis*	ST
Natural Community	Basic Mesic Forest	n/a	
	Coastal Plain/Piedmont Basic Seepage Swamp		
	Pine-oak/Heath Woodland		
	Upland Depression Swamp		
Vascular Plants	Pear hawthorn	*Crataegus calpodendrom*	
	Pink thoroughwort	*Eupatorium incarnatum*	
	Old-field milkvine	*Matelea decipiens*	
	Dwarf chinquapin oak	*Quercus prinoides*	
Bedford County (Including the City of Bedford)			
Amphibians	Peaks of Otter Salamander	*Plethodon hubrichti*	
Birds	Winter Wren	*Troglodytes troglodytes*	
Bivalvia (Mussels)	Yellow Lance	*Elliptio lanceolata*	
Natural Community	Carolina Hemlock Forest	n/a	
	Eastern Hemlock-Hardwood Forest		
	High-elevation Seepage Swamp		
	Montane Depression Wetlands		
	Montane Mixed Oak/Oak-Hickory Forest	n/a	
	Northern Red Oak Forest		
	Oak/Heath Forest		
	Piedmont/Mountain Floodplain Forest		
	Rich Cove/Slope Forest		
	Riverside Prairie		
Fish	Roanoke logperch	*Percina rex*	FE/SE
Lepidoptera	A Noctuid moth	*Hadena ectypa*	

Table 4.2.1C Natural Heritage Resources

Category	Common Name	Scientific Name	Status
(Butterflies & Moths)	Tawny crescent	*Phyciodes batesii batesii*	
Odonata (Dragonflies & Damselflies)	Piedmont clubtail	*Gomphus parvidens*	
	Appalachian snaketail	*Ophiogomphus incurvatus*	
Significant Caves	Significant Cave	*n/a*	
Vascular Plants	Nodding wild-rye	*Elymus Canadensis*	
	Glade spurge	*Euphorbia purpurea*	
	Kankakee globe-mallow	*Iliamna medeoloides*	
	Small whorled pogonia	*Isotria medeoloides*	
	Highland dog-hobble	*Leucothoe fontanesiana*	
	Gray's lily	*Lilium grayi*	
	Starflower false solomon's seal	*Maianthemum stellatum*	
	Large purple-fringe orchis	*Platanthera grandiflora*	
	Common clammy-weed	*Polanisia dodecandra ssp. Dodecandra*	
	Bog goldenrod	*Solidage uliginosa var. uliginosa*	
	Freshwater cordgrass	*Spartina pectinata*	
	Smooth buttonweed	*Spermacoce glabra*	
	American purple vetch	*Vicia Americana ssp. Americana*	
Campbell County (Including the Towns of Altavista and Brookneal)			
Amphibians	Mole salamander	*Ambystoma talpoideum*	
Birds	Bald eagle	*Haliaeetus leucocephalus*	ST
Natural Communities	Basic Mesic Forest	n/a	
	Basic Oak-Hickory Forest		
	Eastern Hemlock-Hardwood Forest		
	Upland Depression Swamp		
Fish	Orangefin madtom	*Noturus gilberti*	ST
Odonata (Dragonflies & Damselflies)	Selys' sundragon	*Helocordulia selysii*	
Vascular Plants	Blue-hearts	*Buchnera Americana*	
	Smooth coneflower	*Echinacea laevigata*	FE/ST
	Nestronia	*Nestronia umbellula*	SE
	Downy phlox	*Phlox pilosa ssp. Pilosa*	
	Torrey's Mountain-mint	*Pycnanthemum torrei*	
City of Lynchburg			
Bivalvia (Mussels)	Green floater	*Lasmigona subviridis*	ST
Vascular Plants	Smooth coneflower	*Echinacea laevigata*	FE/ST
Nelson County			
Bivalvia (Mussels)	Yellow lance	*Elliptio lanceolata*	
	Green floater	*Lasmigona subviridis*	ST
Chilopoda (Centipedes)	Montane centipede	*Escaryus cryptorobius*	
Natural Community	Appalachian Bog	n/a	
	Eastern Hemlock-Hardwood Forest		
	High-elevation Boulderfield Forest/Woodland		
	High-elevation Outcrop Barren		
	Low-elevation Basic Outcrop Barren		
	Montane Mixed Oak/Oak-Hickory Forest		
	Mountain/Piedmont Acidic Seepage Swamp		
	Mountain/Piedmont Basic Seepage Swamp		

Table 4.2.1C Natural Heritage Resources

Category	Common Name	Scientific Name	Status
	Mountain/Piedmont Basic Woodland		
Diplopoda (Millipedes)	A Millipede	*Semionellus placidus*	
Lepidoptera (Butterflied & Moths)	Silver-bordered fritillary	*Boloria selene*	
Odonata (Dragonflies & Damselflies)	Laura's clubtail	*Stylurus laurae*	
Vascular Plants	Speckled alder	*Alnus incana ssp. Rugosa*	
	Hairy rockcress	*Arabis hirsute var. adpressipillis*	
	Great Indian-plantain	*Arnoglossum muehlenbergii*	
	Smooth sweet-shrub	*Calycanthus floridus var. glaucus*	
	Linear-leaved willow-herb	*Epilobium leptophyllum*	
	Swamp-pink	*Helonias bullata*	FT/SE
	Appalachian fir-clubmoss	*Huperzia appalachiana*	
	Highland dog-hobble	*Leucothoe fontanesiana*	
	Mountain sandwort	*Minuartia groenlandica*	
	Large purple-fringe orchis	*Plantanthera grandiflora*	
	Tall cinquefoil	*Potentilla arguta*	
	Torrey's mountain-mint	*Pycnanthemum torrei*	
	Three-toothed cinquefoil	*Sibbaldiopsis tridentate*	
	Bog goldenrod	*Solidago uliginosa var. uliginosa*	

Source: http://192.206.31.46/cfprog/dnh/naturalheritage/select_counties.cfm

4.2.2 Anadromous, Trout and other Significant Fisheries

No anadromous fish species are present in the region. Trout and other significant fish species identified and recorded by the DGIF are found in waterways throughout Region 2000. Fishes are given Game, Sport, and Pest/Nuisance designations where appropriate. Additional designations are given under the Virginia Wildlife Action Plan (WAP), which determines noted levels of conservation need from moderate (level IV) to critical (level I) beyond the threatened and endangered listings.

In Amherst County, 52 fish species are recorded, 14 of which are sport fish, one of which is a pest/nuisance fish. Appomattox County has 46 recorded fishes of which 10 are considered sport fish. Bedford County has 74 recorded fishes are found with 29 of them identified as sport fish and one pest/nuisance fish. Campbell County has 57 recorded fishes with 17 of those being sport fish and one pest/nuisance fish. In Nelson County, 42 fish species are recorded, 12 of which are sport fish. The specific fish species are tabulated below with sport/game fish shaded.

Table 4.2.2 Fish Species and Game Fish

Species Code	Common Name	Scientific Name	Status/WAP
Amherst County (Including the Town of Amherst)			
010363	Darter, Appalachia	*Percina gymnocephala*	FS/IV
010077	Shiner, bridle	*Notropis bifrenatus*	SS/I
010131	Eel, American	*Anguilla rostrata*	-/IV
010188	Bass, largemouth	*Micropterus salmoides*	Sport Fish
010175	Bass, rock	*Ambloplites rupestris*	Sport Fish
010186	Bass, smallmouth	*Micropterus dolomieu*	Sport Fish
010183	Bluegill	*Lepomis macrochirus*	Sport Fish
010122	Bullhead, yellow	*Ameiurus natalis*	
010062	Carp, common	*Cyprinus carpio*	Sport Fish Pest/Nuisance
010125	Catfish, channel	*Ictalurus punctatus*	Sport Fish
010066	Chub, bluehead	*Nocomis leptocephalus*	
010373	Chub, bull	*Nocomis raneyi*	
010103	Chub, creek	*Semotilus atromaculatus*	
010067	Chub, river	*Nocomis micropogon*	
010106	Chubsucker, creek	*Erimyzon oblongus*	
010101	Dace, blacknose	*Rhinichthys atratulus*	
010102	Dace, longnose	*Rhinichthys cataractae*	
010060	Dace, mountain redbelly	*Phoxinus oreas*	
010193	Darter, fantail	*Etheostoma flabellare*	
010204	Darter, glassy	*Etheostoma vitreum*	
010198	Darter, johnny	*Etheostoma nigrum*	
010196	Darter, longfin	*Etheostoma longimanum*	
010061	Darter, roanoke	*Percina roanoka*	
010211	Darter, stripeback	*Percina notogramma*	
010104	Fallfish	*Semotilus corporalis*	
010112	Jumprock, black	*Moxostoma cervinum*	
010129	Madtom, margined	*Noturus insignis*	
010099	Minnow, bluntnose	*Pimephales notatus*	
010063	Minnow, cutlips	*Exoglossum maxillingua*	
010408	Minnow, eastern silvery	*Hybognathus regius*	
010056	Pickerel, chain	*Esox niger*	Sport Fish
010182	Pumpkinseed	*Lepomis gibbosus*	Sport Fish
010114	Redhorse, golden	*Moxostoma erythrurum*	
010116	Redhorse, shorthead	*Moxostoma macrolepidotum*	Sport Fish
010283	Sculpin, mottled	*Cottus bairdi*	
010072	Shiner, comely	*Notropis amoenus*	
010082	Shiner, common	*Luxilus cornutus*	
010078	Shiner, crescent	*Luxilus cerasinus*	
010068	Shiner, golden	*Notemigonus crysoleucas*	
010074	Shiner, rosefin	*Lythrurus ardens*	
010087	Shiner, rosyface	*Notropis rubellus*	
010073	Shiner, satinfin	*Cyprinella analostana*	
010082	Shiner, spottail	*Notropis hudsonius*	
010086	Shiner, swallowtail	*Notropis procne*	
010058	Stoneroller, central	*Campostoma anomalum*	
010108	Sucker, northern hog	*Hypentelium nigricans*	
010118	Sucker, torrent	*Moxostoma rhothoecum*	
010105	Sucker, white	*Catostomus commersoni*	Sport Fish
010180	Sunfish, redbreast	*Lepomis auritus*	Sport Fish
010052	Trout, brook	*Salvelinus fontinalis*	Sport Fish
010051	Trout, brown	*Salmo trutta*	Sport Fish
010050	Trout, rainbow	*Oncorhynchus mykiss*	Sport Fish
Appomattox County (Including the Towns of Appomattox and Pamplin)			
010174	Bass, roanoke	*Ambloplites cavifrons*	FS/SS Sport Fish/II
010115	Sucker, rustyside	*Thoburnia hamiltoni*	FS/SS/III
010109	Sucker, roanoke hog	*Hypentelium roanokense*	FS/IV
010131	Eel, American	*Anguilla rostrata*	-/IV
010188	Bass, largemouth	*Micropterus salmoides*	Sport Fish

010187	Bass, spotted	*Micropterus punctulatus*	Sport Fish
010183	Bluegill	*Lepomis macrochirus*	Sport Fish
010066	Chub, bluehead	*Nocomis leptocephalus*	
010373	Chub, bull	*Nocomis raneyi*	
010103	Chub, creek	*Semotilus atromaculatus*	
010067	Chub, river	*Nocomis micropogon*	
010106	Chubsucker, creek	*Erimyzon oblongus*	
010190	Crappie, black	*Pomoxis nigromaculatus*	Sport Fish
010101	Dace, blacknose	*Rhinichthys atratulus*	
010102	Dace, longnose	*Rhinichthys cataractae*	
010060	Dace, mountain redbelly	*Phoxinus oreas*	
010193	Darter, fantail	*Etheostoma flabellare*	
010204	Darter, glassy	*Etheostoma vitreum*	
010198	Darter, johnny	*Etheostoma nigrum*	
010196	Darter, longfin	*Etheostoma longimanum*	
010061	Darter, ronaoke	*Percina Roanoke*	
010213	Darter, shield	*Percina peltata*	
010211	Darter, stripeback	*Percina notogramma*	
010104	Fallfish	*Semotilus corporalis*	
010129	Madtom, margined	*Noturus insignis*	
010063	Minnow, cutlips	*Exoglossum maxillingua*	
010408	Minnow, eastern silvery	*Hybognathus regius*	
010054	Mudminnow, eastern	*Umbra pygmaea*	
010163	Perch, pirate	*Aphredoderus sayanus sayanus*	
010056	Pickerel, chain	*Esox niger*	Sport Fish
010182	Pumpkinseed	*Lepomis gibbosus*	Sport Fish
010283	Sculpin, mottled	*Cottus bairdi*	
010072	Shiner, comely	*Notropis amoenus*	
010080	Shiner, common	*Luxilus cornutus*	
010078	Shiner, crescent	*Luxilus cerasinus*	
010068	Shiner, golden	*Notemigonus crysoleucas*	
010074	Shiner, rosefin	*Lythrurus ardens*	
010087	Shiner, rosyface	*Notropis rubellus*	
010073	Shiner, satinfin	*Cyprinella analostana*	
010086	Shiner, swallowtail	*Notropis procne*	
010058	Stoneroller, central	*Campostoma anomalum*	
010108	Sucker, northern hog	*Hypentelium nigricans*	
010118	Sucker, torrent	*Moxostoma rhothoecum*	
010105	Sucker, white	*Catostomus commersoni*	Sport Fish
010180	Sunfish, redbreast	*Lepomis auritus*	Sport Fish
010177	Warmouth	*Lepomis gulosus*	Sport Fish
Bedford County and the City of Bedford			
010214	Logperch, Roanoke	*Percina rex*	FE/SE/I
010174	Bass, Roanoke	*Ambloplites cavifrons*	FS/SS Sport Fish/II
010110	Jumprock, bigeye	*Scartomyzon ariommus*	FS/III
010363	Darter, Appalachia	*Percina gymnocephala*	FS/IV
010200	Darter, riverweed	*Etheostoma podostemone*	FS/IV
010109	Sucker, Roanoke hog	*Hypentelium roanokense*	FS/IV
010077	Shiner, bridle	*Notropis bifrenatus*	SS/I
010038	Alewife	*Alosa pseudoharengus*	Sport Fish/IV
010131	Eel, American	*Anguilla rostrata*	-/IV
010188	Bass, largemouth	*Micropterus salmoides*	Sport Fish
010175	Bass, rock	*Ambloplites rupestris*	Sport Fish
010186	Bass, smallmouth	*Micropterus dolomieu*	Sport Fish
010168	Bass, striped	*Morone saxatilis*	Sport Fish
010167	Bass, white	*Morone chrysops*	Sport Fish
010183	Bluegill	*Lepomis macrochirus*	Sport Fish
010123	Bullhead, brown	*Ameiurus nebulosus*	Sport Fish
010124	Bullhead, flat	*Ameiurus platycephalus*	Sport Fish
010122	Bullhead, yellow	*Ameiurus natalis*	
010062	Carp, common	*Cyprinus carpio*	Sport Fish Pest/Nuisance
010125	Catfish, channel	*Ictalurus punctatus*	Sport Fish
010130	Catfish, flathead	*Pylodictis olivaris*	Sport Fish
010120	Catfish, white	*Ameiurus catus*	Sport Fish

010066	Chub, bluehead	*Nocomis leptocephalus*	
010373	Chub, bull	*Nocomis raneyi*	
010103	Chub, creek	*Semotilus atromaculatus*	
010067	Chub, river	*Nocomis micropogon*	
010190	Crappie, black	*Pomoxis nigromaculatus*	Sport Fish
010189	Crappie, white	*Pomoxis annularis*	Sport Fish
010101	Dace, blacknose	*Rhinichthys atratulus*	
010102	Dave, longnose	*Rhinichthys cataractae*	
010060	Dace, mountain redbelly	*Phoxinus oreas*	
010193	Darter, fantail	*Etheostoma flabellare*	
010204	Darter, glassy	*Etheostoma vitreum*	
010198	Darter, johnny	*Etheostoma nigrum*	
010196	Darter, longfin	*Etheostoma longimanum*	
010061	Darter, Roanoke	*Percina Roanoke*	
010213	Darter, shield	*Percina peltata*	
010059	Goldfish	*Carassius auratus*	
010112	Jumprock, black	*Moxostoma cervinum*	
010129	Madtom, margined	*Noturus insignis*	
010099	Minnow, bluntnose	*Pimephales notatus*	
010408	Minnow, eastern silvery	*Hybognathus regius*	
010365	Muskellunge	*Esox masquinongy*	Sport Fish
010166	Perch, white	*Morone Americana*	Sport Fish
010206	Perch, yellow	*Perca flavescens*	Sport Fish
010056	Pickerel, chain	*Esox niger*	Sport Fish
010182	Pumpkinseed	*Lepomis gibbosus*	Sport Fish
010374	Quillback	*Carpiodes cyprinus*	
010114	Redhorse, golden	*Moxostoma erythrurum*	
010116	Redhorse, shorthead	*Moxostoma macrolepidotum*	Sport Fish
010387	Redhorse, silver	*Moxostoma anisurum*	
010113	Redhorse, v-lip	*Moxostoma pappillosum*	
010283	Sculpin, mottled	*Cottus bairdi*	
010041	Shad, gizzard	*Notropis amoenus*	
010080	Shiner, common	*Luxilus cornutus*	
010078	Shiner, crescent	*Luxilus cerasinus*	
010068	Shiner, golden	*Notemigonus crysoleucas*	
010071	Shiner, highfin	*Notropis altipinnis*	
010074	Shiner, rosefin	*Lythrurus ardens*	
010073	Shiner, satinfin	*Cyprinella analostana*	
010091	Shiner, spotfin	*Cyprinella spiloptera*	
010082	Shiner, spottail	*Notropis hudsonius*	
010086	Shiner, swallowtail	*Notropis procne*	
010069	Shiner, white	*Luxilus albeolus*	
010058	Stoneroller, central	*Campostoma anomalum*	
010108	Sucker, northern hog	*Hypentelium nigricans*	
010118	Sucker, torrent	*Moxostoma rhothoecum*	
010105	Sucker, white	*Catostomus commersoni*	Sport Fish
010180	Sunfish, redbreast	*Lepomis auritus*	Sport Fish
010052	Trout, brook	*Salvelinus fontinalis*	Sport Fish
010051	Trout, brown	*Salmo trutta*	Sport Fish
010050	Trout, rainbow	*Oncorhynchus mykiss*	Sport Fish
010216	Walleye	*Stizostedion vitrum vitreum*	Sport Fish
010177	Warmouth	*Lepomis gulosus*	Sport Fish
Campbell County (Including the Towns of Altavista and Brookneal) and the City of Lynchburg			
010353	Darter, Carolina	*Etheostoma collis*	FS/ST/II
010174	Bass, Roanoke	*Ambloplites cavifrons*	FS/SS Sport Fish/II
010115	Sucker, rustyside	*Thoburnia hamiltoni*	FS/SS/III
010200	Darter, riverweed	*Etheostoma podostemone*	FS/IV
010109	Sucker, Roanoke hog	*Hypentelium roanokense*	FS/IV
010131	Eel, American	*Anguilla rostrata*	-/IV
010188	Bass, largemouth	*Micropterus salmoides*	Sport Fish
010186	Bass, smallmouth	*Micropterus dolomieu*	Sport Fish
010168	Bass, striped	*Morone saxatilis*	Sport Fish
010183	Bluegill	*Lepomis macrochirus*	Sport Fish
010034	Bowfin	*Amia calva*	
010123	Bullhead, brown	*Ameiurus nebulosus*	Sport Fish

010124	Bullhead, flat	*Ameiurus platycephalus*	Sport Fish
010062	Carp, common	*Cyprinus carpio*	Sport Fish Pest/Nuisance
010125	Catfish, channel	*Ictalurus punctatus*	Sport Fish
010120	Catfish, white	*Ameiurus catus*	Sport Fish
010066	Chub, bluehead	*Nocomis leptocephalus*	
010373	Chub, bull	*Nocomis raneyi*	
010103	Chub, creek	*Semotilus atromaculatus*	
010106	Chubsucker, creek	*Erimyzon oblongus*	
010190	Crappie, black	*Pomoxis nigromaculatus*	Sport Fish
010101	Dace, blacknose	*Rhinichthys atratulus*	
010102	Dace, longnose	*Rhinichthys cataractae*	
010060	Dace, mountain redbelly	*Phoxinus oreas*	
010193	Darter, fantail	*Etheostoma flabellare*	
010204	Darter, glassy	*Etheostoma vitreum*	
010198	Darter, johnny	*Etheostoma nigrum*	
010061	Darter, Roanoke	*Percina Roanoke*	
010213	Darter, shield	*Percina peltata*	
010211	Darter, stripeback	*Percina notogramma*	
010104	Fallfish	*Semotilus corporalis*	
010112	Jumprock, black	*Moxostoma cervinum*	
010129	Madtom, margined	*Noturus insignis*	
010408	Minnow, eastern silvery	*Hybognathus regius*	
010206	Perch, yellow	*Perca flavescens*	Sport Fish
010056	Pickerel, chain	*Esox niger*	Sport Fish
010182	Pumkinseed	*Lepomis gibbosus*	Sport Fish
010374	Quillback	*Carpiodes cyprinus*	
010114	Redhorse, golden	*Moxostoma erythrurum*	
010116	Redhorse, shorthead	*Moxostoma macrolepidotum*	Sport Fish
010387	Redhorse, silver	*Moxostoma anisurum*	
010113	Redhorse, v-lip	*Moxostoma pappillosum*	
010283	Sculpin, mottled	*Cottus bairdi*	
010041	Shad, gizzard	*Dorosoma cepedianum*	
010072	Shiner, comely	*Notropis amoenus*	
010080	Shiner, common	*Luxilus cornutus*	
010078	Shiner, crescent	*Luxilus cerasinus*	
010074	Shiner, rosefin	*Lythrurus ardens*	
010073	Shiner, satinfin	*Cyprinella analostana*	
010082	Shiner, spottail	*Notropis hudsonius*	
010086	Shiner, swallowtail	*Notropis procne*	
010069	Shiner, white	*Luxilus albeolus*	
010058	Stoneroller, central	*Campostoma anomalum*	
010108	Sucker, northern hog	*Hypentelium nigricans*	
010118	Sucker, torrent	*Moxostoma rhothoecum*	
010105	Sucker, white	*Catostomus commersoni*	Sport Fish
010180	Sunfish, redbreast	*Lepomis auritus*	Sport Fish
Nelson County			
010363	Darter, Appalachia	*Percina gymnocephala*	FS/IV
010131	Eel, American	*Anguilla rostrata*	-/IV
010188	Bass, largemouth	*Micropterus salmoides*	Sport Fish
010175	Bass, rock	*Ambloplites rupestris*	Sport Fish
010186	Bass, smallmouth	*Micropterus dolomieu*	Sport Fish
010183	Bluegill	*Lepomis macrochirus*	Sport Fish
010125	Catfish, channel	*Ictalurus punctatus*	Sport Fish
010066	Chub, bluehead	*Nocomis leptocephalus*	
010373	Chub, bull	*Nocomis raneyi*	
010103	Chub, creek	*Semotilus atromaculatus*	
010067	Chub, river	*Nocomis micropogon*	
010106	Chubsucker, creek	*Erimyzon oblongus*	
010190	Crappie, black	*Pomoxis nigromaculatus*	Sport Fish
010101	Dace, blacknose	*Rhinichthys atratulus*	
010102	Dace, longnose	*Rhinichthys cataractae*	
010060	Dace, mountain redbelly	*Phoxinus oreas*	
010193	Darter, fantail	*Etheostoma flabellare*	
010198	Darter, johnny	*Etheostoma nigrum*	

010196	Darter, longfin	*Etheostoma longimanum*	
010061	Darter, Roanoke	*Percina Roanoke*	
010213	Darter, shield	*Percina peltata*	
010211	Darter, stripeback	*Percina notogramma*	
010104	Fallfish	*Semotilus corporalis*	
010129	Madtom, margined	*Noturus insignis*	
010408	Minnow, eastern silvery	*Hybognathus regius*	
010283	Sculpin, mottled	*Cottus bairdi*	
010080	Shiner, common	*Luxilus cornutus*	
010068	Shiner, golden	*Notemigonus crysoleucas*	
010074	Shiner, rosefin	*Lythrurus ardens*	
010087	Shiner, rosyface	*Notropis rubellus*	
010073	Shiner, satinfin	*Cyprinella analostana*	
010082	Shiner, spottail	*Notropis hudsonius*	
010086	Shiner, swallowtail	*Notropis procne*	
010058	Stoneroller, central	*Campostoma anomalum*	
010108	Sucker, northern hog	*Hypentelium nigricans*	
010118	Sucker, torrent	*Moxostoma rhothoecum*	
010105	Sucker, white	*Catostomus commersoni*	Sport Fish
010180	Sunfish, redbreast	*Lepomis auritus*	Sport Fish
010052	Trout, brook	*Salvelinus fontinalis*	Sport Fish
010051	Trout, brown	*Salmo trutta*	Sport Fish
010050	Trout, rainbow	*Oncorhynchus mykiss*	Sport Fish
010177	Warmouth	*Lepomis gulosus*	Sport Fish

Source: http://vafwis.org/fwis/?Menu=Home.Species+Information

4.2.3 River Segments that have Recreational Significance including Scenic River Status

Information on river segments with recreational significance, including state scenic river status, was collected from DCR. DCR has established the Virginia Scenic River System. The intent of this program is to identify, designate, and help protect rivers and streams that possess outstanding scenic, recreational, historic, and natural characteristics of statewide significance for future generations. A focus of the program is to enhance the conservation and wise use of scenic rivers and their attendant corridors. Based on a review of the Scenic Rivers Map of Virginia, segments of the following (see table below) are designated or potential scenic rivers. However, according to a representative from DCR, the segment of the Roanoke River from Shawsville to Smith Mountain Lake is no longer considered scenic, though the on-line data has not been updated, the GIS layer (as is presented on Figure 4.2.3) is accurate. A river component identified as desirable is one that has been evaluated and found worthy of the scenic designation but has not been legislatively designated. A river component identified as potential is one that has been identified as being worthy of future study. A map showing scenic rivers in the region is included as Figure 4.2.3.

Figure 4.2.3 – Designated Scenic Rivers Map

Table 4.2.3A Virginia's Scenic Rivers

River	Designated Reach	City/County	Status
Appomattox River	Rte. 612 to Rte. 608	Appomattox	Scenic
James River	Lynchburg to Wingina	Amherst, Campbell, City of Lynchburg, Nelson	Potential
James River	Wingina to Maidens	Nelson	Desirable
Roanoke River*	Shawsville to Smith Mtn. Lake	Bedford	Scenic
Rockfish River	Rte. 693 at Schuyler to confluence with James River	Nelson	Scenic
Staunton River	Town of Altavista to Long Island	Campbell	Scenic

Source:http://www.dcr.virginia.gov/recreational_planning/documents/srlist.pdf
http://www.dcr.virginia.gov/recreational_planning/documents/srmap.pdf
*As noted in the preceding paragraph, according to a representative from DCR, the segment of the Roanoke River from Shawsville to Smith Mountain Lake is no longer considered scenic though on-line data has not been updated. The information is presented in this table as it was documented on the source page.

Additionally, the National Park Service maintains a Nationwide Rivers Inventory as part of the Rivers, Trains, and Conservation Assistance program. The list of Virginia Segments with noted significance includes the following river segments.

Table 4.2.3B Rivers, Trails & Conservation Program - River Segments

River	Locality	Year Listed/updated	Significance
Appomattox River	Appomattox County	1982	Wild Historic
Big Otter River	Bedford County/Campbell County	1982	Geologic Botanic
Big Otter River	Bedford County	1982	Hydrologic
Cub Creek	Appomattox County	1982	Historic Geologic
Falling River	Appomattox County/Campbell County	1982	Historic Geologic
Roanoke River	Campbell County	1982	Historic Geologic
Rucker Run	Nelson County	1982	Geologic
Tye River	Nelson County	1982	Geologic Botanic

Source: http://www.nps.gov/ncrc/programs/rtca/nri/states/va.html

4.2.4 Site of Historic or Archaeological Significance

The National Register of Historic Places (NRHP) is the Nation's official list of cultural resources worthy of preservation. Authorized under the National Historic Preservation Act (NHPA) of 1966, the NRHP is part of a national program to coordinate and support public and private efforts to identify, evaluate and protect historic and archaeological resources. Properties listed in the NRHP include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture.

The Virginia Department of Historic Resources (DHR) protects Virginia's significant historic, architectural, archaeological, and cultural resources. Under Federal law a historic property is any district, site, building, structure, or object that meets the criteria for listing on the NRHP. The National Register is a list established by the NHPA of 1966, as amended, to recognize properties for their significance in history, architecture, archaeology, engineering, or culture. Under state law a historic property is any district, site, building, structure, or object designated by the Virginia Board of Historic Resources for listing on the Virginia Landmarks Register. The criteria are the same as those used for the National Register.

The Virginia Landmarks Register (VLR), established in 1966, is managed by the DHR. It is the State's official list of properties important to Virginia's history. The same criteria used by the DHR are used to evaluate resources for inclusion in the Virginia Landmarks Register.

Table 4.2.4 Summary of Historic Sites

Name of Historic Site	City/Town	Quadrangle	VLR Listing	NRHP Listing	NRHP File #
Amherst County (Including the Town of Amherst)					
Sweet Briar House	Amherst	Amherst	7/7/70	9/15/70	005-0018
Winton	Clifford	Piney River	11/20/73	5/2/74	005-0021
Red Hill Farm	Pedlar Mills	Big Island	3/18/80	6/9/80	005-0014
Geddes	Clifford	Arrington	10/19/82	2/24/83	005-0007
Fort Riverview	Madison Heights	Kelly	4/18/89	11/16/89	005-0185
Sweet Briar College Historic District	Sweet Briar	Amherst	1/15/95	3/30/95	005-0219
Bear Mountain Indian Mission School	Amherst	Tobacco Row Mtn.	9/18/96	2/21/97	005-0230
Mountain View (Spencer Plantation)	Clifford	Arrington	9/18/96	9/3/97	005-0011
Hite Store	Lowesville	Lowesville	3/19/97	6/6/97	005-0058
Tusculum	Amherst	Arrington/Amherst	9/8/04	11/19/04	005-0020
Brick House (Garland House)	Clifford	Piney River	12/07/05	2/1/06	005-0002
Edgewood	Amherst	Amherst	6/8/06	8/16/06	163-0003
Oak Lawn	Madison Heights	Lynchburg	6/8/06	9/6/06	005-5029
Forest Hill	-	Piney River	12/6/06	3/22/07	005-0108
Speed the Plough	-	Tobacco Row Mtn.	3/7/07	4/30/07	005-0040
Edgewood (Boulder Springs)	Amherst	Forks of Buffalo	12/5/07	Pending	005-0158
Appomattox County (Including the Towns of Appomattox and Pamplin)					
Appomattox Courthouse National Historical Park	Appomattox	Vera	7/6/71	10/15/66	006-0033
Pamplin Pipe Factory	Pamplin	Pamplin	6/17/80	11/25/80	277-0002

Appomattox Historic District	Appomattox	Appomattox	9/12/01	5/16/02	165-5002
Appomattox River Bridge	Appomattox	Vera	6/1/05	7/27/05	006-0048
Bedford City					
Bedford Historic Meeting House	Bedford	Bedford	9/20/77	1/31/78	141-0005
Bedford Historic District	Bedford	Bedford	8/21/84	10/4/84	141-0073
Burkes-Guy-Hagan House	Bedford	Bedford	9/17/85	12/19/85	141-0027
Avenel	Bedford	Bedford	12/11/91	1/30/92	141-0001
Ballard-Worsham House	Bedford	Bedford	9/17/97	12/12/97	141-0014
Bedford County					
Poplar Forest	Lynchburg	Forest	5/13/69	11/12/69	009-0027
Three Otters	Bedford	Bedford	7/7/70	9/15/70	009-0031
Fancy Farm	Bedford	Peaks of Otter	7/6/71	1/7/72	009-0007
New London Academy	Forest	Forest	12/21/71	4/13/72	009-0047
Elk Hill	Forest	Boonsboro	11/21/72	4/2/73	009-0006
Woodbourne	Forest	Forest	4/17/73	7/2/73	009-0033
Old Rectory (Saint Stephen's)	Perrowville	Boonsboro	9/16/73	7/24/73	009-0056
Hope Dawn	Lynchburg	Lynchburg/Tobacco Row Mtn.	9/17/74	10/9/74	009-0043
Saint Stephen's Episcopal Church	Forest	Boonsboro	8/13/85	11/07/85	009-0029
Bellvue	Goode	Forest	8/15/89	12/19/90	009-0003
Locust Level	Montvale	Montvale	8/21/90	12/21/90	009-0018
Mount Airy	Leesville	Leesville	10/16/90	12/19/90	009-0221
Cifax Rural Historic District	Cifax	Sedalia	8/21/91	2/20/92	009-0254
Rothsay	Forest	Forest	2/28/92	10/30/92	009-0065
Bowling Eldridge House	Moved from Halifax County	Lynchburg	6/19/93	8/12/93	009-5283
Brook Hill Farm	Forest	Goode/Forest	9/18/96	6/6/97	009-0318
Big Otter Mill	Bedford	Peaks of Otter	9/14/98	10/30/98	009-0152
New Prospect Church	Bedford	Montvale	6/16/99	3/31/00	009-5211
Otterburn	Bedford	Goode	12/6/00	2/16/01	009-0024
Twin Oaks Farm	-	Montvale	3/14/01	7/5/01	009-5273
Thomas Methodist Episcopal Chapel	Thaxton	Montvale	6/16/04	8/11/04	009-0178
Bellevue Rural Historic District	Forest	Forest/Goode	10/14/05	11/30/05	009-5296
Pleasant View	Forest	Forest	9/6/06	11/15/06	009-0207
Olive Branch Missionary Baptist Church	-	Goodview	3/7/07	5/4/07	009-0135
Campbell County (Including the Towns of Altavista and Brookneal)					
Green Hill	Long Island	Long Island	9/9/69	11/12/69	015-0005
Mount Athos	Kelly	Kelly	2/18/75	7/24/75	015-0019
Blenheim (BI)	Spring Mills	Mike	2/15/77 (3/10/94)	5/31/79 (5/26/94)	015-0066
Cat Rock Sluice of the Roanoke Navigation	Brookneal	Brookneal	12/20/77	3/25/80	015-0217
Shady Grove	Gladys	Gladys	5/18/82	8/26/82	015-0013
Campbell County Courthouse	Rustburg	Rustburg	6/16/81	10/29/81	015-0001
Avoca	Altavista	Lynch Station	3/16/82	9/16/82	015-0378
Federal Hill	Forest	Forest	5/18/82	9/9/82	015-0003
Norfolk Southern Six Mile Bridge No. 58	Lynchburg	Kelly	8/28/95	10/12/95	015-0352
Walnut Hill	Lynchburg	City Farm	12/1/99	1/28/00	015-5012
Oak Grove	Altavista	Altavista	12/5/01	5/16/02	015-5103
Lynchburg City					
Academy of Music	Lynchburg	Lynchburg			
Point of Honor	Lynchburg	Lynchburg	11/5/68	6/11/69	118-0001
Lynchburg Courthouse	Lynchburg	Lynchburg	12/2/69	2/26/70	118-0014
Garland Hill Historic District	Lynchburg	Lynchburg	4/18/72	5/19/72	118-0002
Old City Cemetery	Lynchburg	Lynchburg	8/15/72	9/7/72	118-0026
Western Hotel (Joseph Nichol's Tavern)	Lynchburg	Lynchburg	9/19/72	4/2/73	118-0027
Quaker Meeting House	Lynchburg	Lynchburg	6/18/74	7/22/74	118-0020

Miller-Claytor House	Lynchburg	Lynchburg	10/21/75	5/6/76	118-0012
Anne Spences House	Lynchburg	Lynchburg	9/21/76	12/6/76	118-0061
Carter Glass House	Lynchburg	Lynchburg	2/15/77	12/8/76	118-0006
Main Hall, Randolph Macon Woman's College	Lynchburg	Lynchburg	2/26/79	6/19/79	118-0149
Diamond Hill Historic District (Extension)	Lynchburg	Lynchburg	5/15/79 (4/19/83)	10/1/79 (4/14/83)	118-0060
Aviary	Lynchburg	Lynchburg	4/15/80	7/30/80	118-0155
Federal Hill Historic District	Lynchburg	Lynchburg	5/20/80	9/17/80	118-0056
Jones Memorial Library	Lynchburg	Lynchburg	7/31/80	10/30/80	118-0153
Court Street Baptist Church	Lynchburg	Lynchburg	6/16/81	7/8/82	118-0156
Sandusky House	Lynchburg	Lynchburg	2/16/82	7/26/82	118-0017
J.W. Wood Building	Lynchburg	Lynchburg	5/18/82	2/17/83	118-0009
Daniel's Hill Historic District	Lynchburg	Lynchburg	2/14/82	2/24/83	118-0198
First Baptist Church	Lynchburg	Lynchburg	4/21/81	9/9/82	118-0025
Saint Paul's Church	Lynchburg	Lynchburg	4/21/81	9/9/82	118-0196
Rosedale (BI)	Lynchburg	Lynchburg	10/19/82 (12/11/91)	7/7/83 (4/10/92)	118-0201
Allied Arts Building	Lynchburg	Lynchburg	4/16/85	12/19/85	118-0110
Kentucky Hotel (Langhorne-Terrell House)	Lynchburg	Lynchburg	6/17/86	12/11/86	118-0177
Montview	Lynchburg	Lynchburg	12/9/86	6/5/87	118-0210
Lower Basin Historic District (BI)	Lynchburg	Lynchburg	10/14/86 (6/13/01)	4/24/87 (6/6/02)	118-0211
James River and Kanawha Canal Sites	Lynchburg	Lynchburg	12/11/84	-	118-0209
Bragassa Toy Store	Lynchburg	Lynchburg	8/21/90	1/11/91	118-0176
Locust Grove	Lynchburg	Boonsboro/ Lynchburg	6/19/91	12/17/92	118-0219
Virginia Episcopal School	Lynchburg	Lynchburg	6/17/92	10/28/92	118-0224
Samuel Miller House	Lynchburg	Lynchburg	9/15/92	11/12/92	118-0223
John Marshall Warwick House	Lynchburg	Lynchburg	12/6/95	12/6/96	118-0019
St. Paul's Vestry House	Lynchburg	Lynchburg	12/4/96	2/21/97	118-0078
Lynchburg Hospital	Lynchburg	Lynchburg	9/15/99	12/9/99	118-5160
Rivermont	Lynchburg	Lynchburg	12/1/99	5/11/00	118-0203
Centerview	Lynchburg	Lynchburg	9/13/00	12/1/00	118-5062
Court House Hill (Downtown Historic District) (BI)	Lynchburg	Lynchburg	12/6/00 (9/11/02)	8/16/01 (Pending)	118-5163
Fort Early & Jubal Early Monument	Lynchburg	Lynchburg	6/13/01	1/24/02	118-5162
Dr. Robert Walter Johnson House and Tennis Court	Lynchburg	Lynchburg	6/13/01	1/24/02	118-0225-0077
Lynch's Brickyard House	Lynchburg	Lynchburg	12/5/01	3/13/02	118-0226-0178
William Phaup House	Lynchburg	Lynchburg	12/5/01	3/13/02	118-0226-0246
Rivermont Historic District	Lynchburg	Lynchburg	12/4/02	4/11/03	118-0334
Pyramid Motors	Lynchburg	Lynchburg	9/5/07	11/0/07	118-5237
Presbyterian Orphans Home	Lynchburg	Lynchburg	12/5/07	Pending	118-5240
Nelson County					
Swannanoa	Waynesboro	Waynesboro East	5/16/78	10/1/69	062-0022
Nelson County Courthouse	Lovingston	Lovingston	4/17/73	5/17/73	062-0009
Oak Ridge Railroad Overpass	Shipman	Shipman	11/15/77	4/15/78	062-0085
Bon Aire	Shipman	Howardsville	4/15/80	7/30/80	062-0089
Montezuma	Norwood	Shipman	4/15/80	7/30/80	062-0010
River Bluff	Wintergreen	Sherando	5/20/80	7/30/80	062-0088
Soldier's Joy	Wingina	Howardsville	4/15/80	11/28/80	062-0015
Woodson's Mill	Lowesville	Piney River	10/21/92	12/17/92	062-0093
Lovingston High School	Lovingston	Arrington	3/13/02	6/23/03	062-5003
Hamner House	-	Schuyler	9/8/04	Pending	062-0282
Lovingston Historic District	Lovingston	Lovingston	9/14/05	11/9/05	062-5108
Wintergreen Country Store	Nellysford	Sherando	9/14/05	11/9/05	062-0117
Edgewood	Wingina	Howardsville	3/8/06	5/2/06	062-0004
Mitchell's Brick House Tavern (Oakland)	Arrington	Arrington	3/8/06	5/3/06	062-0052
Schuyler Historic District	Schuyler	Schuyler	6/8/06	3/21/07	062-5002

Tyro Mill	Tyro	Massies Mill	6/8/06	8/30/06	062-0028
Elk Hill	Nellysford	Sherando/ Horseshoe Mtn.	12/6/06	3/27/07	062-0005

Source:http://www.dhr.virginia.gov/registers/RegisterMasterList.pdf, http://www.nr.nps.gov/

The Virginia Council on Indians (VCI) is a subcommittee of the National Association of Tribal Historic Preservation Officers created by the General Assembly to gain knowledge of the historic dealings and relationship between the Commonwealth of Virginia and the Virginia Indian Tribes. The Council's duties include studies and research regarding the Indian Tribes in Virginia and making recommendations to the Commonwealth on issues regarding Virginia Indians. A list of the Indian Tribes is available through the VCI.

- The Monacan Indian Nation is a State recognized tribe in Amherst County. The tribe currently owns land on Bear Mountain and other nearby properties, which include the Bear Mountain Indian Mission School, circa 1870, registered on the VLR and NRHP (Tobacco Row Mountain Quadrangle). (Source: http://indians.vipnet.org/tribes.cfm)

4.2.5 Unusual Geologic Formations or Special Soil Types

DCR-NHR tracks natural heritage resources as noted in section 4.2.1. The natural heritage resources includes unusual geologic features, primarily cave and karst resources. No cave and karst resources are identified within Region 2000. DCR is currently not tracking geologic resources other than cave and karst features.

Active and Inactive Mine Sites

Because of their potential impact to natural resources by stream sedimentation from un-vegetated soils, acid drainage tailings and waste piles, groundwater degradation, and waste dumps, active and inactive mines were reviewed and mapped. Information on Virginia's Economic Geology (mineral resources) was provided by the Department of Mines, Minerals and Energy (DMME) – Division of Geology and Mineral Resources. Primary mineral resources in the Blue Ridge Physiographic Province includes industrial minerals feldspar, phosphate, and kaolin; metals iron, manganese, copper, and titanium; building stone soapstone; and aggregate. Primary mineral resources in the Piedmont Physiographic Province includes industrial minerals feldspar, mica, kyanite, vermiculite, and barite; metals iron, manganese, copper, gold, pyrite, and tungsten; building stone granite, slate, and marble; and aggregate.

Active mines within Region 2000 include open pit, quarry, dredge, and dragline type mines. There are five active mines in Amherst County (clay, aplite, sand), one in Appomattox County (limestone), eight in Bedford County (sand and gravel, granite, limestone, quartz sand), eight in Campbell County (sand, marble, limestone, sandstone, greenstone), and one in Nelson County (soapstone). Active and inactive mines are mapped on Figure 4.2.5 for the region. Not all mine locations have been field verified by DMME and are considered approximate.

Inactive mines include adit, pit, quarry, shaft, dredge, and prospect mines. Some adits and shafts have collapsed and are under review by DMME. Primary commodities of inactive mines include the following:

- Amherst County – slate, iron, silica, clay, soapstone, copper, manganese, quartz, marble, granite, titanium, feldspar, gold, shale, and quartzite.
- Appomattox County – feldspar, granite, gold, manganese, iron, limestone, copper, quartzite, granite gneiss, and marble.
- Bedford County – sand and gravel, granite, mica, asbestos, gold, feldspar, clay, greenstone, vein quartz, barite, iron, limestone, and slate.
- Campbell County – iron, manganese, barite, asbestos, limestone, vein quartz, sand and gravel, copper, quartzite, greenstone, granite, gold, and marble.
- Nelson County – silver, fill, kaolin, lead, metasandstone, phosphate, schist, feldspar, soapstone, manganese, limestone, copper, sandstone, saprolite, iron, titanium, gold, granite, garnet, sand and gravel, quartzite, and marble.

In 1996, the General Assembly of Virginia amended state statutes governing localities' comprehensive planning to include mineral resources among the key considerations in planning for future growth. To aid in this process, DMME initiated a program to deliver geologic and mineral resource information to the counties, municipalities, and regional planning authorities. This information is not included in this water supply plan.

Figure 4.2.5 – Mine Site Maps

Urban Soils

Urban soils are found in watersheds that provide drinking water, food, waste utilization, and natural resources to communities according to USDA NRCS. Urban soils can also be located in city park areas, recreational areas, community gardens, green belts, lawns, septic absorption fields, sediment basins, and other uses. Urban lands are altered, reworked, or removed soil material. Commercial, industrial, and residential developments cover much of the surface of soils defined as Urban. Also, soils may be classified as Udorthents. These are categorized as excavations or fill material. The USDA NRCS web soil survey identifies the acreage of urban soils for each county as presented in the following table.

Table 4.2.5 Urban Soils

Survey Area	Unit Name	Acreage in Survey Area	Percent of Survey Area
Amherst including the Town of Amherst	Udorthents, smoothed	856	0.3
Appomattox County including the Towns of Appomattox and Pamplin	Udorthents-Urban Land Complex 0-15% slopes	317	0.1
Bedford County	None Listed		
City of Bedford	Udorthents, loamy	4	<0.1
City of Bedford	Urban Land	353	8.2
Campbell County including the City of Lynchburg and the Towns of Altavista and Brookneal	Urban Land	4,792	1.3
Campbell County including the City of Lynchburg and the Towns of Altavista and Brookneal	Urban Land – Cecil Complex, sloping	205	<0.1
Campbell County including the City of Lynchburg and the Towns of Altavista and Brookneal	Urban Land – Cullen Complex	272	<0.1
Campbell County including the City of Lynchburg and the Towns of Altavista and Brookneal	Urban Land – Madison Complex	1,022	0.3
Nelson County	Udorthents, smoothed	117	<0.1

Source: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

4.2.6 Wetlands

The National Wetlands Inventory (NWI) is a department under the U.S. Fish and Wildlife Service (FWS), a bureau of the U.S. Department of Interior. NWI produces and provides information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats and other wildlife habitats.

The following definition is used by the FWS for conducting the National Wetlands Inventory (NWI): "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year." Hydrophytes are plants capable of growing in water or waterlogged soils/substrates; hydric soils are waterlogged soils that support plant growth; and nonsoil is a nonvegetated substrate like a mudflat or rock outcrop. This is different than the federal regulatory definition of a wetland, which is used to identify wetlands subject to federal regulations under the Clean Water Act. The federal regulatory ndefinition includes only vegetated wetlands.

To categorize wetland plants, the federal government has compiled a list with plants identified based on four different classifications based on expected frequency to occur in wetlands (obligate, facultative wetlands species, facultative species, and facultative upland species). This list contains approximately 7,000 plant species. The NWI is also compiling a Plant Database based on technical literature that contains habitat information on approximately 5,200 plant species that have the potential to occur in wetlands. When completed, this computerized database will be available to all governmental agencies; however, this database is not currently active. Due to the vast nature of the plant databases, identification of specific local and regional wetlands plants is not included in this report.

Hydric soils form under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils are important in land-use planning, conservation planning, and assessment of potential wildlife habitat. A combination of hydric soil, hydrophytic vegetation, and hydrologic properties define wetlands. Therefore, hydric soils may be an indicator or potential wetlands. Hydric soils are identified in Amherst, Appomattox, Bedford, and Nelson counties as listed in the following table.

Table 4.2.6 Hydric Soils

Unit Name	Component Name	Map Unit	Percent Composition	Landforms	Hydric Criteria[1]
Amherst County (Including the Town of Amherst)					
Colleen loam (2-7% slopes)	Pineywoods	22 8B	1	Hillslopes, swales	2B3
Colleen loam (7-15% slopes)	Pineywoods	22 8C	1	Hillslopes, swales	2B3
Combs loam (0-3% slopes)	Yogaville	25 9A	5	Flood plains	2B3
Craigsville very cobbly sandy loam (0-3% slopes)	Poorly drained soils	27 11A	5	Backswamps, flood plains	2B3
Pineywoods silt loam (0-2% slopes)	Pineywoods	70 11A	85	Hillslopes	2B3
Pineywoods silt loam (2-7% slopes)	Pineywoods	71 27B	85	Hillslopes	2B3
Sindion-Yogaville complex (0-3% slopes)	Yogaville	80 31A	40	Flood plains	2B3
Sketerville silt loam (2-7% slopes)	Pineywoods	81 32B	1	Hillslopes, swales	2B3
Speedwell loam (0-3% slopes)	Yogaville	82 33A	5	Flood plains	2B3
Appomattox County (Including the Towns of Appomattox and Pamplin)					
Altavista loam (0-2% slopes)	Wehadkee	0 1A	2	Flood plains	2B3, 4
Altavista loam (0-2% slopes)	Yogaville	0 1A	3	Flood plains	2B3
Batteau loam (0-2% slopes)	Yogaville	3 3A	3	Flood plains	2B3
Chewacla loam (0-2% slopes)	Wehadkee	8 6A	3	Flood plains	2B3, 4
Riverview loam (0-2% slopes)	Wehadkee	32 20A	2	Flood plains	2B3, 4
State loam (0-2% slopes)	Wehadkee	33 21A	2	Flood plains	2B3, 4
Wehadkee loam (0-2% slopes)	Wehadkee	47 29A	90	Backswamps, flood plains	2B3, 4
Wingina loam (0-2% slopes)	Yogaville	48 30A	3	Flood plains	2B3

Yogaville loam (0-2% slopes)	Yogaville	49 31A	90	Backswamps, flood plains	2B3
Bedford County and City of Bedford					
Altavista fine sandy loam (2-7% slopes)	Wet spots	0 1B	5	Depressions	2B3, 4
Chewacla loam (0-2% slopes)	Wet spots	15 8A	5	Depressions	2B3, 4
Toccoa sandy loam (0-2% slopes)	Frequently flooded	74 32A	5	Flood plains	4
Nelson County					
Batteau loam (0-2% slopes)	Yogaville	2 2A	5	Depressions, flood plains	2B3
Belvoir sandy loam (2-7% slopes)	Chatuge	3 3B	3	Fans, terraces	2B3
Chatuge loam (1-4% slopes)	Chatuge	11 7B	85	Fans, terraces	2B3
Codorus silt loam (0-2% slopes)	Hatboro	12 8A	5	Depressions, flood plains	2B3
Colleen gravelly loam (2-7% slopes)	Pineywoods	13 9B	3	Mountain slopes	2B3
Craigsville very cobbly loam (0-2% slopes)	Hatboro	17 11A	5	Depressions, flood plains	2B3
Delanco loam (7-15% slopes)	Chatuge	19 12C	3	Fans, terraces	2B3
Galtsmill fine sandy loam (0-2% slopes)	Yogaville	36 19A	3	Depressions, flood plains	2B3
Hatboro loam (0-2% slopes)	Hatboro	38 21A	85	Depressions, flood plains	2B3
Pineywoods silt loam (0-2% slopes)	Pineywoods	79 37A	85	Mountain slopes	2B3
Sketerville silt loam (2-7% slopes)	Pineywoods	86 41B	3	Mountain slopes	2B3
Suches loam (0-2% slopes)	Hatboro	90 43A	5	Depressions, flood plains	2B3
Wingina loam (0-2% slopes)	Yogaville	109 51A	3	Depressions, flood plains	2B3
Yogaville loam (0-2% slopes)	Yogaville	117 55A	85	Depressions, flood plains	2B3

Source: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

1. 2B3 – Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Andic, Vitrandic, and Pachic subgroups, or Cumulic subgroups that are poorly drained or very poorly drained and have water table at less than or equal to 1.0 ft from the surface during the growing season if permeability is less than 6.0 in/h in any layer within 20 in.
   4 – Soils that are frequently flooded for long duration or very long duration during the growing season.

Soils maps can be reviewed on-line through the USDA NRCS Web Soil Survey to help identify site specific soils.

NWI maps are compiled through photointerpretation techniques with limited field checking. Soil survey reports provide information on soil types and location specific to a region based on more extensive field investigations (i.e. hydric soils discussed previously). The combination of NWI maps and soil survey data present valuable information relative to wetlands. Current NWI mapping (Figures 4.2.6.1A through 4.2.6.5A) indicates wetlands in all municipalities throughout Region 2000. Hydric soils, as discussed above, are mapped on Figures 4.2.1.6B through 4.6.1.5B for the region. Based on NWI mapping the following acreages of wetlands were estimated: Amherst County (including the Town of Amherst) – 111.46 acres; Appomattox County (including the Towns of Appomattox and Pamplin) – 257.16 acres; Bedford County – 134.96 acres; City of Bedford – 0.99 acres; Campbell County (including the Towns of Altavista and Brookneal) – 244.12 acres; City of Lynchburg – 11.17 acres; and Nelson County – 124.02 acres.

Figure 4.2.6.1A – Amherst County Wetland Map

Figure 4.2.6.1B – Amherst County Hydric Soil Map

Figure 4.2.6.2A – Appomattox County Wetland Map

Figure 4.2.6.2B – Appomattox County Hydric Soil Map

Figure 4.2.6.3A – Bedford County Wetland Map

Figure 4.2.6.3B – Bedford County Hydric Soil Map

Figure 4.2.6.4A – Campbell County Wetland Map

Figure 4.2.6.4B – Campbell County Hydric Soil Map

Figure 4.2.6.5A – Nelson County Wetland Map

Figure 4.2.6.5B – Nelson County Hydric Soil Map

4.2.7 Riparian Buffers or Conservation Easements

Riparian Forest Buffers

The Virginia Department of Forestry (DOF) provides information regarding the states forest cover as environmental and economic benefits, which include economic income and employment, water quality protection, habitat protection, and recreational opportunities. Conservation of Virginia's forestland is a primary goal of the DOF. Current forested areas in each County are presented on the land use maps as Figures 4.2.8.1 through 4.2.8.5. Riparian buffers are forested areas along stream banks. These buffers filter nutrients, sediments, and other pollutants before they can enter a waterway while also acting as habitats for plants and animals.

Conservation Easements

DCR has established the Virginia Natural Heritage Program (VANHP), which represents a comprehensive effort to save Virginia's native plant and animal life and the ecosystem upon which they depend through inventory, conservation information provision, protection, and stewardship. The VANHP has defined Natural Heritage Resources, or NHR's, as rare plant and animal species, rare and exemplary natural communities, and significant geologic features. The VANHP established the Virginia Conservation Lands Database, which is the Commonwealth's first comprehensive, continually maintained GIS data layer for Virginia's protected conservation lands. The database includes mapped boundaries and attributes for public and certain private lands having various conservation, recreation, and open space roles. Most federal, state, regional, and interstate lands are included, such as water and park authorities, parks and undeveloped or partially-developed lands owned by localities, lands owned as preserves by nonprofit conservation organizations, conservation easements held by the Virginia Outdoors Foundation (VOF), and land trusts. A map showing the major conservation lands for the region is presented as Figure 4.2.7.

Additionally, the VOF maintains open-space easements across the Commonwealth. VOF easements are identified on the conservation lands map (Figure 4.2.7). The open-space easement is a legally documented agreement between a landowner and a public body, such as the VOF. The easements limit property development rights to protect natural and cultural resources. The following easements and acreages are maintained by the VOF at this time.

Figure 4.2.7 – Major Conservation Land Maps

Table 4.2.7 VOF Easements

Locality	# of Easements	Acreage
Amherst County including the Town of Amherst	19	3,748.75
Appomattox County including the Towns of Appomattox and Pamplin	4	781.03
Bedford County	21	3,979.15
City of Bedford	1	44.92
Campbell County including the Towns of Altavista and Brookneal	10	3,044.21
City of Lynchburg	1	39.00
Nelson County	30	8,188.73

Source: http://www.virginiaoutdoorsfoundation.org/VOF_pub-bycounty.php

4.2.8 Land Use and Land Coverage

Figures 4.2.8.1 through 4.2.8.5 illustrate land use and land cover information for each of the municipalities in Region 2000.

Figure 4.2.8 – Land Use and Land Cover

Figure 4.2.8.1 – Amherst County Land Use/ Land Cover Map

Figure 4.2.8.2 – Appomattox County Land Use/ Land Cover Map

Figure 4.2.8.3 – Bedford County Land Use/ Land Cover Map

Figure 4.2.8.4 – Campbell County Land Use/ Land Cover Map

Figure 4.2.8.5 – Nelson County Land Use/ Land Cover Map

4.2.9 Presence of Impaired Streams and Type of Impairment

The DEQ, the State Water Control Board, and the USEPA regulate water resources and water pollution in Virginia. They administer programs created by the federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), the Federal Water Quality Act, and a 1984 amendment to RCRA. The DEQ conducts and compiles Water Quality Assessments for surface waterways throughout the state. As part of the assessment, monitoring reports are compared to numerical water quality standards to determine if the waterway is impaired. Each waterway that falls below certain water quality standards are identified on either a 305(b) or 303(d) report. The Final 305(b)/303(d) Water Quality Assessment Integrated Report was released on October 30, 2006. Current assessments for 2008 have not yet been completed. The Integrated Report satisfies the requirements of the U.S. Clean Water Act sections 305(b) and 303(d) and the Virginia Water Quality Monitoring, Information, and Restoration Act. The following information is compiled/excerpted from the 2006 Integrated Report. Figure 4.2.9 illustrates the impaired water segments throughout the region.

Figure 4.2.9 – Impaired Streams Map

The cities, counties, and towns included in Region 2000 are located in two river basins, the James River Basin and the Roanoke River Basin. All or portions of Amherst, Appomattox, Bedford, Campbell, and Nelson counties are included in the James River Basin including the City of Lynchburg. Portions of Appomattox, Bedford, and Campbell counties are included in the Roanoke River Basin including the City of Bedford. The following table is a summary of the impaired waters in each river basin within Region 2000.

Table 4.2.9 Impaired Waters Summary

Locality	Type of Impairment	Number of Water Bodies Affected
James River Basin		
Amherst County including the Town of Amherst	Escherichia coli	4
	Fecal coliform	9
	PCBs in Fish Tissue	11
	pH	3
Appomattox County including the Towns of Appomattox and Pamplin	Escherichia coli	3
	Fecal coliform	3
Bedford County	Escherichia coli	1
	PCBs in Fish Tissue	4
Campbell County including the Towns of Altavista and Brookneal	Fecal coliform	2
	PCBs in Fish Tissue	2
City of Lynchburg	Escherichia coli	4
	Fecal coliform	7
	PCBs in Fish Tissue	4
Nelson County	Escherichia coli	3
	Fecal coliform	7
	PCBs in Fish Tissue	2
	pH	1
	Benthic-macroinvertibrate bioassessments (stream)	2
	Temperature	2
Roanoke River Basin		
Appomattox County including the Towns of Appomattox and Pamplin	Escherichia coli	1
	Fecal coliform	1
City of Bedford	Benthic-macroinvertibrate bioassessments (stream)	1
Bedford County	Escherichia coli	7
	Fecal coliform	8
	PCBs in Fish Tissue	9
	pH	1
	Benthic-macroinvertibrate bioassessments (stream)	4
	Dissolved Oxygen	1
Campbell County including the Towns of Altavista and Brookneal	Escherichia coli	11
	Fecal coliform	4
	PCBs in Fish Tissue	7
	pH	1

http://www.deq.virginia.gov/wqa/ir2006.html

4.2.10 Location of Point Source Discharges

Information on point source discharges in the region was collected from the USEPA Environfacts Data Warehouse (EDW) and DEQ Databases. A National Pollution Discharge Elimination System (NPDES) permit is required for all facilities which discharge pollutants from any point source into waters of the United States. For Virginia, this includes stormwater discharges from industrial facilities. Exclusions include vessels, runoff from fields and orchards, return flows from irrigation, land disposal of pollutants permitted by other Virginia programs, and discharges into otherwise permitted treatment systems. The Virginia Pollution Discharge Elimination System (VPDES) Permit Program is regulated under 9 VAC 25-31 and is monitored and maintained by DEQ. VPDES permits are the state equivalent of the NPDES permit and permit identification is the same.

The EDW contains data of EPA-Regulated Facilities with permitted discharges to water. The database compiles information from the Permit Compliance System (PCS), the Safe Drinking Water Information System (SDWIS), and the National Contaminant Occurrence Database. Specifically, the PCS allows a review of information relative to permit issuance and expiration, and discharge and monitoring data. A copy of the PCS listings for each jurisdiction in the region is outlined in the following table. DEQ databases for point source dischargers in the region were provided by DEQ personnel and the information is Table 4.2.10 below. The DEQ databases and EPA EDW were crosschecked.

Table 4.2.10 Active NPDES/VPDES Permits (Point Source Discharges)

Permit #*	Facility Name	Town/City	Type
Amherst County (Including the Town of Amherst)			
VAG840063	Boxley Material Co.	Arrington (Quarry is located in Amherst County)	Non-metallic Mineral Mining
VA0006050	Amherst Co. Service Authority	Madison Heights	Minor Industrial
VA0063657	Amherst Co. Service Authority	Madison Heights	Minor Municipal
VA0082546	Amherst Co. Service Authority	Amherst	Minor Municipal
VA0088684	Amherst County Landfill, Permit #181	Amherst	Minor Industrial
VA0051713	Colonial Pipeline Co.	Amherst	Minor Industrial
VA0006408	Greif Riverville LLC	Riverville	Major Industrial
VA0031321	Rutledge Creek WWTP	Amherst	Minor Municipal
VA0027618	US Dept of Labor	Monroe	Minor Municipal
VAR051354	Amherst County Landfill, Permit #181	Amherst	Ind. Storm Water

Permit #*	Facility Name	Town/City	Type
VAR050171	Buffalo Air Handling	Amherst	Ind. Storm Water
VAR051586	DeGe Inc. Misc. Metal Fabricators	Amherst	Ind. Storm Water
VAR050404	E.F. Fitzgerald Lumber	Amherst	Ind. Storm Water
VAR050411	Ellington Wood Products Inc.	Amherst	Ind. Storm Water
VAR050222	Glad Manufacturing Co.	Amherst	Ind. Storm Water
VAR051506	Huss, Inc. Truck Terminal	Madison Heights	Ind. Storm Water
VAR050540	J.P. Bradley & Sons Inc.	Amherst	Ind. Storm Water
VAR050737	Lynchburg Steel & Specialty Co. Inc.	Monroe	Ind. Storm Water
VAR050451	Marvin V. Templeton & Sons Inc.	Piney River	Ind. Storm Water
VAR051595	Mays Farm Service Fertilizer Plant	Amherst	Ind. Storm Water
VAR051265	Old Virginia Brick Company	Madison Heights	Ind. Storm Water
VAR050167	Virginia Auto Parts Inc.	Madison Heights	Ind. Storm Water
VAG110132	Erie Strayer MG	Amherst	Concrete Products
VAG110020	Lynchburg Ready Mix Concrete Co. Inc.	Amherst	Concrete Products
Appomattox County (Including the Towns of Appomattox and Pamplin)			
VA0089486	Appomattox County Landfill, Permit #86	Appomattox	Minor Industrial
VA0020249	Appomattox Trickling Filter Plant	Appomattox	Minor Municipal
VA0020257	Appomattox Water Reclamation Facility	Appomattox	Minor Municipal
VAR051353	Appomattox County Landfill, Permit #86	Appomattox	Ind. Storm Water
VAR050770	Campbell Lumber Co. of Appomattox	Appomattox	Ind. Storm Water
VAR051775	Smiths Foreign Used Auto Parts Inc.	Spout Spring	Ind. Storm Water
VAR050213	Thomasville Furniture Ind.,Inc.	Appomattox	Ind. Storm Water
VAG840046	Appomattox Lime Company	Appomattox	Non-metallic Mineral Mining
VAG110196	Buckingham Appomattox Ready Mix	Appomattox	Concrete Products
VAG110213	Lynchburg Ready Mix Concrete Co. Inc.	Appomattox	Concrete Products
VAG830119	Appomattox Oil Co. Inc.	Appomattox	Petroleum Contaminated Sites
VAG750147	Cedar Line Automotive	Spout Spring	Car Wash
VAG402047	Evans, Alvin Residence	Appomattox	Single Family Home
Bedford County			
VA0020818	BCS – Body Camp Elem.	Bedford	Minor Municipal
VA0020826	BCS – New London Academy	Forest	Minor Municipal
VA0020851	BCS – Otter River Elem. School	Goode	Minor Municipal
VA0063738	BCS – Staunton River HS	Moneta	Minor Municipal
VA0020842	BCS – Stewartsville Elem.	Goodview	Minor Municipal
VA0020869	BCS – Thaxton Elem. School	Thaxton	Minor Municipal
VA0089052	Blue ridge Wood Preserving Inc.	Moneta	Minor Industrial
VA0091162	Boonsboro Country Club	Lynchburg	Minor Municipal
VA0054577	BP Products North America Inc.	Montvale	Minor Industrial
VA0091553	Cedar Rock WWTP	Goode	Minor Municipal
VA0051721	Colonial Pipeline Co.	Montvale	Minor Industrial
VA0027553	Eagle Eyrie Baptist Conference Center Sewage Treatment	Lynchburg	Minor Municipal
VA0003026	GP Big Island LLC	Big Island	Major Industrial
VA0001449	Gunnoe Sausage Co.,Inc.	Goode	Minor Industrial
VA0091502	Heptinstall Grocery	Huddleston	Minor Industrial
VA0051888	Lynchburg City Abert Water Filtration Plant	Lynchburg	Minor Industrial
VA0055328	Magellan Terminals Holdings LP	Montvale	Minor Industrial
VA0023515	Moneta Adult Detention Center	Moneta	Minor Municipal
VA0091669	Moneta Regional WWTP	Moneta	Minor Municipal
VA0087238	Montvale WWTP	Bedford	Minor Municipal
VA0001490	Motiva Enterprises LLC	Montvale	Minor Industrial
VA0072389	Ramsey's Mobile Home Park	Troutville	Minor Municipal
VA0074179	Smith Mountain Dam Visitor Center Sewage Treatment	Bedford	Minor Municipal
VA0051446	TransMontaigne Montvale Piedmont Terminal	Montvale	Minor Industrial
VA0026051	TransMontaigne Montvale Atlantic Terminal	Montvale	Minor Industrial
VA0091910	Western Energy Montvale Terminal	Montvale	Minor Industrial
VA0074870	Woodhaven Nursing Home	Montvale	Minor Municipal
VAR050032	Barr Laboratories Inc.	Forest	Ind. Storm Water

Permit #*	Facility Name	Town/City	Type
VAR051369	Bedford City – Hylton Site	Bedford	Ind. Storm Water
VAR051233	Bedford County Landfill, Permit #560	Bedford	Ind. Storm Water
VAR050138	BRC Co. Inc.	Bedford	Ind. Storm Water
VAR050719	Duval Auto Parts Inc.	Forest	Ind. Storm Water
VAR050731	East Coast Auto Source	Thaxton	Ind. Storm Water
VAR051222	Forestry Equipment of VA Inc.	Forest	Ind. Storm Water
VAR050010	Gammapar	Forest	Ind. Storm Water
VAR050456	Hydrocarbon Recovery Services Inc.	Montvale	Ind. Storm Water
VAR051765	J.C. Sales Inc.	Montvale	Ind. Storm Water
VAR051649	Royal Oak Farm Solid Waste Composting Facility	Evington	Ind. Storm Water
VAR050733	Rubatex International LLC	Bedford	Ind. Storm Water
VAR051316	Safety Kleen Systems Inc.	Vinton	Ind. Storm Water
VAR050214	Shredded Products Corp.	Montvale	Ind. Storm Water
VAR050257	Taylor Ramsey Corp.	Big Island	Ind. Storm Water
VAR050268	Valley Auto Parts	Blue Ridge	Ind. Storm Water
VAG840055	Boxley Materials Co.	Blue Ridge	Non-metallic Mineral Mining
VAG110177	Marshall Concrete Products	Moneta	Concrete Products
VAG750060	Terry Volkswagen Subaru	Forest	Car Wash
VAG402101	Behrens Residence	Bedford	Single Family Home
VAG402030	Jordantown Wesleyan Church	Vinton	Single Family Home
VAG402058	Long, Johnny Helen Property	Montvale	Single Family Home
VAG402000	Orange, Timothy Residence	Thaxton	Single Family Home
Bedford City			
VA0022390	Bedford City – Sewage Treatment Plant	Bedford	Major Municipal
VA0001503	Bedford City – Water Treatment Plant	Bedford	Minor Municipal
VAR050184	Brooks Food Group Inc.	Bedford	Ind. Storm Water
VAR050185	Frank Chervan Inc.	Bedford	Ind. Storm Water
VAR050544	Hilltop Lumber Co Inc.	Bedford	Ind. Storm Water
VAR050528	Sam Moore Furniture LLC	Bedford	Ind. Storm Water
VAR050153	Wheelabrator Abrasives Inc.	Bedford	Ind. Storm Water
VAG110014	Bedford Ready Mix	Bedford	Concrete Products
Campbell County (Including the Towns of Altavista and Brookneal)			
VA0020451	Altavista Town – WWTP	Altavista	Major Municipal
VA0004774	AREVA NP Inc.	Lynchburg	Minor Industrial
VA0031194	Briarwood Village Mobile Home Park STP	Rustburg	Minor Municipal
VA0022250	Brookneal Town – Falling River Lagoon	Brookneal	Minor Municipal
VA0022241	Brookneal Town – Staunton River lagoon	Brookneal	Minor Municipal
VA0084034	Brookneal Town Water Treatment Plant	Brookneal	Minor Municipal
VA0003697	BWXT Nuclear Operations Division	Lynchburg	Minor Municipal
VA0078646	Campbell Co. Utility and Service Authority	Lynchburg	Minor Industrial
VA0023965	Campbell Co. Utility and Service Authority	Lynchburg	Minor Municipal
VA0091723	Campbell County Landfill	Rustburg	Minor Industrial
VA0001538	Dan River Inc.	Brookneal	Minor Industrial
VA0023396	DOC Rustburg Correctional Unit 9	Rustburg	Minor Municipal
VA0083402	Dominion – Altavista Power Station	Altavista	Minor Industrial
VA0062031	Evergreen Mobile Home Park	Lynchburg	Minor Municipal
VA0089478	Gladys Timber Products Inc.	Gladys	Minor Industrial
VA0006262	Lynchburg Foundry dba INTERMET Archer Creek Foundry	Lynchburg	Minor Industrial
VA0068543	Thousand Trails Lynchburg Preserve	Gladys	Minor Municipal
VAR050525	Abbott Laboratories	Altavista	Ind. Storm Water
VAR050710	BFI Waste Services LLC	Lynchburg	Ind. Storm Water
VAR050170	Brookneal Chips Inc.	Brookneal	Ind. Storm Water
VAR051356	Campbell County Landfill	Rustburg	Ind. Storm Water
VAR051763	CD Auto Recycling	Rustburg	Ind. Storm Water
VAR050716	Cunningham Brothers Used Auto Parts Inc.	Rustburg	Ind. Storm Water
VAR050414	Driskills Auto Parts Inc.	Rustburg	Ind. Storm Water
VAR051777	Foster Fuels Inc.	Brookneal	Ind. Storm Water
VAR050189	Georgia-Pacific Wood Products LLC	Brookneal	Ind. Storm Water

Permit #*	Facility Name	Town/City	Type
VAR051791	Kerr Auto Parts	Rustburg	Ind. Storm Water
VAR050168	Lynchburg Regional Airport	Lynchburg	Ind. Storm Water
VAR050452	Marvin Templeton & Sons - Plant 2	Lynchburg	Ind. Storm Water
VAR050536	Marvin V Templeton & Sons Inc.	Concord	Ind. Storm Water
VAR050392	MeadWestvaco	Gladys	Ind. Storm Water
VAR051801	New London Auto Parts Inc.	Evington	Ind. Storm Water
VAR051341	Owens-Brockway Plastic Products Inc.	Altavista	Ind. Storm Water
VAR050529	Schrader Bridgeport International Inc.	Altavista	Ind. Storm Water
VAR051437	Tarkett Wood Inc.	Brookneal	Ind. Storm Water
VAR050509	Timken Company	Altavista	Ind. Storm Water
VAR051398	Tollers VW Shop	Lynch Station	Ind. Storm Water
VAR050447	United Parcel Service Inc.	Lynchburg	Ind. Storm Water
VAR050413	Yeatts Transfer Co.	Altavista	Ind. Storm Water
VAG840045	Boxley Materials Co.	Lynchburg	Non-metallic Mineral Mining
VAG840062	Boxley Materials Co.	Concord	Non-metallic Mineral Mining
VAG110154	Chandler Concrete of VA Inc.	Altavista	Concrete Products
VAG110099	Felton Brothers Transit Mix	Brookneal	Concrete Products
VAG830138	Joy Food Stores, Inc. #862	Rustburg	Petroleum Contaminated Sites
VAG750164	Foster Fuels Inc.	Brookneal	Car Wash
VAG750165	Jiffy Lube	Lynchburg	Car Wash
VAG402034	Kelley's Food Shop	Evington	Single Family Home
VAG402029	Shupe, Wayne Residence	Evington	Single Family Home
Lynchburg City			
VA0078999	Alum Springs Shopping Center	Lynchburg	Minor Municipal
VA0087114	American Electric Power	Lynchburg	Minor Industrial
VA0061042	Bennies Mobile Home Park Sewage Treatment Plant	Lynchburg	Minor Municipal
VA0002925	Griffin Pipe Products Company	Lynchburg	Minor Industrial
VA0024970	Lynchburg City Sewage Treatment Plant	Lynchburg	Major Municipal
VAR050265	Aerofin Corporation	Lynchburg	Ind. Storm Water
VAR051675	Areva NP	Lynchburg	Ind. Storm Water
VAR050391	Azdel Incorporated	Forest	Ind. Storm Water
VAR051286	Banker Steel Company LLC	Lynchburg	Ind. Storm Water
VAR050442	Boxley Block LLC - Concord	Lynchburg	Ind. Storm Water
VAR051631	Boxley Block LLC - Lynchburg Plant	Lynchburg	Ind. Storm Water
VAR050267	Boxley Block LLC - Sackett	Lynchburg	Ind. Storm Water
VAR050169	Candler Oil Company Incorporated	Lynchburg	Ind. Storm Water
VAR050262	CR Hudgins Plating Incorporated	Lynchburg	Ind. Storm Water
VAR050172	Davis Frost Incorporated	Lynchburg	Ind. Storm Water
VAR050173	Delta Star Incorporated	Lynchburg	Ind. Storm Water
VAR050718	Diebold Southeast Manufacturing Inc	Lynchburg	Ind. Storm Water
VAR050266	Flowserve Lynchburg Operations	Lynchburg	Ind. Storm Water
VAR050188	Frito-Lay Incorporated	Lynchburg	Ind. Storm Water
VAR050546	Hanson Industries Inc	Lynchburg	Ind. Storm Water
VAR050190	Intermet Corp - Falwell Landfill	Lynchburg	Ind. Storm Water
VAR050541	Lawhorne Brothers Inc	Lynchburg	Ind. Storm Water
VAR051355	Lynchburg City Sanitary Landfill	Lynchburg	Ind. Storm Water
VAR051358	Lynchburg City Sewage Treatment Plant	Lynchburg	Ind. Storm Water
VAR051269	Norcraft Companies	Lynchburg	Ind. Storm Water
VAR050261	Parker Hannifin Corporation - Powertrain Division	Lynchburg	Ind. Storm Water
VAR050527	R R Donnelley Printing Co - Lynchburg	Lynchburg	Ind. Storm Water
VAR050524	Rock Tenn Converting Company - Mill	Lynchburg	Ind. Storm Water
VAR050263	Siegwerk Incorporated	Lynchburg	Ind. Storm Water
VAR050260	UPS Ground Freight	Lynchburg	Ind. Storm Water
VAR050511	Waytec Electronics Corp	Lynchburg	Ind. Storm Water
VAR051585	Weyerhaeuser Company	Lynchburg	Ind. Storm Water
VAG110021	Lynchburg Ready Mix Co. Inc.	Lynchburg	Concrete Products

Permit #*	Facility Name	Town/City	Type
VAG830111	Griffin Pipe Products Co.	Lynchburg	Petroleum Contaminated Sites
VAG402011	Daye, Mary Residence	Lynchburg	Single Family Home
VAG402027	Hamlett, Samuel Residence	Lynchburg	Single Family Home
Nelson County			
VA0072991	Camp Blue Ridge STP	Montebello	Minor Municipal
VA0061247	Gladstone STP	Gladstone	Minor Municipal
VA0087505	Hendersons Store STP	Piney River	Minor Municipal
VA0091243	Montebello Fish Culture Station	Montebello	Minor Industrial
VA0089729	Nelson County Regional STP	Lovingston	Minor Municipal
VA0026484	Schuyler STP	Schuyler	Minor Municipal
VA0088081	Schuyler WTP	Schuyler	Minor Industrial
VA0031011	Wintergreen Mountain	Wintergreen	Minor Municipal
VA0074047	Wintergreen Stoney Creek STP	Wintergreen	Minor Municipal
VAR050803	American Fibers and Yarns - Afton Plant	Afton	Ind. Storm Water
VAR050955	Taylor-Ramsey - Tye River Concentration Yard	Tye River	Ind. Storm Water
VAG840123	The Alberene Soapstone Co.	Schuyler	Non-metallic Mineral Mining
VAG831019	Roseland Rescue Squad	Roseland	Petroleum Contaminated Sites
VAG408328	Coley, David and Hillary Residence	Schuyler	Single Family Home
VAG408118	Mostly Maples Nursery LLC	Afton	Single Family Home
VAG408094	Rutherford, Robert and Donna Residence	n/a	Single Family Home

Source: Databases provided from DEQ.
http://www.epa.gov/enviro/html/pcs/pcs_query_java.html

4.2.11 Other Potential Threats to the Existing Water Quantity and Quality

Geologic Events

The Virginia Department of Emergency Management (VDEM) has identified geologic events that may occur throughout the Commonwealth including earthquakes, landslides, sinkholes, shoreline erosion, and other geologic hazards. However, the VDEM is not responsible for tracking geologic events throughout the state; their primary goal is to provide emergency preparedness during such events. The presence or increased likelihood of geologic hazards such as these is often dependent on the underlying geology or soil type. In some instances, geologic hazards are enhanced by man-made activities.

Virginia has a moderate earthquake risk, though major faults and high-strain zones are mapped throughout the Commonwealth. Portions of five major fault or high strain zones are mapped within Region 2000: Fries zone, Rockfish Valley zone, Brookneal zone, Bowens Creek fault, and the Dan River Basin. Earthquakes in Virginia are tracked at the Virginia Tech Seismological Observatory (VTSO) at Virginia Tech in Blacksburg, Virginia. According to a representative from the VTSO, earthquakes with a magnitude of

5 or greater have the potential to affect water resources, primarily residential drinking water wells. Over 160 earthquakes have occurred in Virginia since 1977 with only 16% of those with magnitudes sufficient to be felt. Only one earthquake is documented greater than 5.0 in Virginia, which occurred on May 31, 1897 in Giles County and registered as a magnitude 5.8.

Landslides can occur throughout the Commonwealth and Region 2000 primarily on steep slopes, such as those of the Blue Ridge Mountains. Additionally, man-made changes such as slope modification or drainage alteration may increase the likelihood of landslides. A source of landslide tracking throughout the state could not be identified and is not conducted by DMME as a geologic hazard. However, regional VDOT residencies may have specific local landslide data along major roadways and highways, but a centralized database is not maintained by VDOT.

Based on the review by VDEM, the most likely area for sinkhole formation and subsidence is in the Valley and Ridge provinces and limited areas of the Piedmont province. However, areas over underground mines are also susceptible to sinkhole formation. These areas, however, are primarily located outside Region 2000. Shoreline erosion can occur along rivers and lakes within Region 2000. The USDA NRCS website soil survey identifies a general acreage of surface water in each locality as described in the following table.

Shoreline erosion along rivers and lakes can be reduced if sufficient riparian buffers exist (see section 4.2.7).

Table 4.2.11A Surface Water Acreages from USDA Soil Survey

Survey Area	Acreage in Survey Area	Percent of Survey Area
Amherst including the Town of Amherst	3,178	1.0
Appomattox including the Towns of Appomattox and Pamplin	50	<0.1
Bedford County	11,551	2.5
City of Bedford	6	0.1
Campbell County including the City of Lynchburg and the Towns of Altavista and Brookneal	1,512	0.4
Nelson County	2,277	0.7

Source: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Other hazards including expansive soils, frost heave, and radon emission are typically localized, but may exist in the region.

Water Quality Assessments

Chapter 5.1 of the 2006 Final 305(b)/303(d) Water Quality Assessment Integrated Report discusses ground water protection programs. The Piedmont Physiographic Province, where the majority of Region 2000 lies is identified with a diverse geology with a wide range of groundwater quality and availability. This area is noted as having a low to moderate pollution potential. The Blue Ridge Physiographic Province including portions of Nelson, Amherst and Bedford Counties is identified with impervious rock types and low well yields. Pollution potential is high because of rapid movement of water in fractures. A number of programs exist in an effort to reduce potential impact to water resources. These include: wellhead protection programs; the Groundwater Management Act of 1992; the Storage Tank Compliance Program; the Storage Tank Remediation Program; Waste Permitting; Remediation Programs; the Pesticide Disposal Program; Pesticides and Groundwater Management; the Karst Program, and the Source Water Assessment Program.

Petroleum Releases

Releases of petroleum or regulated substances into the environment, once reported to DEQ, are monitored during characterization and possible remediation of the release. Depending on the nature of the release, impact to surface or subsurface water sources may occur. Release incidences once characterized and/or remediated are considered closed. However, these files may be re-opened and additional activities required if conditions warrant further investigation. Therefore, DEQ tracks active incidences (Open) and inactive incidences (Closed). The following is a summary of petroleum release files:

- Amherst County – 12 Open, 53 Closed
- Appomattox County – 2 Open, 33 Closed
- Bedford County – 18 Open, 98 Closed
- Bedford City – 30 Open, 34 Closed
- Campbell County – 23 Open, 112 Closed
- Lynchburg City – 33 Open, 181 Closed

- Nelson County – 10 Open, 64 Closed

Voluntary Remediation Sites

The Voluntary Remediation Program (VRP) was designed to encourage hazardous substance cleanups throughout the state. Once completed land use controls, also known as institutional or engineering controls, may exist for the site. These can include groundwater (GW) restrictions, subsurface excavation (EXC) restrictions, residential development (RES) restrictions, or other restrictions beyond GW, EXC, or RES. The following table identifies the completed and planned VRP sites within the region and any land use controls that exist or planned.

Table 4.2.11B VRP Sites (Completed and Planned)

VRP #	Facility Name	Town/City/County	Land Use Controls
VRP00222	Flexo Building Sites	Bedford County	GW RES
VRP00146	Bibb Company	Campbell County	GW RES EXC
VRP00169	Lynchburg Manufactured Gas Plant	Campbell County	GW RES EXC
VRP00299	Brookneal Flooring	Campbell County	GW RES EXC
VRP00411	Balvac Production Machinery Facility	Lynchburg City	GW OTHER
VRP00300	Burruss Wood Laminating	Lynchburg City	GW RES
VRP00320	Altavista WWTP	Campbell County	Planned Site
VRP00422	Schenkel Rose	Lynchburg City	Planned Site
VRP00423	Allen Morrison (former)	Lynchburg City	Planned Site

http://www.deq.virginia.gov/vrp/public.html

5.0 PROJECTED WATER DEMAND INFORMATION

As population in the Region increases so will the demand for water. By examining past trends, current conditions, and future projections, a plan can be developed to prepare for future water demands. As required by the Regulations[19] an analysis of population growth and water demand projections is detailed in the following section of the Plan. Projections of future water demand for the Region are based on existing data from municipalities and population and employment projections from the U.S. Census Bureau and the Virginia Employment Commission, respectively.

5.1 Population Data[20]

5.1.1 Historical Population and Growth Trends

Past population trends provide a good starting point when estimating future growth and water demands for the region. The U.S. Census Bureau provides historical data for counties and cities only; therefore, it was assumed that the towns in the region have the same rate of change in population as their respective county. The historical population and population growth rate percentage for each jurisdiction over the past 40 years is presented in Figures 5.1.1A and Figure 5.1.1B, respectively.

Table 5.1.1A: Historical Population by Jurisdiction

Jurisdiction	Census 1960	Census 1970	Census 1980	Census 1990	Census 2000
Amherst Co.	22,953	26,072	29,122	28,578	31,894
Appomattox Co.	9,148	9,784	11,971	12,298	13,705
Bedford Co.	31,028	26,728	34,927	45,656	60,371
Campbell Co.	32,958	43,319	45,424	47,572	51,078
Nelson Co.	12,752	11,702	12,204	12,778	14,445
Bedford city	5,921	6,011	5,991	6,073	6,299
Lynchburg city	54,790	54,083	66,743	66,049	65,269

Table 5.1.1B: Historical Population Growth Rate % by Jurisdiction

Jurisdiction	1960-1970	1970-1980	1980-1990	1990-2000	Average
Amherst Co.	1.36	1.17	-0.19	1.16	0.88
Appomattox Co.	0.70	2.24	0.27	1.14	1.09

[19] 9 VAC 25-780-110.
[20] 9 VAC 25-780-110 A.

Bedford Co.	-1.39	3.07	3.07	3.22	1.99
Campbell Co.	3.14	0.49	0.47	0.74	1.21
Nelson Co.	-0.82	0.43	0.47	1.31	0.35
Bedford city	0.15	-0.03	0.14	0.37	0.16
Lynchburg city	-0.13	2.34	-0.10	-0.12	0.50

Growth in Amherst County is typically seen in areas close to the City of Lynchburg and the Town of Amherst. According to the Amherst County Comprehensive Plan, these areas have experienced the greatest amount of growth between 1990 and 2000.

Based on the Appomattox County Comprehensive Plan, Thomasville Furniture Plant attributed to growth increases in the 1970's. Growth increases seen in the 1990's have been attributed to the western part of the county becoming a "bedroom community" of the City of Lynchburg. In addition, growth increase is attributed to natural increase and net migration. Natural increase is simply the number of births minus the number of deaths in the county and net migration is the number of people moving into the county minus the number of people moving out.

Bedford County has experienced the highest growth rate in the region. Bedford County's location between the City of Lynchburg and Roanoke County and City has had a substantial impact on population growth in the late twentieth century. In addition, the development of Smith Mountain Lake in the 1960's has attributed to growth in the county. The area around Smith Mountain Lake began to see significant second home development during the mid-1970's and has also become a popular spot for retirees. According to the Bedford County Comprehensive Plan, the growth rate for the county is 2.75% which is slightly higher than the historical trends.

The Campbell County Comprehensive Plan attributes population growth increases to natural increase and net migration. Natural increase is the number of births minus the number of deaths in the county and net migration is the number of people moving into the county minus the number of people moving out.

According to the 2002 Nelson County Comprehensive Plan, the county is experiencing moderate growth with the majority of new residents locating in the northern sections of the county, particularly Rockfish Valley and along the Albemarle County line. Rockfish Valley has seen the highest growth rates in the county. Based on the January 2003 City of Bedford Comprehensive Plan, growth in the City of Bedford is a result of suburban expansion around the City of Lynchburg and Roanoke County and City as well as growth around Smith Mountain Lake.

5.1.2 Current Population and Future Population Projections

The current population by jurisdiction based on the Census is presented in Table 5.1.2A. Please note that the county populations do not include the towns within their respective county.

Table 5.1.2A: Current Population by Jurisdiction (2007)

Name of Locality	Population
Amherst County	33,115
Appomattox County	12,129
Bedford County	65,893
Campbell County	48,473
Nelson County	15,262
City of Bedford	6,400
City of Lynchburg	67,958
Town of Altavista	3,425
Town of Amherst	2,251
Town of Appomattox	1,761
Town of Brookneal	1,259
Town of Pamplin	199
Total Population for Region	**243,068**

The percent change in population for each county was determined by comparing the population in the year 2000 (U.S. Census Bureau) and the estimated population in 2030 (Virginia Employment Commission). Once the percent change in population was determined for each county and city, the percentage was used to project the population through 2060. Please note that the U.S. Census Bureau only provides information for counties and cities; therefore, it was assumed that the average annual percent change in population for the towns was the same as its respective county. Future population projections through 2060 are presented in Table 5.1.2B.

Table 5.1.2B: Projected Population and Growth Rate by Jurisdiction

Jurisdiction	2000	2010	2020	2030	2040	2050	2060	Growth %
Amherst Co.	31,894	36,763	41,832	47,599	54,162	61,630	70,127	1.30
Appomattox Co.	13,705	14,236	14,736	15,254	15,790	16,345	16,919	0.35
Bedford Co.	60,371	68,091	75,963	84,745	94,542	105,472	117,665	4.0-1.1
Campbell Co.	51,078	54,760	63,062	67,955	73,227	78,908	85,030	0.5-0.75
Nelson Co.	14,445	15,580	16,689	17,877	19,150	20,513	21,973	0.69
Bedford city	6,299	6,439	6,569	6,701	6,837	6,975	7,115	0.20
Lynchburg city	65,269	69,024	72,698	76,568	80,644	84,937	89,459	0.52

Since Amherst County is experiencing significant growth due to its proximity to the City of Lynchburg, a growth rate higher than the historical average was used for the county. Based on the November 2004 study titled *"Graham Creek Reservoir Population Growth Projections"* completed by Hurt & Proffitt, an adjusted average annual increase in population of 1.3 % was used to project population growth for Amherst County to 2060. This percentage accounts for the 30% distortions of the 1990 through 2000 Census data, which was a result of downsizing the CVTC population during that period.

The average projected growth rate in Appomattox County is lower than the rate from 1990-2000 which suggests that the rate of growth is slowing down.

Bedford County has been experiencing significant growth for the past 30 years and is expected to grow even more rapidly in the next 10 years. Much of this growth is a result of Bedford County's location between the City of Lynchburg and Roanoke County and City. In addition, the county is experiencing significant growth around Smith Mountain Lake. Bedford County is projected to grow at 4% through 2018 and then at 1.1% through 2060.

Campbell County's annual population growth rate is projected to remain the same in the future with growth at 0.5% through 2018 and then 0.75% through 2060.

While Nelson County is growing faster than the historical average over the past 40 years, the County's population increase is expected to slow down slightly compared to the growth rate from 1990-2000.

The City of Bedford's population growth rate is projection to remain the same over the next 50 years at an annual rate of 0.2%. While not much more growth is expected within the city limits, growth is expected to continue outside of the city limits, influencing the population growth in Bedford County.

The City of Lynchburg's population growth rate is projected to remain the same over the next 50 years at an annual rate of 0.52%. While not much more growth is expected within the city limits, growth is expected to continue outside the city limits, influencing the population growth in the neighboring counties.

5.1.3 Future Growth

Region 2000 recognized the importance of communication between the water utilities in the region and the planning staff for each jurisdiction. Region 2000 felt it was important to make sure the areas the water utilities identified as future growth and expansion areas were the same areas the planning staff identified as potential growth areas. As part of the planning process individual meetings were held with the planning staff for each jurisdiction to review comprehensive plans and discuss future growth. Areas of potential growth in the future were identified with planning staff. These future growth areas were compared to existing infrastructure, which will aid both the water utilities and planning staff in evaluating growth areas. By working together, the water utilities and planning staff will be able to determine whether infrastructure expansion is needed and feasible as well as determine areas where it may be difficult to expand infrastructure and where alternative water sources will need to be evaluated. A map showing future growth areas in the region is presented in Figure 5.1.3.

Figure 5.1.3: Future Growth Areas in the Region

5.2 Demand Projection Methodology

The annual percent change in population for each jurisdiction was determined by comparing the population in the year 2000 (U.S. Census Bureau) and the estimated population in 2030 (Virginia Employment Commission). Once the percent change in population was determined, that percentage was used to project the population through 2060. The percent change in population was then used to project water demand by applying it to water demands that are influenced by changes in population such as residential demand. For jurisdictions where a population decrease was anticipated, a projection of zero growth was assumed.

For demand categories that are more influenced by changes in employment, such as commercial and industrial demands, the annual projected average percent change in employment (per the Virginia Employment Commission) was used.

5.2.1 Public Community Water Systems

Population estimates within the planning area served by each existing community water system in 2006 were supplied by each jurisdiction. Each jurisdiction also supplied the data for the current total demand and when available disaggregated the demand into the following categories of use:

- Residential
- Commercial, institutional and light industrial
- Heavy Industrial
- Military
- Water used in water production processes
- Unaccounted for water losses
- Sales to other community water systems
- Other

When the jurisdiction did not provide disaggregate information, assumptions were made in order to calculate the demand for each category.

In order to project the demand for public community water systems, the average annual percent change in population from 2000 to 2030 was applied to the residential demand. Then the commercial, institutional, industrial, military, production process, unaccounted-for-water, sales and other demand projections were established by applying the annual average percent change in employment from 2002 to 2012 to the current demand for each category. The annual average percent change in employment was applied since these categories are more likely influenced by changes in employment.

For each town it was assumed that the residential demand increased at the same rate as the annual average percent change in population. When calculating the annual average percent change in population for a town, it was assumed that the town's population increased at the same rate as the respective county since the census does not provide data for towns. In addition, it was assumed that towns have the same rate of change in employment as their respective county.

Once the demands were projected through 2060 in each category, all of the demands were summed to give the total annual average demand for each public water system. The peak monthly demand and the average monthly demand were provided by the localities and used to calculate a peaking factor. The peaking factor was then applied to the annual average demand and projected through 2060. When a jurisdiction did not provide the peak monthly demand, a peaking factor of 1.2 was assumed.

5.2.2 Private Community Water Systems

In order to project the future demands for private community water systems the annual average percent change in population was applied to the total demand for all of the private community systems in each jurisdiction. Since these water systems are serving a community it is assumed that the growth in these areas will be the same as the percent change in population for the jurisdiction.

5.2.3 Self-supplied, non-agricultural users using greater than 300,000 gallons of water per month

In order to project the future demands the annual average percent change in employment was applied to the total demand for all of these users for each locality. Please note self supplied, non-agricultural users of less than 300,000 gallons were included in this category because they were more similar to users in this category than in the individual well user category.

5.2.4 Self-supplied, agricultural users using greater than 300,000 gallons of water per month

Information on individual agricultural users using greater than 300,000 gallons of water per month was very limited or unavailable. Agricultural information for each county was collected from the USDA NASS 2002 Census of Agriculture. General information on livestock (e.g., number of head of cattle) and crops (e.g., type of crop planted) was available and was used to make a general estimate of water used by self-supplied, agricultural users in the region. Agriculture in the region is not expected to increase in the future and in many areas of the region will likely decrease as growth occurs. To be conservative agricultural projections were flat lined across the region.

5.2.5 Private self-supplied, individual well users less than 300,000 gallons per month

To determine an estimate of residences and businesses that are self-supplied and served by individual groundwater wells withdrawing less than 300,000 gallons per month, the population served by both public and private community water systems was determined. Population served by public community water systems was provided by each jurisdiction and is based on 2006 data. Population served by private community water systems was estimated based on review of VDH Engineering Description Sheets and/or community water system lists from EPA SDWIS. The total population for each county and city was provided by the 2000 US Census Bureau. The total population for each town was provided by the town and subtracted from the county population.

The population served by individual wells was estimated by subtracting the population served by public and private community water systems from the total population. The total population, the population served by community water systems, and the population served by individual wells for each jurisdiction are shown in Table 5.4. It is important to note for the City of Bedford, City of Lynchburg, and Town of Appomattox, the 2006 population served by the public community water system provided by the jurisdiction was greater than the 2000 US Census Bureau population estimate; therefore, it was assumed that the estimated population served by individual wells is zero. The estimated population served by individual wells for the towns of Altavista and Pamplin was provided by each town.

Table 5.2: Population Served by Community Water System and Individual Wells

Jurisdiction	Total Population	Population Served by Public CWS	Estimated Population Served by Private CWS	Estimated Population Served by Individual Wells
Amherst County	29,643	15,774	192	13,677
Appomattox County	11,752	0	27	11,725
Bedford County	60,371	17,500	3,067	39,804
Campbell County	46,394	20,160	1,058	25,176
Nelson County	14,445	4,553	864	9,028
City of Bedford	6,299	7,500	0	0
City of Lynchburg	65,269	66,000	0	0
Town of Altavista	3,425	3,850	0	172
Town of Amherst	2,251	2,184	0	67
Town of Appomattox	1,761	2,476	0	0
Town of Brookneal	1,259	1,259		0
Town of Pamplin	199	199	0	25
Total	**243,068**	**141,455**	**5,208**	**99,674**

Water used by self-supplied, individual well users was estimated based on the assumption of 75 gpd per person. Future demands were then projected by applying the average annual percent change in population for each jurisdiction.

5.3 Amendments to Demand Projection Methodology

5.3.1 Amherst County

The VEC projections of 0.2% for population growth and 1.22% for employment increase were considered very low and were not used for Amherst County. Amherst County is experiencing significant growth due to its proximity to the City of Lynchburg. As previously discussed, an adjusted average annual increase in population of 1.3% was used to project population growth based on the study titled *"Graham Creek Reservoir Growth Projections"* completed by Hurt & Proffitt in November 2004. This takes into account the 30% distortions of the 1990 through 2000 U.S. Census data, caused by the downsizing of the CVTC population during that period.

Based on the study titled *"Graham Creek Reservoir Growth Projections"* completed by Hurt & Proffitt in November 2004, a demand of 2.4% was applied to all disaggregated demand categories. This percentage is based on a historic annual average increase in water demand of 1.7% each year and an additional increase anticipated from the completion of the Madison Heights Bypass. ACSA records show that from 1969 through 2004 water demand increased by an average 1.7% per year. This higher growth rate in the Madison and Elon Magisterial Districts, which makes up the majority of the ACSA service area, is further supported by County Commissioner of Revenue records. In addition, an estimated 0.7% annual average increase in projections is expected resulting from growth stimulated by completion of the new Madison Heights bypass. The bypass will make jobs in the City of Lynchburg much more rapidly accessible to residences located in Amherst County and is already stimulating escalating inquiries for residential and commercial development. Between April 2006 and June 2008 approximately 48 projects have been discussed, which would result in 4,800 new connections or their equivalents. Finally, the ACSA provided data that the Amelon Commerce Center would be using an additional 7.3 MG per year, every year for twenty years.

As requested by the ACSA, a 0% growth rate was used for private community systems. Private community systems are considered built out. A 1.0% growth rate was applied to self supplied users because it fell between the seemingly low VEC population projection of 0.2% and the adjusted annual average increase in population of 1.3% cited above.

5.3.2 Appomattox County

The report titled *"Water Source Study for the Appomattox Area"* completed by Wiley and Wilson was used to project public demands since Appomattox County does not currently have a public water system. This report indicated a 2036 average flow of 515,000 gpd for the Route 460 corridor and industrial growth. Assuming that demand would start to occur in 2009, this would add 6.7 MG of demand per year. This figure was used to project demands through 2060.

5.3.3 Bedford County

Since Bedford County is experiencing significant growth, the BCPSA is expecting an increase in the number of connections to their public community water systems. An increase in number of connections to the High Point service area will be a result of continued growth around Smith Mountain Lake. In addition, the Forest and New London service area as well as the Stewartsville Consecutive service area will see an increase in number of connections due to Bedford County's location between the City of Lynchburg and Roanoke County and City. Based on the projected growth rates for these areas in the county, a 4% annual growth rate was applied to project residential demand through 2018 and a 1.1% change in population was then applied to project demand through 2060.

5.3.4 City of Lynchburg

To account for the unanticipated arrival of a unique large demand user (e.g., a bottling plant like Coca-Cola), it will be assumed that a 135 MG per year user will begin operation every ten years until 2060.

5.4 Projected Water Demand Results[21]

5.4.1 Region 2000

The total projected demand for each jurisdiction through 2060 is presented in Table 5.4.1.

Table 5.4.1: Total Projected Demand (VAC 25-780-100 C)

Jurisdiction	Total Projected Demand for Region 2000 (MG/Year)					
	2010	2020	2030	2040	2050	2060
Amherst County	3,371	4,724	4,992	5,262	5,596	6,011
Appomattox County	401	479	558	638	718	798
Bedford County	6,194	7,066	7,876	8,788	9,814	10,967
Campbell County	1,631	2,012	2,193	2,394	2,608	2,849
Nelson County	831	874	922	974	1,031	1,094
City of Bedford	385	421	461	507	557	614
City of Lynchburg	4,439	5,042	5,702	6,424	7,217	8,089
Town of Altavista	690	772	865	970	1,088	1,220
Town of Amherst	185	217	255	301	355	420
Town of Appomattox	95	103	113	123	136	150

[21] 9 VAC 25-780-110 B-G.

Jurisdiction	Total Projected Demand for Region 2000 (MG/Year)					
	2010	2020	2030	2040	2050	2060
Town of Brookneal	395	443	497	558	626	703
Town of Pamplin City	4.60	4.77	4.95	5.14	5.34	5.54
Total for Region 2000	**18,622**	**22,158**	**24,439**	**26,944**	**29,751**	**32,921**

5.4.2 Amherst County

The projected water demands for the public community water system (ACSA) in Amherst County are presented in Figure 5.4.2A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in Amherst County are presented in Figure 5.4.2B. The total projected water demand for Amherst County is presented in Figure 5.4.2C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.2A: Amherst County Annual Average Public CWS Demand Projections

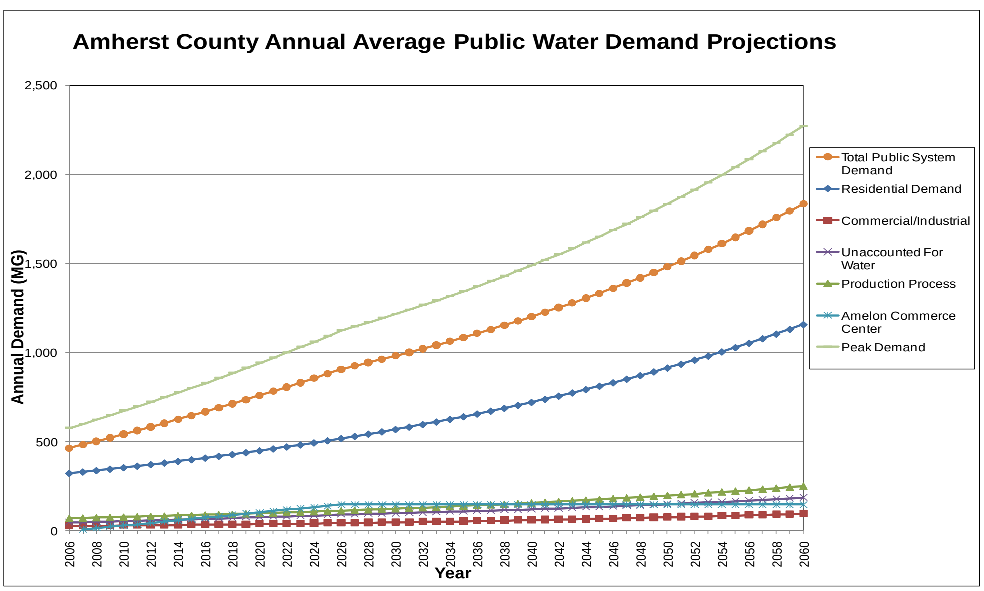


Figure 5.4.2B: Amherst County Annual Average Private Demand Projections

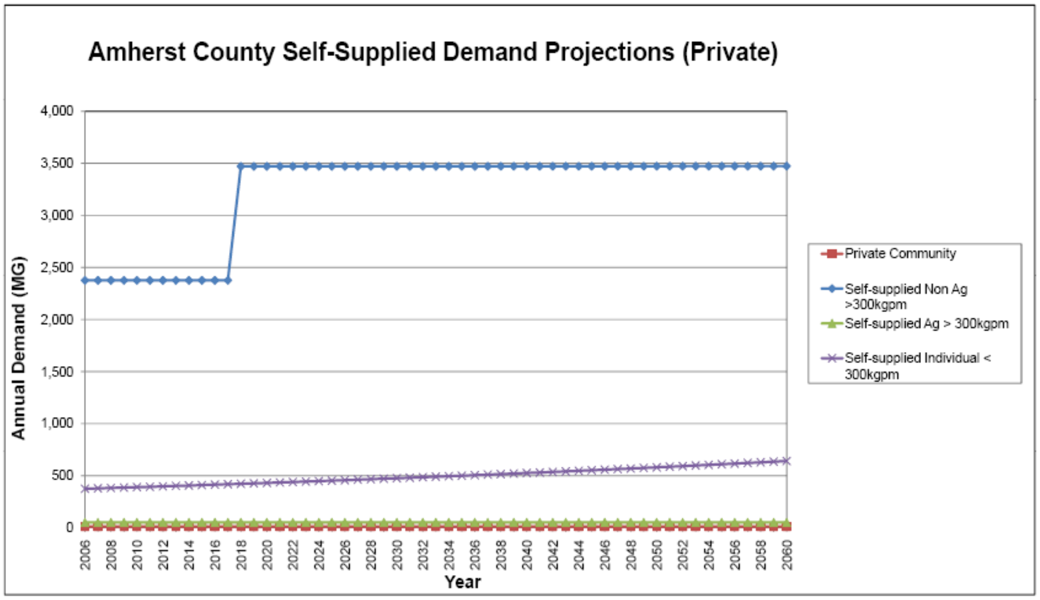
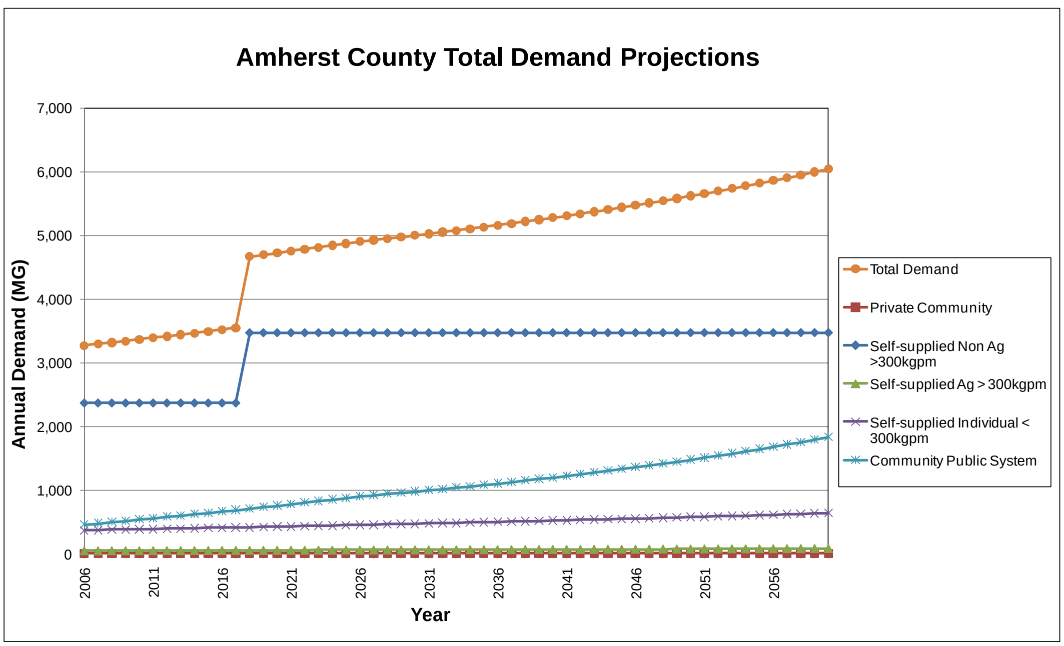


Figure 5.4.2C: Amherst County Annual Total Demand Projections



5.4.3 Appomattox County

The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural; and self-supplied users using individual groundwater wells in Appomattox County are presented in Figure 5.4.3A. Please note that Appomattox does not own or operate a public community water system. The total projected water demand for Appomattox County is presented in Figure 5.4.3B. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.3A: Appomattox County Annual Average Private Demand Projections

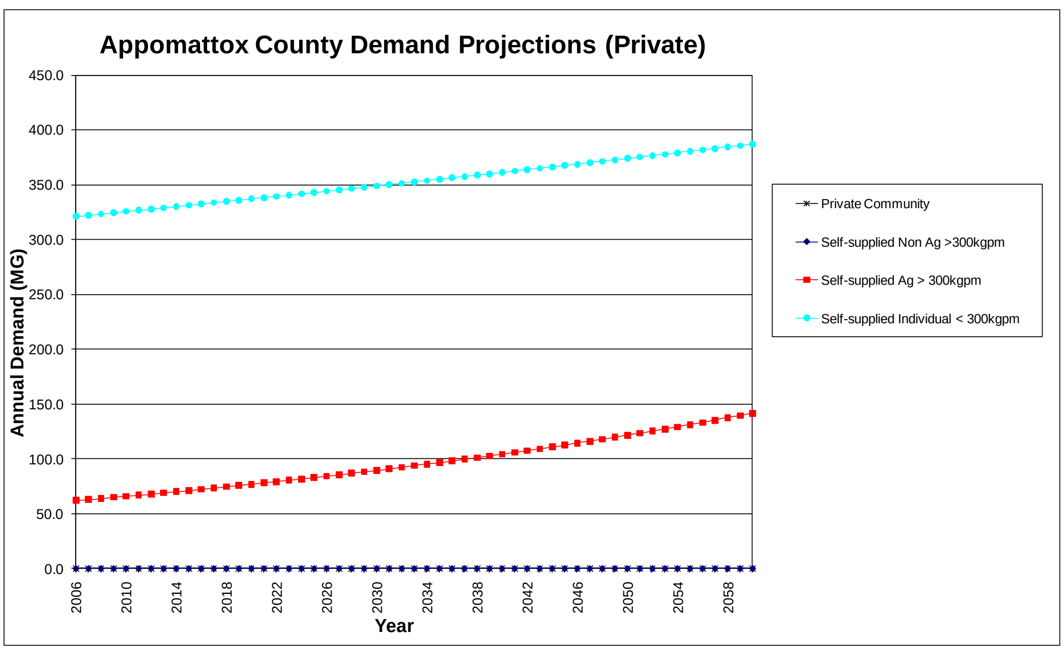
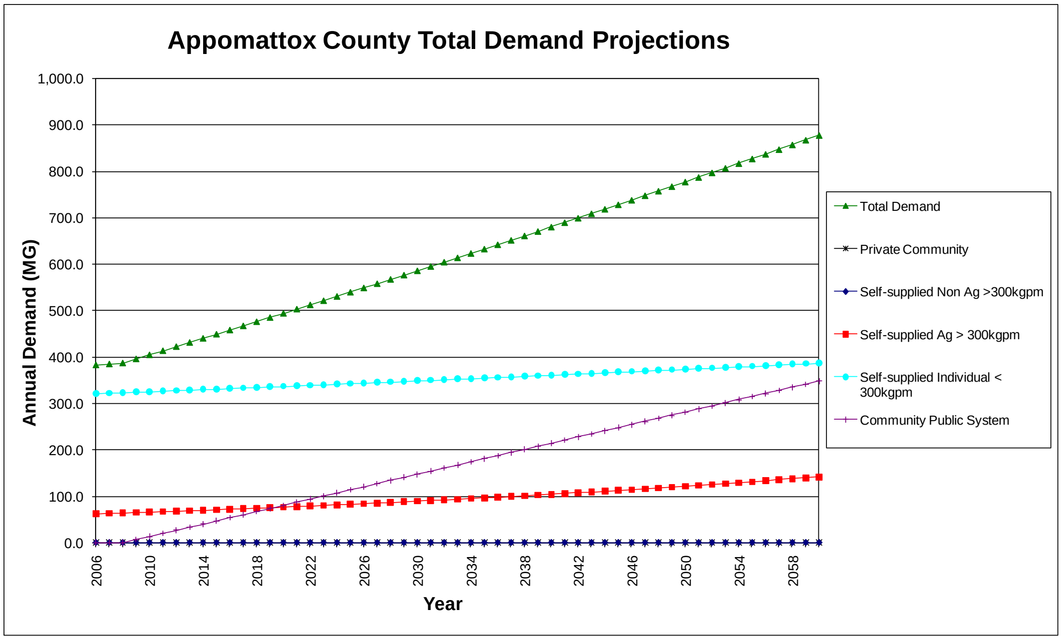


Figure 5.4.3B: Appomattox County Annual Total Demand Projections



5.4.4 Bedford County

The projected water demands for the public community water system (BCPSA) in Bedford County are presented in Figure 5.4.4A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in Bedford County are presented in Figure 5.4.4B. The total projected water demand for Bedford County is presented in Figure 5.4.4C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.4A: Bedford County Annual Average Public CWS Demand Projections

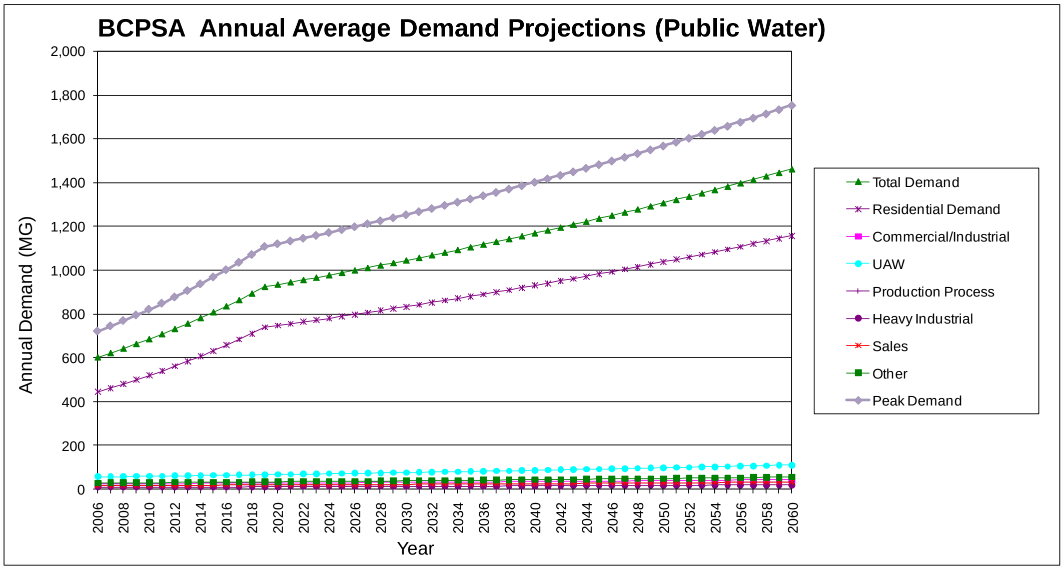


Figure 5.4.4B: Bedford County Annual Average Private Demand Projections

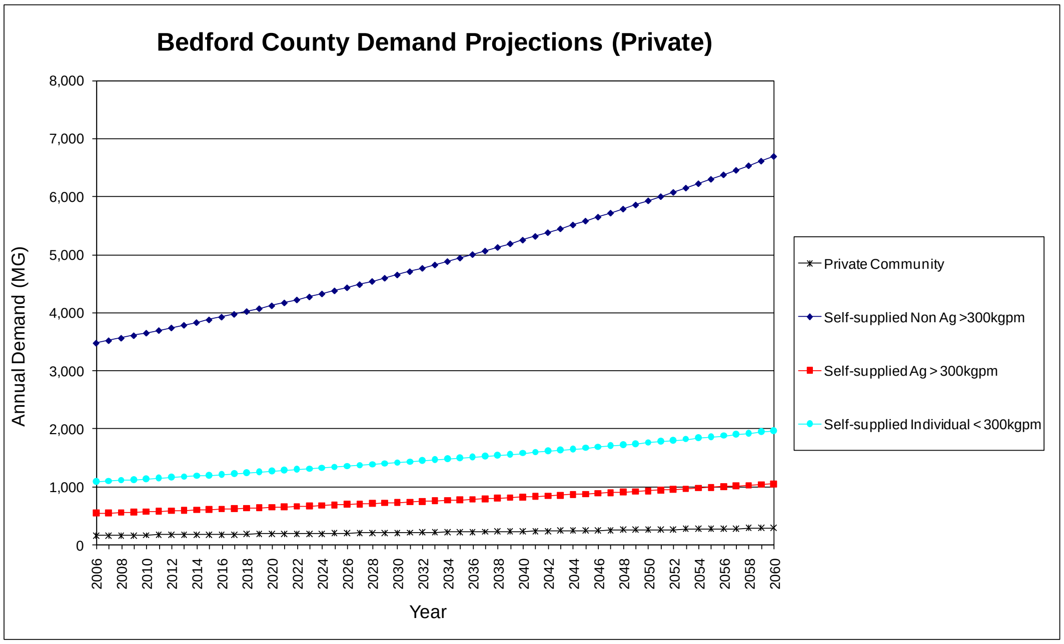
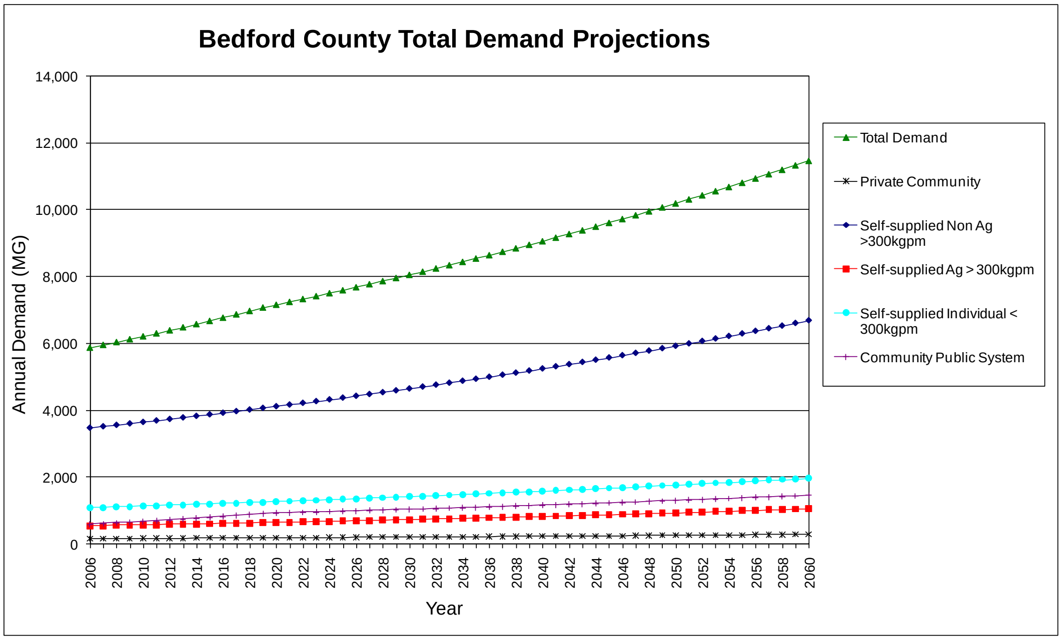


Figure 5.4.4C: Bedford County Annual Total Demand Projections



5.4.5 Campbell County

The projected water demands for the public community water system (CCUSA) in Campbell County are presented in Figure 5.4.5A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in Campbell County are presented in Figure 5.4.5B. The total projected water demand for Campbell County is presented in Figure 5.4.5C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.5A: Campbell County Annual Average Public CWS Demand Projections

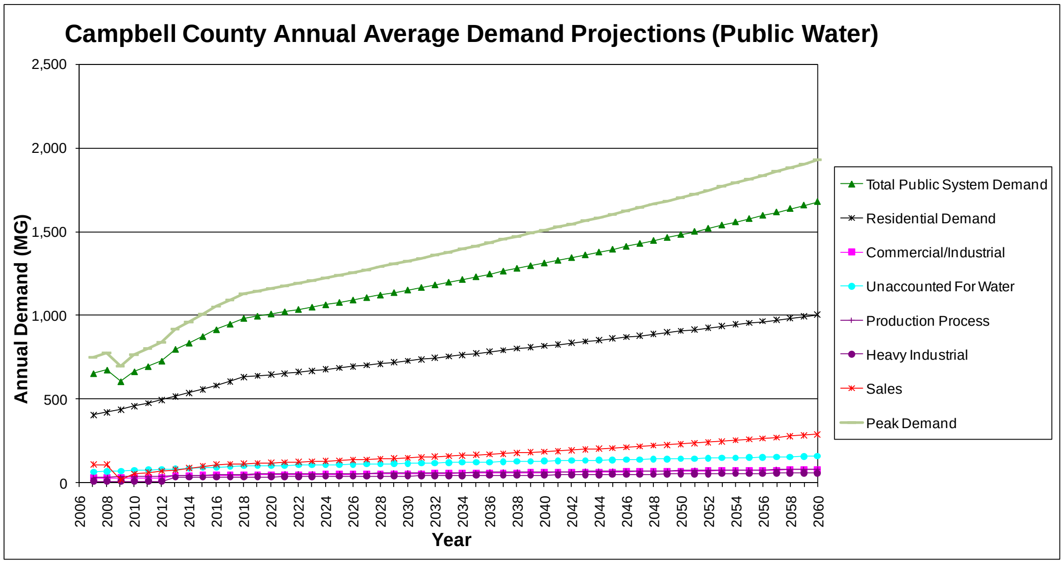


Figure 5.4.5B: Campbell County Annual Average Private Water Demand Projections

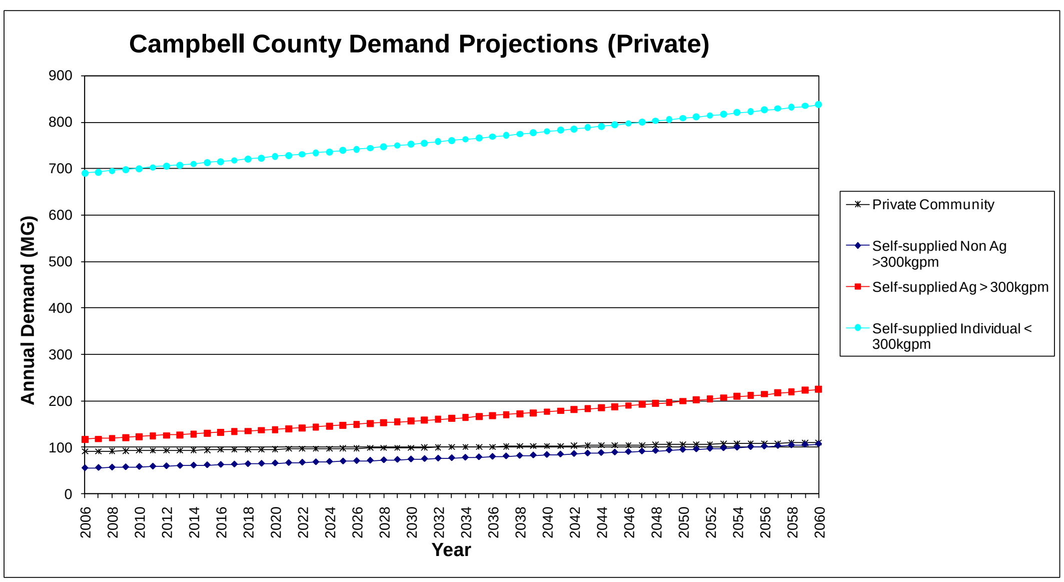
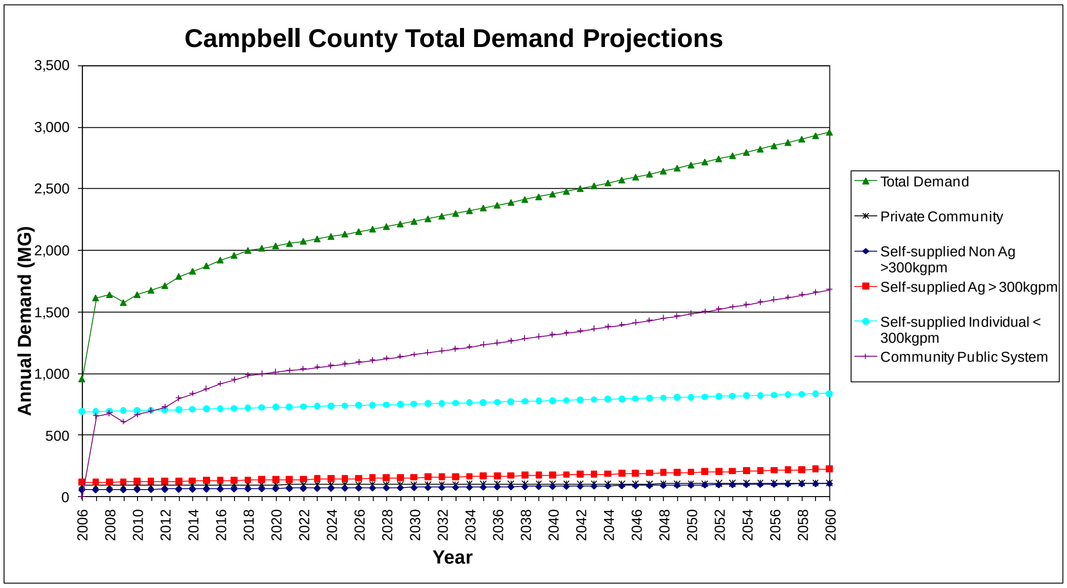


Figure 5.4.5C: Campbell County Annual Total Demand Projections



5.4.6 Nelson County

The projected water demands for the public community water system (NCSA) in Nelson County are presented in Figure 5.4.6A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in Nelson County are presented in Figure 5.4.6B. The total projected water demand for Nelson County is presented in Figure 5.4.6C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.6A: Nelson County Annual Average Public CWS Demand Projections

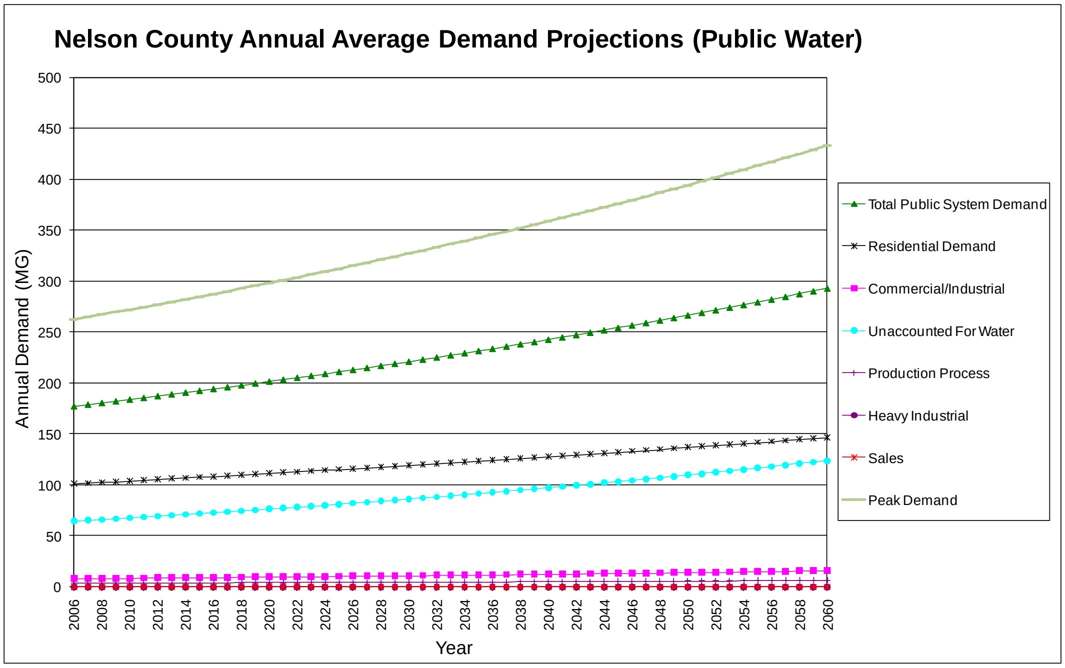


Figure 5.4.6B: Nelson County Annual Average Private Water Demand Projection

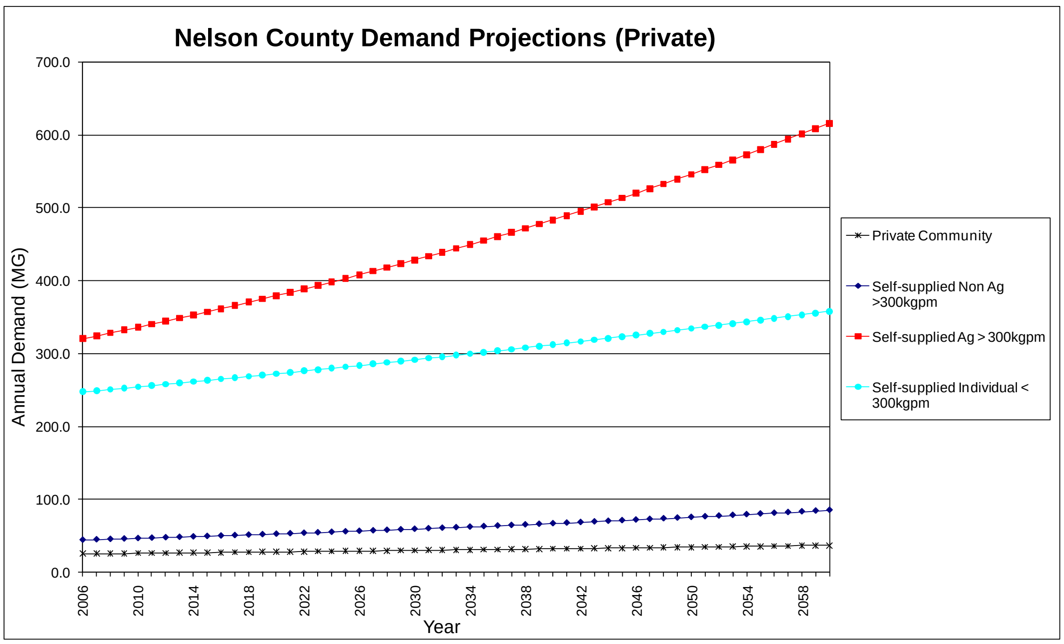
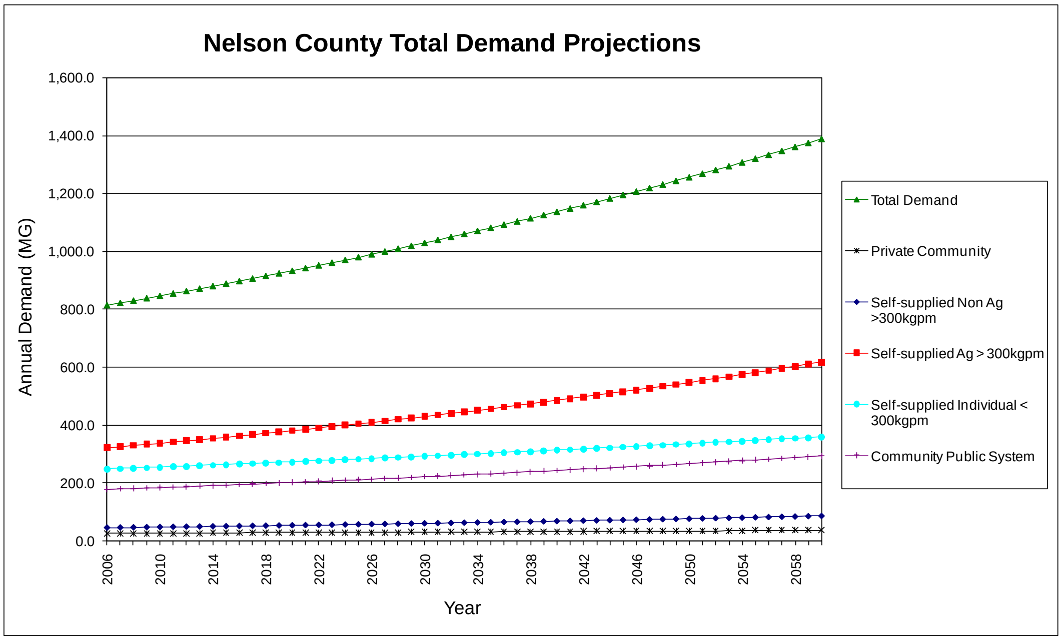


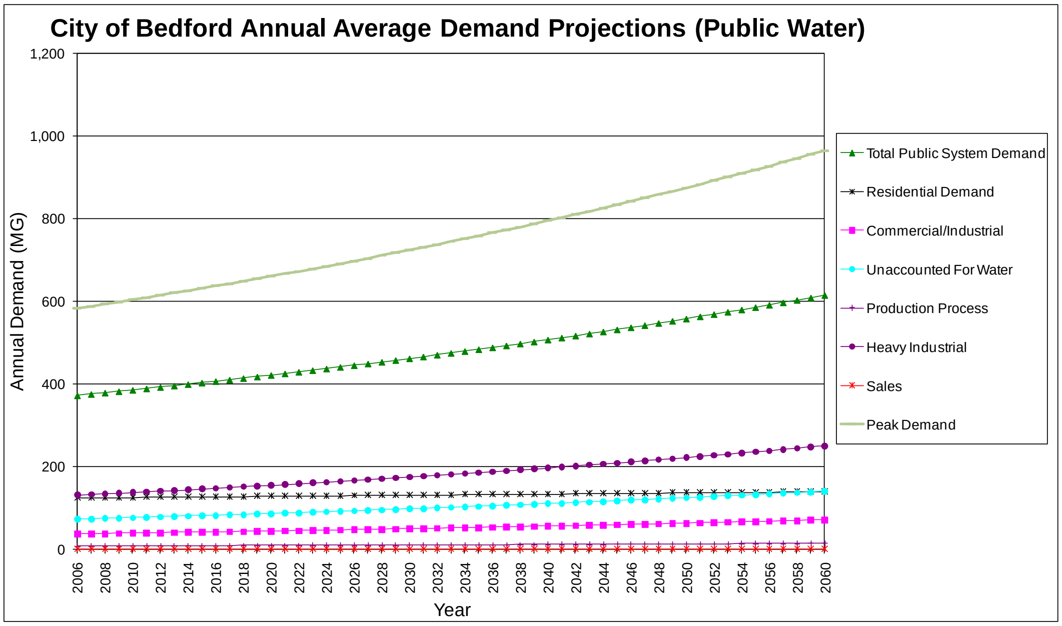
Figure 5.4.6C: Nelson County Annual Total Demand Projections



5.4.7 City of Bedford

The projected water demands for the public community water system in City of Bedford are presented in Figure 5.4.7. There are no known private community water systems or self-supplied users in the City of Bedford. Therefore, the total demand for the City of Bedford is equal to the total public community water system demand. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system.

Figure 5.4.7: City of Bedford Annual Average Public Water Demand Projections



5.4.8 City of Lynchburg

The projected water demands for the public community water system in the City of Lynchburg are presented in Figure 5.4.8A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the City of Lynchburg are presented in Figure 5.4.8B. The total projected water demand for the City of Lynchburg is presented in Figure 5.4.8C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.8A: City of Lynchburg Annual Average Public CWS Demand Projections

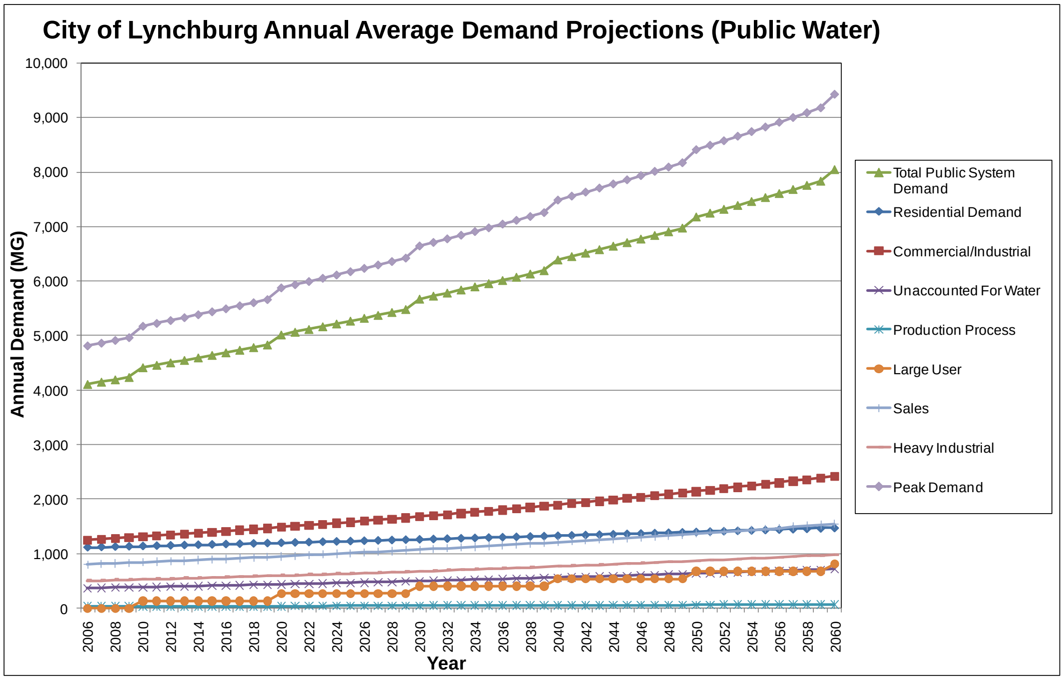


Figure 5.4.8B: City of Lynchburg Annual Average Private Water Demand Projections

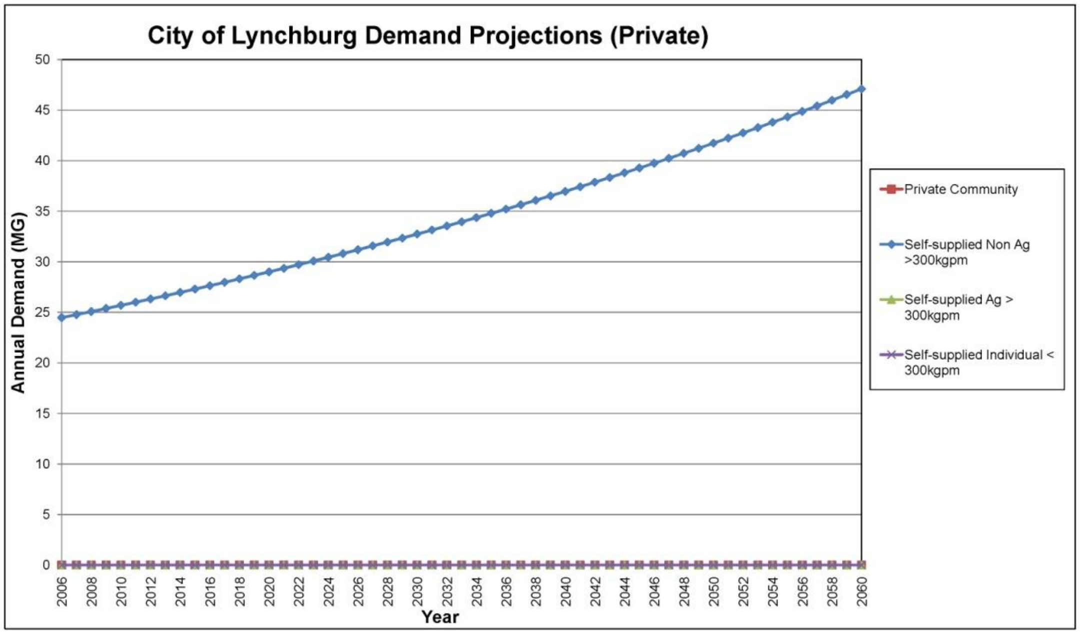
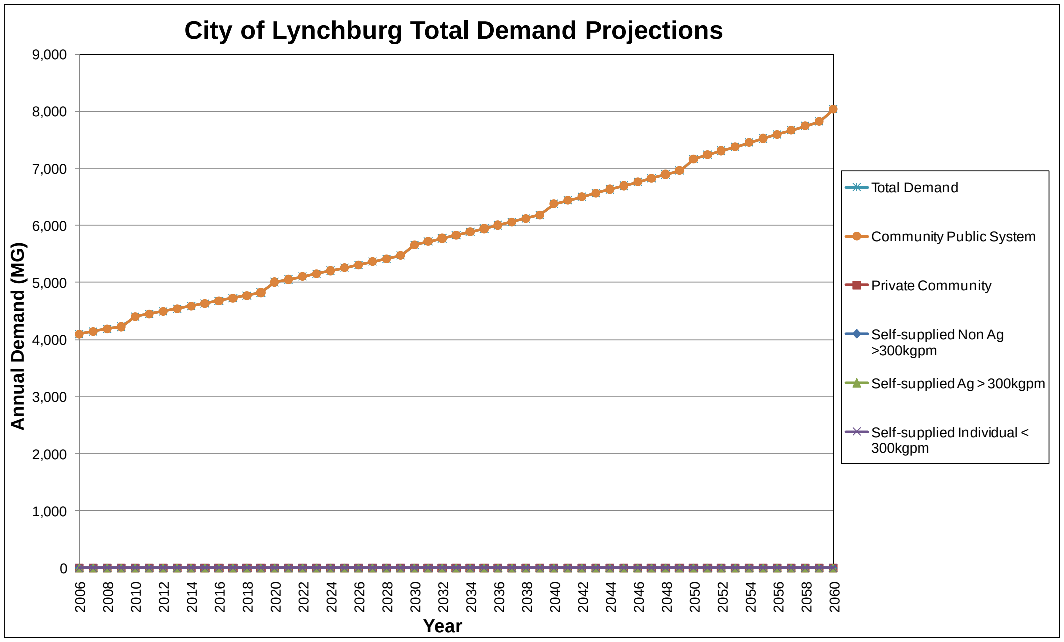


Figure 5.4.8C: City of Lynchburg Annual Total Demand Projections



5.4.9 Town of Altavista

The projected water demands for the public community water system in the Town of Altavista are presented in Figure 5.4.9A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the Town of Altavista are presented in Figure 5.4.9B. The total projected water demand for the Town of Altavista is presented in Figure 5.4.9C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.9A: Town of Altavista Annual Average Public CWS Demand Projections

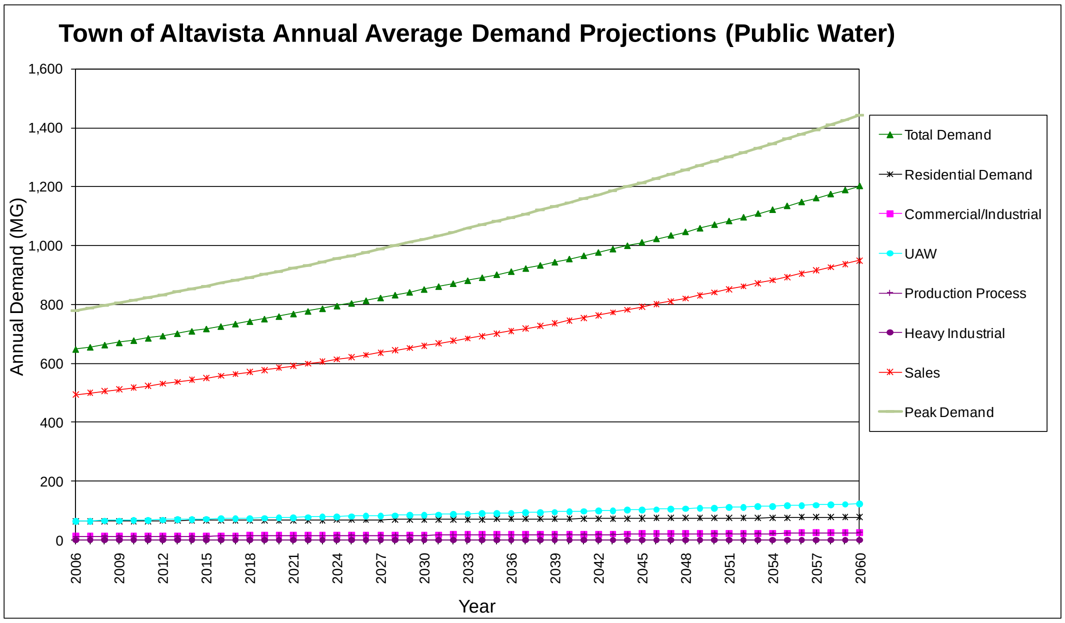


Figure 5.4.9B: Town of Altavista Annual Average Private Water Demand Projections

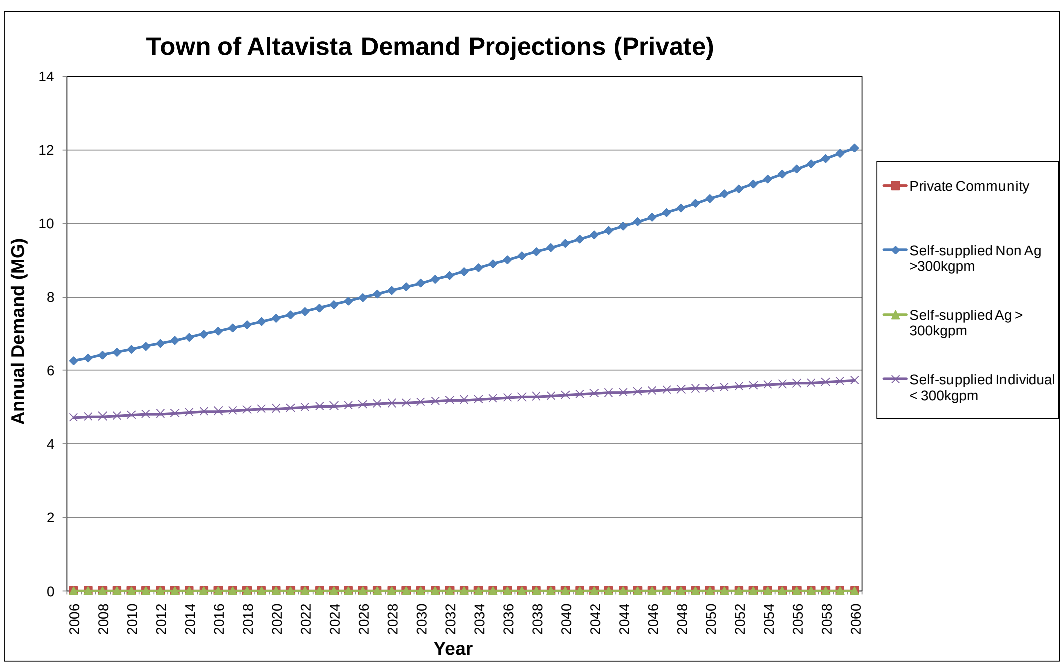
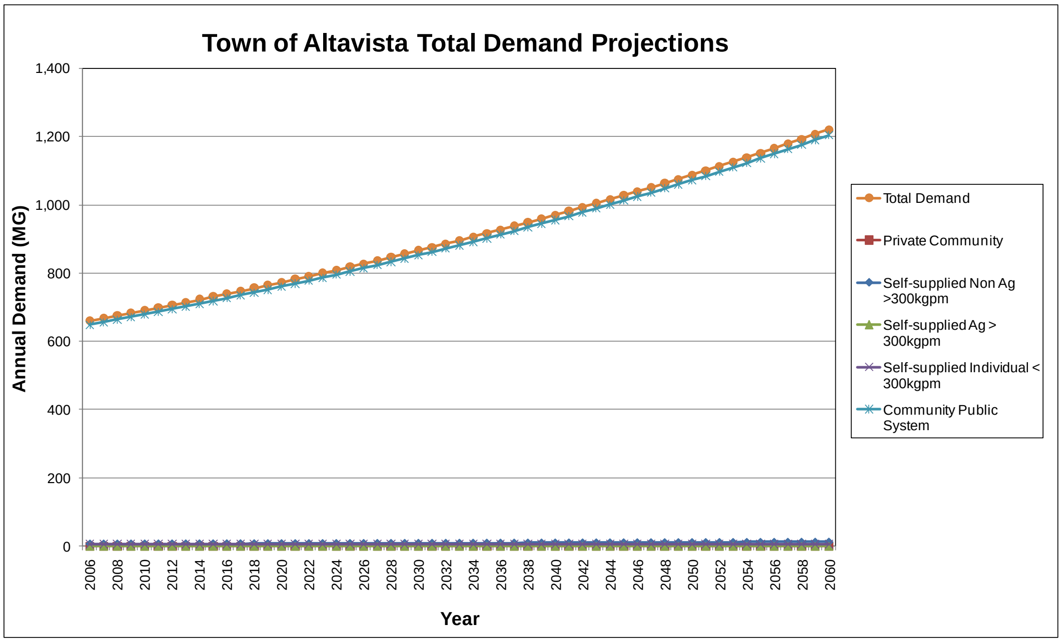


Figure 5.4.9C: Town of Altavista Annual Total Demand Projections



5.4.10 Town of Amherst

The projected water demands for the public community water system in the Town of Amherst are presented in Figure 5.4.10A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the Town of Amherst are presented in Figure 5.4.10B. The total projected water demand for the Town of Amherst is presented in Figure 5.4.10C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.10A: Town of Amherst Annual Average Public CWS Demand Projections

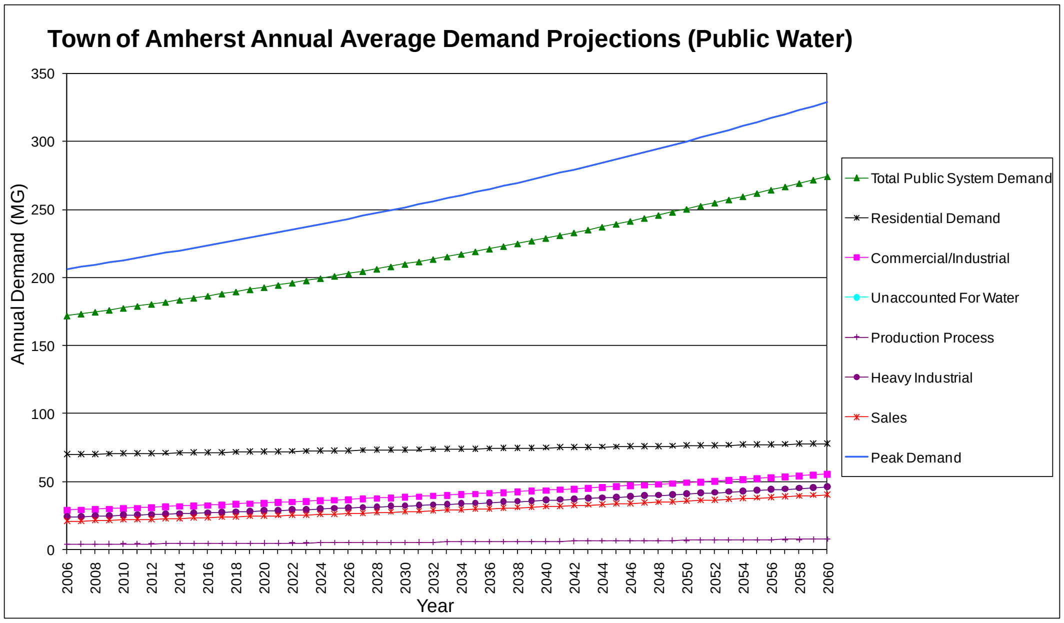


Figure 5.4.10B: Town of Amherst Annual Average Private Water Demand Projections

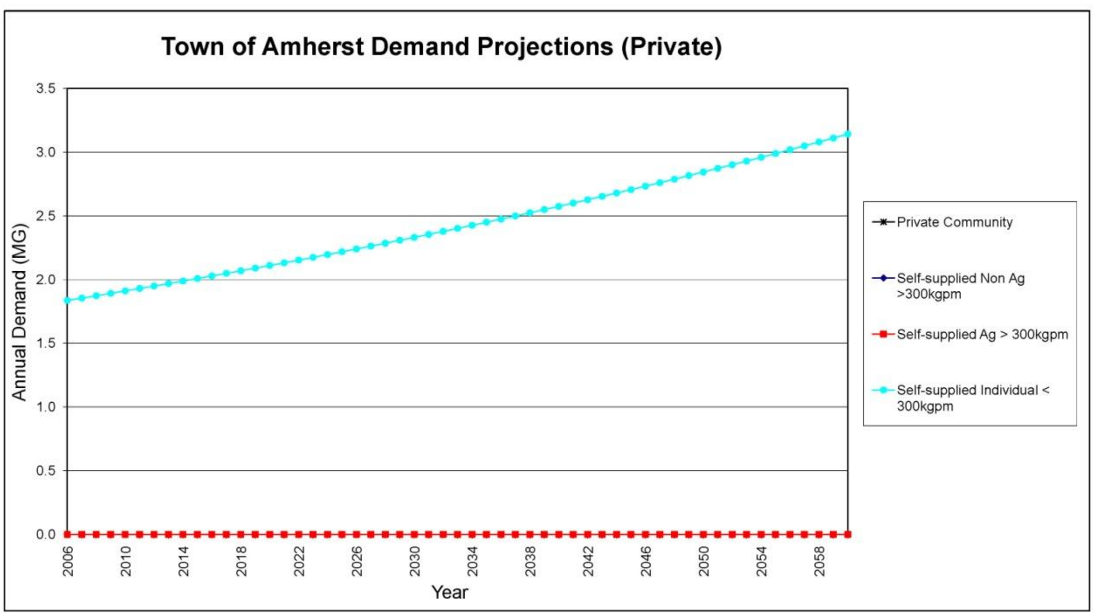
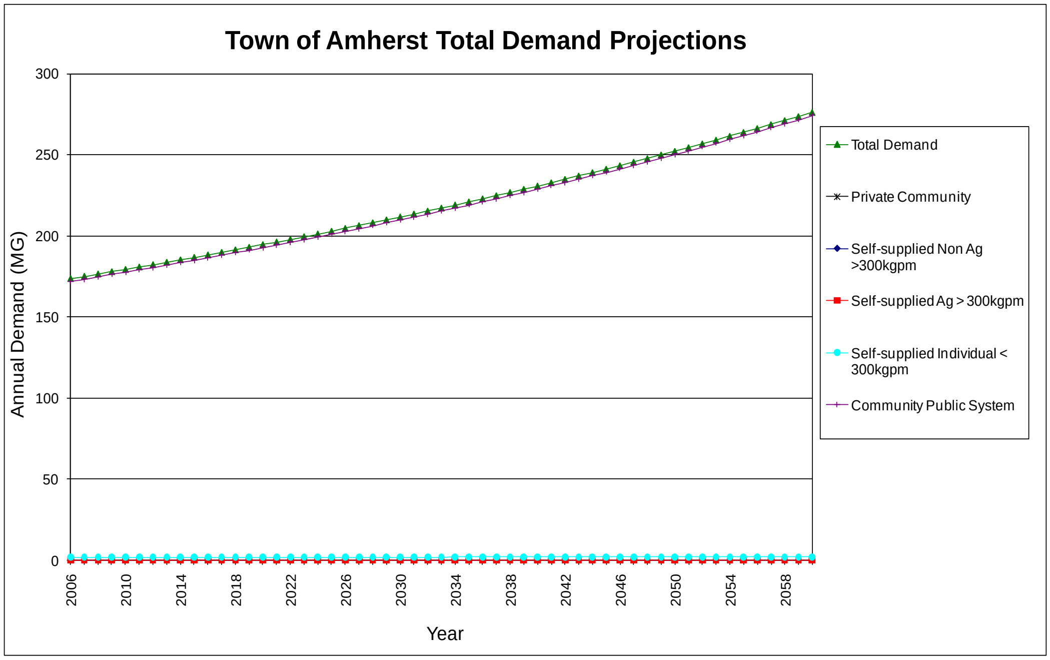


Figure 5.4.10C: Town of Amherst Annual Total Demand Projections



5.4.11 Town of Appomattox

The projected water demands for the public community water system in the Town of Appomattox are presented in Figure 5.4.11A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the Town of Appomattox are presented in Figure 5.4.11B. The total projected water demand for the Town of Appomattox is presented in Figure 5.4.11C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.11A: Town of Appomattox Annual Average Public CWS Demand Projections

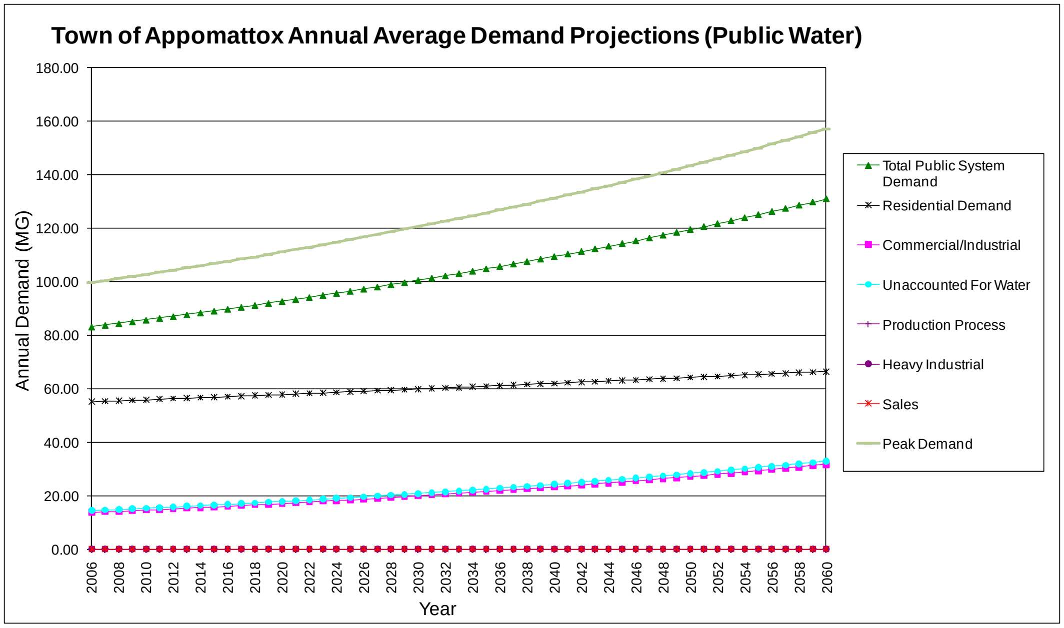


Figure 5.4.11B: Town of Appomattox Annual Average Private Water Demand Projections

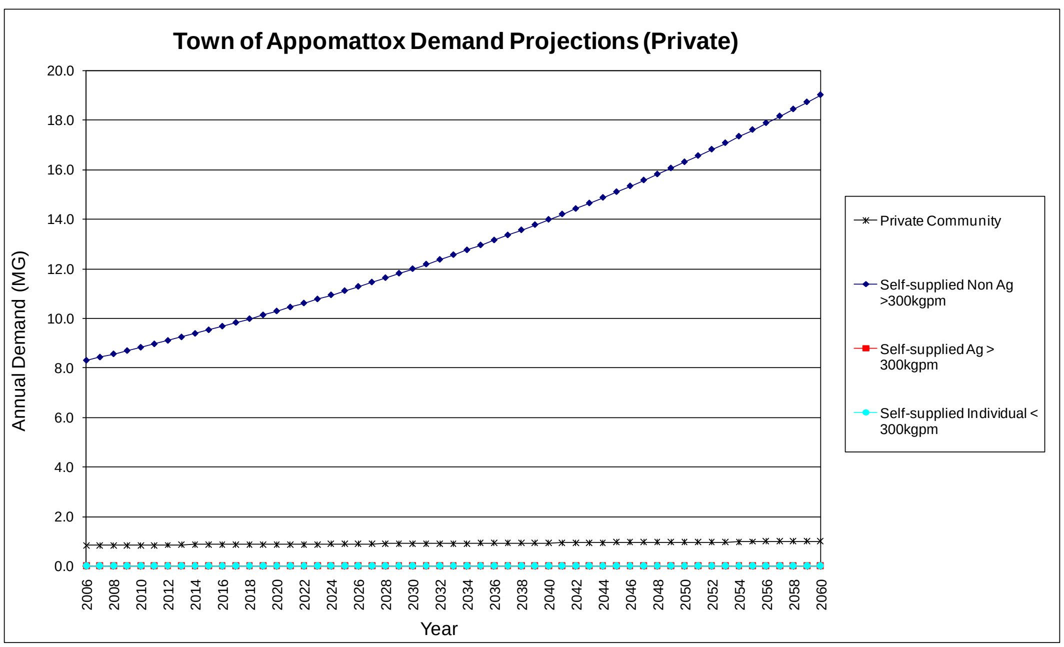
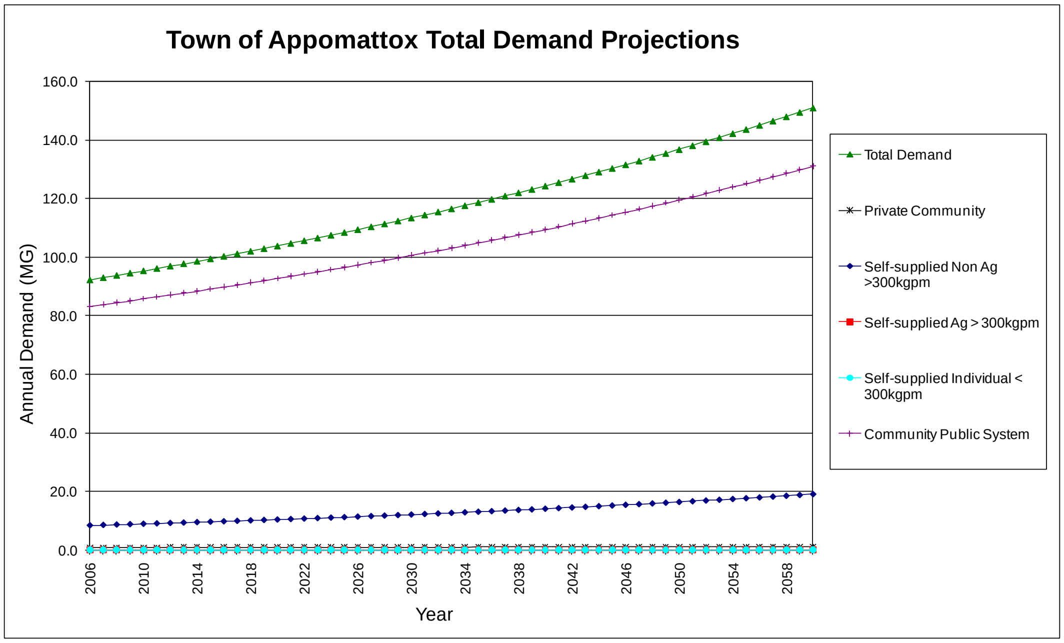


Figure 5.4.11C: Town of Appomattox Annual Total Demand Projections



5.4.12 Town of Brookneal

The projected water demands for the public community water system in the Town of Brookneal are presented in Figure 5.4.12A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the Town of Brookneal are presented in Figure 5.4.12B. The total projected water demand for the Town of Brookneal is presented in Figure 5.4.12C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.12A: Town of Brookneal Annual Average Public CWS Demand Projections

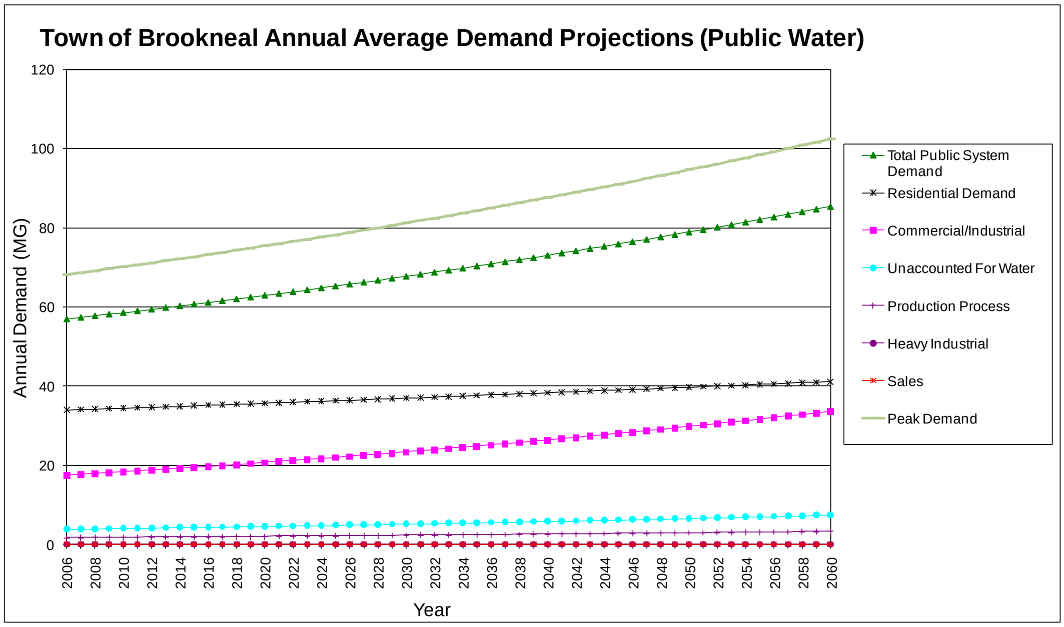


Figure 5.4.12B: Town of Brookneal Annual Average Private Water Demand Projections

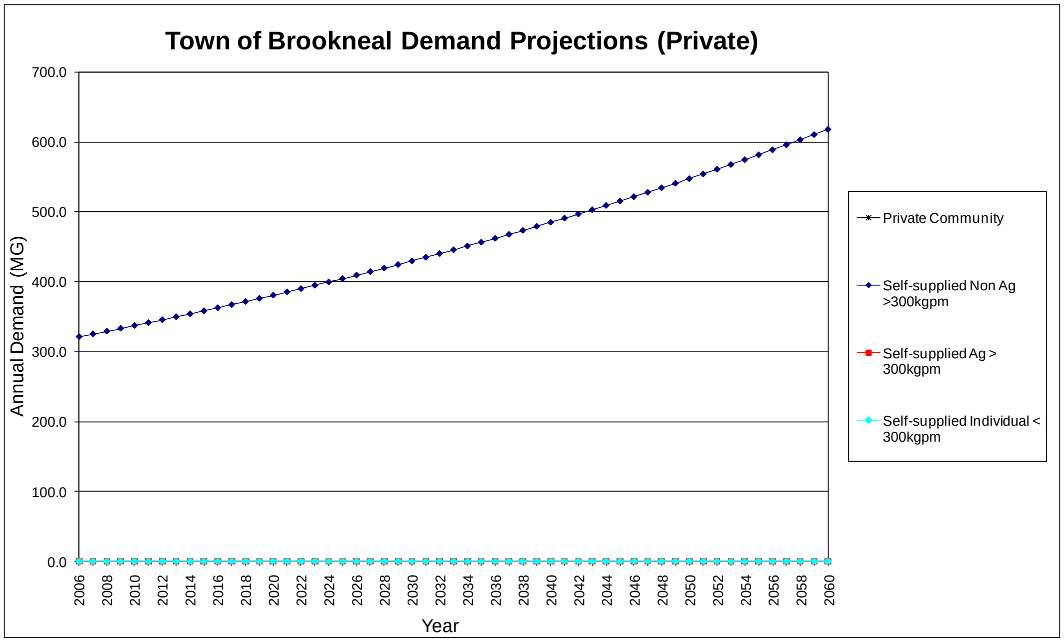
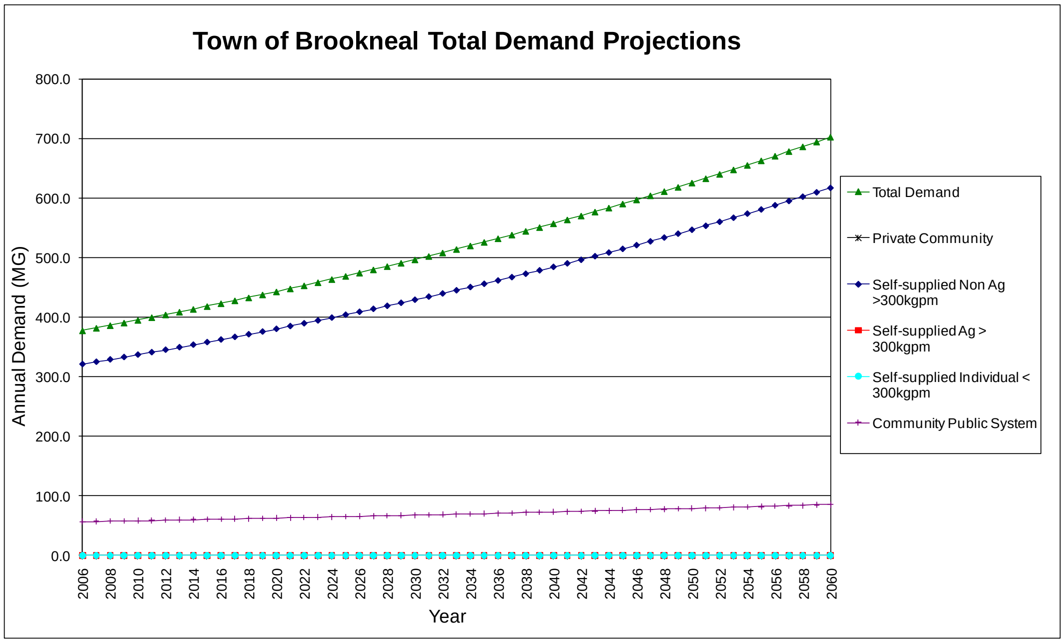


Figure 5.4.12C: Town of Brookneal Annual Total Demand Projections



5.4.13 Town of Pamplin City

The projected water demands for the public community water system in the Town of Pamplin City are presented in Figure 5.4.13A. The projected water demands for the private community water systems; self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells in the Town of Pamplin City are presented in Figure 5.4.13B. The total projected water demand for the Town of Pamplin City is presented in Figure 5.4.13C. Please refer to Appendix D for calculations on the estimated population, annual average water demand, monthly peak water demand, and annual average demand disaggregated into appropriate categories of use for each community water system. In addition, calculations for the self-supplied, non-agricultural users; self-supplied, agricultural users; and self-supplied users using individual groundwater wells are included in Appendix D.

Figure 5.4.13A: Town of Pamplin City Annual Average Public Water Demand Projections

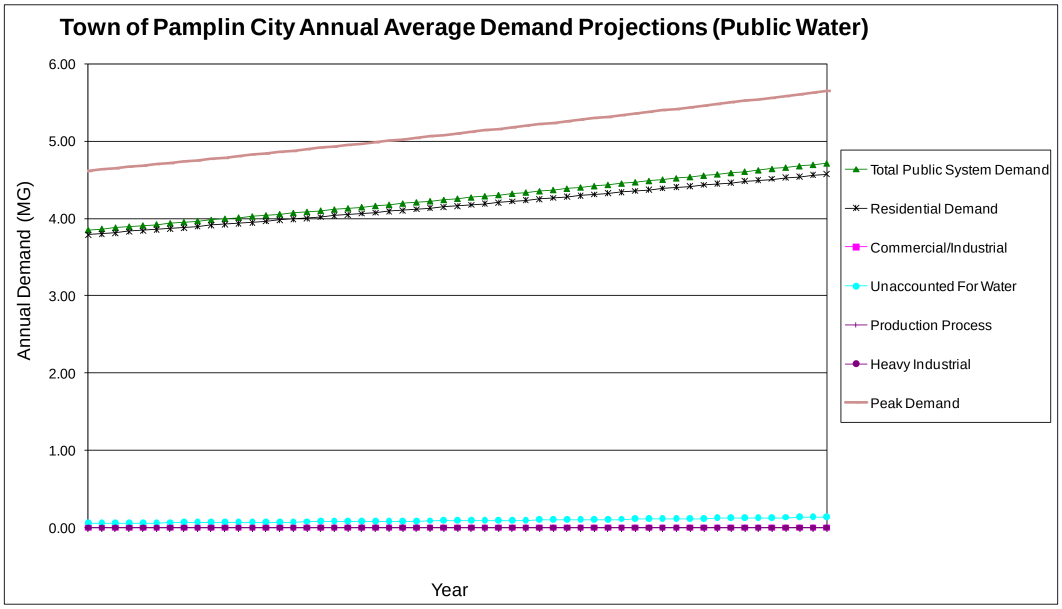


Figure 5.4.13B: Town of Pamplin City Annual Average Private Water Demand Projections

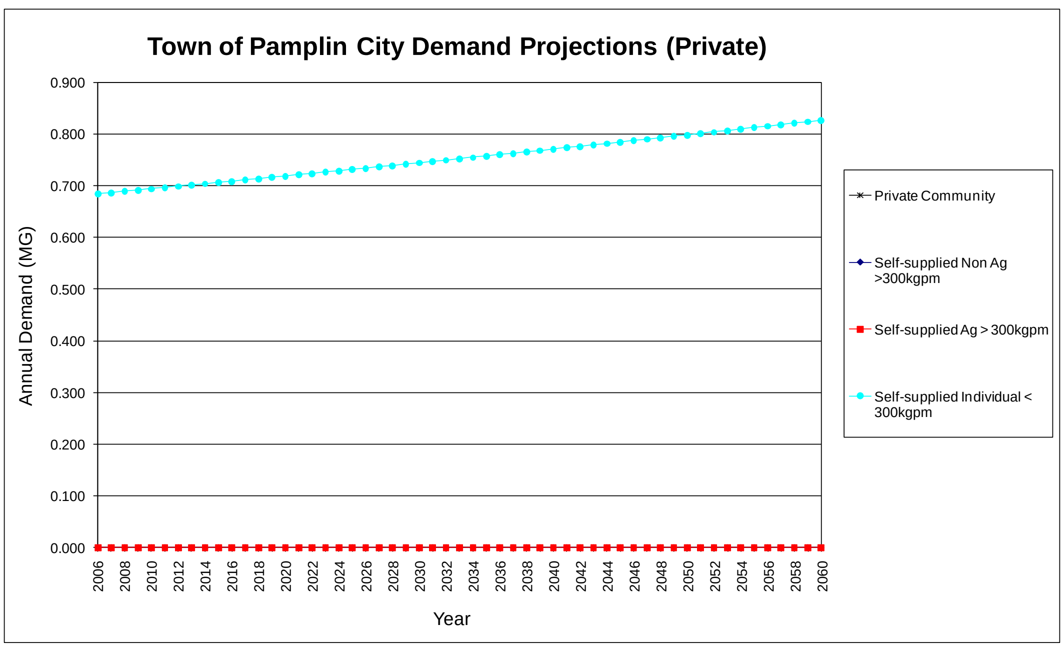
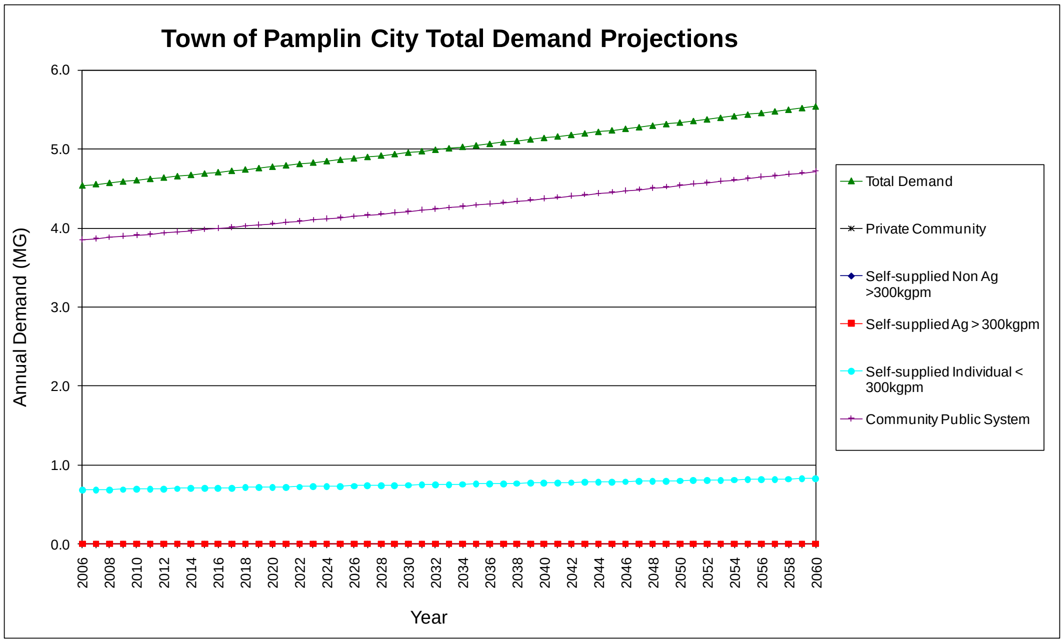


Figure 5.4.13C: Town of Pamplin City Annual Total Demand Projections



6.0 WATER DEMAND MANAGEMENT INFORMATION

The Local and Regional Water Supply Planning Regulation requires the Plan to address conservation as a part of overall water demand management in accordance with practices for more efficient water use, water conservation measures through reduction of use, and practices to reduce water loss. Each is described in more detail in the following sections. Please note that information for the counties of Amherst, Bedford, Campbell, and Nelson was provided by the ACSA, BCPSA, CCUSA, and NCSA, respectively.

6.1 Practices for More Efficient Use[22]

As required by the Regulations, practices for more efficient water use currently in place within the region are described below. The type of measures described may include, but are not limited to, the adoption and enforcement of the Virginia Uniform Statewide Building Code (VUSBC) sections that limit maximum flow of water closets, urinals and appliances; use of low-water use landscaping; and increases in irrigation efficiency.

6.1.1 Virginia Uniform Statewide Building Codes

The VUSBC is a state regulation promulgated by the Virginia Board of Housing and Community Development (Board). The Board is appointed by the Governor of Virginia for the purpose of establishing minimum regulations to govern the construction and maintenance of buildings and structures. The provisions of the VUSBC are based on nationally recognized building and fire codes published by the International Code Council, Inc. The 2003 editions of the International Codes are incorporated by reference into the VUSBC.

The following jurisdictions in the Region 2000 region adopted the VUSBC in the year noted: the cities of Bedford (1973) and Lynchburg (2003); the counties of Amherst (1974), Appomattox (1974), Bedford (1974), Campbell (2001), and Nelson (2003); and the towns of Altavista (2001), Amherst (1974), Appomattox (2005), Brookneal (2001) and Pamplin (2005). The VUSBC requires 1.6 gallon-per-flush toilets and limits the maximum allowable flow rates for showerheads and faucets to 1.5 gallons-per-minute.

[22] 9 VAC 25-780-110 A.

The codes are generally enforced in the region by the “jurisdiction” or “County or City” Building Official through plan reviews and routine inspections.

Section 104.1 of the VUSBC includes a provision for small localities to enter into an agreement with another governing body to enforce the code. The towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin have agreements with their respective counties; therefore, the counties enforce the codes for the towns.

6.1.2 Other Practices for Water Use Efficiency

The following jurisdictions implement practices for more efficient water use: counties of Amherst, Campbell, and Nelson; cities of Bedford and Lynchburg; and the towns of Altavista, Amherst, Appomattox, and Brookneal. Practices for more efficient water use include, but are not limited to, practices to increase irrigation efficiency, participating in the U.S. Environmental Protection Agency (USEPA) Water Sense Program, adopting ordinances declaring wasteful water use unlawful, and other practices.

The following jurisdictions are currently implementing practices to increase irrigation efficiency (i.e., not offering sewer credits during irrigation months, requiring irrigators to invest in irrigation meters, water recycling, etc.): counties of Amherst and Campbell, City of Bedford, and Town of Amherst. Please note that the ACSA and CCUSA oversee implementation of practices for the counties of Amherst and Campbell, respectively.

CCUSA requires irrigation meters for all permanent irrigation systems using public water in Campbell County. In addition, neither ACSA nor CCUSA offer sewer credits during irrigation months. The City of Bedford requires irrigators to invest in a separate water tap with meter, and the Town of Amherst limits irrigation during drought situations.

The following have adopted ordinances/policies declaring excessive water use unlawful: Amherst County; cities of Bedford and Lynchburg; and towns of Altavista, Amherst, and Appomattox. Amherst County, the City of Bedford, and the Town of Amherst adopt these policies during periods of water shortages and droughts. The City of Lynchburg considers unauthorized opening and use of fire hydrants, as well as not keeping plumbing in good repair, a Class 3 misdemeanor.

In addition to the practices discussed above, the following implement additional practices for more efficient water use: counties of Campbell and Nelson and the City of Bedford. Please note that the CCUSA and NCSA oversee implementation of practices for the counties of Campbell and Nelson, respectively.

The CCUSA has instituted a meter replacement program. The CCUSA meter replacement program is funded through Campbell County's Capital Improvement Program (CIP). The goal of the meter replacement program is to have all meters replaced or relatively new meters modified for radio read within the next 7-8 years. This will be accomplished by replacing approximately 700-800 meters per year at a cost of approximately $110,000 per year.

In addition, the NCSA recycles sample monitoring water at the water treatment plant. The City of Bedford encourages conservation through their Erosion & Sediment Control Program as well as water recycling (e.g., car washes). ACSA, NCSA, and the City of Bedford also publish public education brochures describing methods to reduce home water use and place water conservation information on the City's website to reduce water use in the home.

6.2 Water Conservation Measures through Reduction of Use[23]

As required by the Regulation, water conservation measures to conserve water through the reduction of use in the region are described below. The types of measures described may include, but are not limited to, technical, educational and financial programs.

6.2.1 Technical Programs

The following jurisdictions implement technical programs to address water conservation through reduction of use: counties of Amherst, Bedford, Campbell; City of Bedford; and towns of Amherst, Appomattox, and Pamplin. Please note that the ACSA, BCPSA, and CCUSA implement technical programs in the counties of Amherst, Bedford, and Campbell, respectively. Practices to address water conservation through reduction of use may include, but are not limited to, adjusting standard operating procedures at facilities to

[23] 9 VAC 25-780-110 B.

reduce water use, installation of low-flow and/or no-flow fixtures (e.g., faucets, showers, urinals) in government buildings and facilities, offering "yard taps" to customers, using Clean Water State Revolving Funds (CWSRF) or Drinking Water State Revolving Funds (DWSRF) to upgrade/retrofit facility fixtures, build new facilities, or purchasing efficient landscape irrigation equipment for publicly owned facilities (e.g., buildings, parks, golf courses).

The BCPSA and the Town of Appomattox have adopted local ordinances that address water conservation through reduction of use. Bedford County's Major Emergency and Disaster Plan includes a set of prepared ordinances that may be enacted in the event of an emergency related to water shortage or threat of water shortage. The plan was developed under guidance from the Virginia Department of Emergency Services and will be discussed in more detail in the Drought Response and Contingency Plan for the region.

In addition, the ACSA, BCPSA, and the Town of Amherst have adjusted their standard operating procedures to improve water conservation. The ACSA rebuilt the water treatment plant filters with new media allowing longer filter runs. In addition, the flocculation and sedimentation basins are skimmed to remove floating matter (i.e., pollen) only as necessary, and the sample pump operation times at water treatment plant have been minimized. The BCPSA added a backwash recovery system to the treatment unit at their High Point Water Treatment Plant. Water loss from backwashes has been reduced from 10% to 1%. The Town of Amherst replaced old leaky infrastructure as well as replaced the filter media at the water treatment plant for longer filter runs. The Town of Amherst has also installed non-potable hydrants around the treatment plant for washing down process units.

The following jurisdictions have installed low-flow and/or no-flow fixtures in their facilities and/or government buildings in an effort to increase water savings through the reduction of use: counties of Amherst, Appomattox, Bedford, Nelson; City of Bedford; and towns of Amherst and Pamplin. The ACSA installed low-flow fixtures throughout their water treatment facilities. All new fixture replacements in the government buildings and facilities are completed with low-flow and/or no-flow fixtures. Appomattox County installed low-flow fixtures in the recent renovations to the courthouse. The BCPSA and NCSA are also phasing out extensive water using devices in favor of low-flow fixtures. Finally, the Town of Amherst installed low-flow fixtures in their water treatment plant as well as in government buildings and the Town of Pamplin installed low-flow fixtures in government buildings.

In an effort to increase customer awareness of outdoor water use, the ACSA, BCPSA, CCUSA, and NCSA will provide "yard taps" to their customers for purchase.

Finally, the Town of Pamplin recently received a low interest loan through DWSRF to upgrade facilities.

6.2.2 Educational Programs

The following implement educational programs to address water conservation through reduction of use: Amherst County, the City of Bedford, and the Town of Amherst. Please note that the ACSA implements educational programs in Amherst County.

The City of Bedford has sent out brochures in the past discussing water conservation and additional information is placed on the City's website.

The ACSA adjusts the water rate each year to reflect the true cost of service. The ACSA also maintains educational flyers discussing water conservation tips. These flyers are also provided to the Town of Amherst to use as well. ACSA additionally posts these tips on their portion of the county website. The Town of Amherst allows schools to tour their facilities providing an opportunity to educate students on water conservation methods. The Town of Amherst has also used CWSRF/DWSRF to promote water conservation education through development and implementation of water conservation plans, public education programs, and/or ordinances to conserve water.

6.2.3 Financial Programs

The following jurisdictions implement financial programs or practices to address water conservation through reduction of use: counties of Bedford and Nelson, and Town of Amherst. Please note that the BCPSA and NCSA implement financial programs in the counties of Bedford and Nelson, respectively. Financial programs or practices may include, but are not limited to, a water conservation rate structure that encourages reduction of water use by increasing water rates with increasing water usage.

The BCPSA follows the water provider's conservation practices for consecutive systems. The NCSA implements a water conservation rate structure that encourages reduction of water use by increasing water rates with increasing usage. The minimum rate allows up to 4,000 gallons per month. A higher rate is applied for usage over the minimum 4,000 gallons per month.

The ACSA and Town of Amherst encourage their commercial users to recycle to save water and directs them to VDEQ for potential state incentives for reuse.

6.3 Practices to Reduce Water Loss[24]

As required by the Regulation, practices to address water loss in the maintenance of water systems to reduce unaccounted for water are described below. The types of items described may include, but are not limited to, leak detection and repair, and old distribution line replacement. Please note that the ACSA, BCPSA, CCUSA, and NCSA implement such practices for the counties of Amherst, Bedford, Campbell, and Nelson, respectively.

6.3.1 Connection Meters

The following have both source and service connection meters: ACSA, BCPSA, NCSA, cities of Bedford and Lynchburg, and Town of Amherst. The ACSA source meters are read on a daily basis while service meters for businesses and residences are read on a monthly and bi-monthly basis, respectively. The ACSA meters are replaced after 15 years of service to avoid water losses due to meter under registration. In addition, the ACSA replaces lines with a history of leaks.

The BCPSA source meters at the High Point Water Treatment Plant are read every six seconds using a SCADA system. Source meters for groundwater wells are read daily and source meters from Lynchburg are read monthly. All service meters are currently read on

[24] 9 VAC 25-780-110 C.

bi-monthly basis; however, the BCPSA hopes to implement monthly reading and billing of service meters by July 1, 2009. The BCPSA is in the process of implementing a meter replacement program where older and less accurate meters are being replaced with new radio read meters. Manually read meters are selected for replacement based on the following: distance from other meters, usage on the meter, and areas where the BCPSA would like to increase meter reading speed. The BCPSA spends approximately $150,000 per year and expects to replace all meters in the next five years.

The NCSA source meters are read on daily basis while service meters for businesses and residences are read on a monthly and bi-monthly basis, respectively. The NCSA periodically checks meter accuracy and maintains meters monthly based upon reports of condition.

Source and service meters for the City of Bedford are read on a monthly basis. Meters are automatically read using an AMR system, which has been in place for approximately 2.5 years. Maintenance requests and replacement orders are provided to the Public Works Service Department when necessary by personnel reading the meters. The City of Bedford is also working on plan to complete regular water audits of the system in an effort to ensure correct meter readings.

Source (read continuously) and service meters for the City of Lynchburg are read on a monthly basis. Currently, approximately 15% of the meters are AMR meters. The City of Lynchburg estimates that the entire system will have AMR technology in the next 12 to 15 years.

Source meters for the Town of Amherst are read on a daily basis while service meters for businesses and residences are read on a monthly and bimonthly basis, respectively. Service meters are replaced when they reach 100,000 gallons. In addition, large meters are tested bi-annually for accuracy and meters and lines with a history of leaks are replaced. Finally, water tank levels are monitored daily to identify potential leaks.

The following have only service connection meters: CCUSA and the towns of Appomattox, Brookneal, and Pamplin. Service meters for CCUSA are read on a bi-monthly basis. The CCUSA is in their third year of a seven year program to convert the existing meters to AMR. The AMR meters will then be replaced every 15 years.

Service meters for the Town of Brookneal are read on a monthly basis. Service meters are repaired when a problem is identified during meter reading and replaced when they no longer function properly. Finally, service meters for the towns of Appomattox and Pamplin are also read on a monthly basis.

6.3.2 Leak Detection

The following have implemented leak detection practices to reduce water loss: ACSA, CCUSA, and NCSA; cities of Bedford and Lynchburg; and towns of Amherst, Altavista, and Appomattox. Leak detection practices may include, but are not limited to, regularly scheduled water audits, development of education programs to reduce customer-side water loss such as offering leak detection tablets and conducting customer leak detection audits.

ACSA, CCUSA, NCSA, City of Bedford, City of Lynchburg, and the Town of Amherst implement operating strategies for leak detection through regularly scheduled water audits to reduce water loss. In addition, ACSA, CCUSA, and NCSA perform a water production versus water sold audit each month. NCSA has also purchased leak detection equipment.

The City of Bedford completes water audits on a quarterly basis or when there is a noticeable increase in unaccounted for water. Water operators survey the entire water system using a device that monitors frequency changes in the water pipe when water is being released under pressure. This method is able to alert the City of a possible water leak in a certain area and with further investigation, the leak can usually be found within a few feet.

The City of Lynchburg completes water audits on a quarterly basis. Large leaks can be identified through the SCADA software and attended to immediately.

The ACSA and Town of Amherst performs an annual review of all data in an effort to keep their unaccounted for water below 10%.

The following have developed or implemented educational programs to reduce customer side water loss: ACSA, CCUSA, NCSA, and towns of Altavista and Appomattox. The ACSA provides educational literature to customers, as well as providing detailed instructions over the phone for determining fixture leaks versus private service line leaks (underground leaks).

The CCUSA notifies customers when water bills reflect a possible leak and may adjust a customer's bill when a leak or break on the customer's side could not reasonably be detected until notification of a high consumptive bill is received. If an adjustment is warranted, the adjustment may be made to one or two consecutive billing cycles if the leak or break is repaired within 15 days after notification or receipt of bill indicating excessive water consumption.

The NCSA staff assists customers in determining water use excesses and provides leak detection tablets at no cost to the consumer. The Town of Altavista also provides leak detection tablets and assistance from the meter readers. Finally, the Town of Appomattox may provide customers with a monitoring device, which is mounted on their refrigerator, for several days to detect leaks.

6.3.3 Line Replacement

The following have programs or operating strategies in place for the repair or replacement of water mains, service connections, fire hydrants, valves, etc. to reduce water loss: ACSA, BCPSA, CCUSA, and NCSA; cities of Bedford and Lynchburg; and towns Altavista, Amherst, Appomattox, Brookneal, and Pamplin.

The ACSA requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss.

The CCUSA has an ordinance in place that requires water users to repair leaking fixtures, appliances, and/or plumbing. In addition, CCUSA requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. All fire hydrants are tested on a regular basis through a fire hydrant maintenance program. CIP funds are also used to replace older problematic water mains.

The BCPSA requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. The BCPSA includes dedicated funds to upgrade existing facility infrastructure in their CIP.

The NCSA requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. In addition, NCSA maintains an inventory of replacement parts and equipment on hand for emergency repairs as well as utilizing funds in their CIP for improvements.

The City of Bedford requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss.

The City of Lynchburg has a policy in place that requires water users to repair leaking fixtures, appliances, and/or plumbing. Monetary penalties can be implemented for wasteful water users or for water users that are not keeping plumbing in good repair. In addition, the City of Lynchburg requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. A crew is on standby 24 hours a day and can respond to water line breaks within an hour. The City has developed standard operating procedures for water main break repairs as well as supplying field crews with laptops with instant access to GIS data of the area. The water main breaks are logged in a database to identify problematic areas in the City. Finally, CIP funds are utilized for infrastructure repair and replacement as needed.

The Town of Altavista requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. In addition, the town utilizes CIP funds for infrastructure improvements.

The Town of Amherst requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. In addition, the town utilizes CIP funds for infrastructure improvements.

The Town of Appomattox has a policy in place that requires water users to repair leaking fixtures, appliances, and/or plumbing and requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss.

The Town of Brookneal requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss. In addition, the town utilizes CIP funds for infrastructure improvements.

The Town of Pamplin requires immediate repair to damaged or leaking service connections, fire hydrants, valves, etc., to reduce water loss.

6.3.4 Other

The following have practices or policies in place in an effort to track unauthorized connections (e.g., tapping of fire hydrants): counties of Amherst and Campbell; City of Lynchburg; and the towns of Amherst, Appomattox, and Brookneal. In Amherst County, citizen monitoring has been effective in identifying water theft. When an unauthorized water connection is identified, the individual(s) are required to pay the County for water used. The individuals are confronted by a deputy sheriff, and prosecution may occur if there is a reoccurrence.

In Campbell County, police and fire officials stop and question anyone connected to fire hydrants. The County also prints annual articles in the local newspaper regarding water theft.

In the City of Lynchburg, water theft is a Class 2 misdemeanor carrying a fine of $200. The Town of Appomattox personnel as well as the Appomattox Sheriff's department monitors fire hydrants and citizens and police monitor the fire hydrants in the Town of Brookneal.

Finally, the City of Bedford has implemented land disturbing activity inspections and monitoring as additional water loss reduction practices.

7.0 DROUGHT RESPONSE AND CONTINGENCY PLANS

The Local and Regional Water Supply Planning Regulation requires the Plan to develop a Drought Response and Contingency Plan (9 VAC 25-780-120) for community water systems and self-supplied users who withdraw more than an average of 300,000 gallons per month of water. The Drought Response and Contingency Plan addresses the unique characteristics of the water source being utilized and the nature of the beneficial use of water as well as following three graduated stages of responses to the onset of drought conditions as required by the regulation. In addition, the Drought Response and Contingency Plan includes local ordinances adopted by each locality describing the procedures for the implementation and enforcement of the Drought Response and Contingency Plan. A copy of the Drought Response and Contingency Plan for the region is included in Appendix E.

8.0 STATEMENT OF NEED

8.1 Methodology

Current Public Water System (PWS) capacities were compared to the annual treated water demand projections for each Region 2000 partner (see Section 5.4), to determine when the localities and the Region as a whole can be expected to experience a deficit or surplus of water. The projected demands reflect the average day demand on the existing PWS. Capacities were defined as the limiting capacity for each water supply source. For example, if a supply source has a safe yield of 4 mgd, but the treatment capacity is only 2 mgd, then the limiting capacity was defined as 2 mgd. In addition, sales between Region 2000 localities were not included in the demand projections or capacities so that the total need for the Region can be accurately calculated. Water sales to or purchases from communities outside of Region 2000 were factored into the deficit-surplus calculations. A summary of the PWS capacities used to calculate the local and regional needs for the Region 2000 localities is presented in Table 8.1.1, below.

Table 8.1.1 Summary of PWS Capacities for Region 2000 Localities

Community	Total Existing PWS Capacity (MG/Yr)	Total Existing PWS Capacity (MGD)	Limiting Factor
Amherst County	730.0	2.00	Lanum WTP capacity (2.0 MGD)
Appomattox County	0.0	0.00	County does not currently have PWS
Bedford County	287.5	0.79	VDH permitted capacity for groundwater wells (0.265 MGD), High Point WTP capacity (0.5 MGD), and purchases from WVWA (0.02 MGD)
Campbell County	1,611.0	4.41	VDH permitted capacity for groundwater wells (0.291 MGD), and Otter River WTP capacity (4.1 MGD)
Nelson County	287.5	0.79	WTP capacities: Schuyler/Gladstone (0.1 MGD), Coleen/Lovingston (0.14 MGD), Wintergreen Partners (0.547 MGD)
City of Bedford	730.5	2.00	Safe yield of Stoney Creek (1.8 MGD) and groundwater wells (0.2 MGD)
City of Lynchburg	8,766.0	26.0	Combined treatment capacities of the College Hill WTP and Abert WTP
Town of Altavista	1,095.8	3.00	WTP capacity (3.0 MGD)
Town of Amherst	365.0	1.00	VDH permitted capacity for Buffalo River intake (1.0 MGD)
Town of Appomattox	120.0	0.33	VDH permitted capacity for groundwater wells

Town of Brookneal	137.0	0.38	VDH permitted capacity for Phelps Creek Reservoir (0.375 MGD)
Town of Pamplin	12.8	0.04	VDH permitted capacity for groundwater wells
Total for Region:	14,143	40.75	

8.2 Comparison of Supply and Demand

8.2.1 Region 2000 – Entire Region

Based on the potable average day demand projections presented in Section 5.4 and the total existing PWS capacities for the Region 2000 localities (presented in Table 8-1), the Region is projected to experience a water supply surplus of 1.98 mgd by the Year 2060. It should be noted that there is some uncertainty associated with any point estimate of future deficit (or surplus) 50 years out into the future. This surplus is based on current limiting capacities and total demands (excluding sales to other localities). As shown in Figures 8.2.1.1 and 8.2.1.2, a large surplus is projected for the Lynchburg PWS, which provides support to the alternatives that involve an interconnection with Lynchburg; however, several other localities (such as Amherst and Bedford Counties) are projected to experience large water supply deficits by the Year 2060.

Additional private demand (from groundwater and surface water sources) on the order of 17 mgd may be needed to supply residential and agricultural users in the outlying areas of the region that are not served through expansions of the Region 2000 Localities' water systems. It should be noted that if some of the projected private system demand became PWS demand through the expansion of the service area to a greater extent than assumed, then this would increase the future PWS deficit projections.

Table 8.2.1.1 summarizes the Year 2060 local and regional needs for both public and private water systems.

Table 8.2.1.1 Summary of 2060 Water Needs by Community and as the Total Region

	2060 Average Day Demand Projections[6]			Total Existing PWS Capacity[3]	Public Water Supply System Deficit or Surplus	Additional Demand on Private Systems[4]
	Public System[1]	Private Systems[2]	Total Demand			
Community	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**	**MGD**
Amherst County[7]	5.03	1144	16.47	2.00	**-3.03**	3.74
Appomattox County[5]	0.96	123	2.19	0.00	**-0.96**	0.18
Bedford County	3.91	26.04	29.95	0.79	**-3.12**	1158
Campbell County	3.78	3.21	6.99	4.41	**0.63**	0.60
Nelson County	0.80	2.19	3.00	0.79	**-0.02**	0.45
City of Bedford	168	0.00	168	2.00	**0.32**	0.00
City of Lynchburg	17.75	0.13	17.88	26.02	**8.27**	0.06
Town of Altavista	3.29	0.05	3.34	3.00	**-0.29**	0.02
Town of Amherst	0.97	0.01	0.98	100	**0.03**	0.00
Town of Appomattox	0.36	0.05	0.41	0.33	**-0.03**	0.03
Town of Brookneal	0.23	169	193	0.38	**0.14**	0.81
Town of Pamplin	0.01	0.00	0.02	0.04	**0.02**	0.00
Total for Region:	38.8	46.1	84.8	40.8	**198**	17

Notes:

[1]Projected demand for residential, commercial, institutional, industrial (light and heavy), military, production process, UAW, water sales

[2] Projected demand for privately-owned community systems, private self-supplied non-ag (>300,000 gal/mo), private self-supplied ag (>300,000 gal/mo), and private individual well users (<300,000 gal/mo)

[3] PWS capacity includes surface water and groundwater sources. Lowest capacity considered limiting for each system (i.e. if permit only allows 2 mgd, but plant is designed for 4 mgd, 2 mgd is limiting capacity). PWS Capacities also do not include water purchased from other Region 2000 localities.

[4] Increase in demand from 2006 to 2060 on private systems.

[5] No existing public water supply system in Appomattox County

[6] Demand projections for Lynchburg, Bedford County, Campbell County, and the Town of Amherst do not include water sales to other Region 2000 localities.

[7] With the expansion of the Lanum WFP to 4.0 MGD, Amherst County's 2060 public supply system deficit will be reduced to 103 MGD, and with the 2050 interconnection with the City of Lynchburg, all of Amherst County's deficit is eliminated.

Figure 8.2.1.1: Region and All Jurisdictions

Figure 8.2.1.2: Region and All Jurisdictions (ZOOMED)

8.2.2 Amherst County (ACSA)

Amherst County Service Authority (ACSA) is projected to experience a water supply shortage between 2018 and 2020, based on their current PWS capacity of 2.0 mgd (see Figure 8.2.2.1). Current plans to expand the Lanum Water Filtration Plant (WFP) from 2.0 mgd to 4.0 mgd capacity will provide ACSA with sufficient water supply until approximately 2050, at which time the County will replace its US Route 29 water mains and existing interconnection with the City of Lynchburg (discussed in further detail in the Alternatives Description Section). Under current capacity conditions, the 2060 deficit is expected to be approximately 3 mgd; however, after the expansion of the Lanum WFP, that deficit is reduced to approximately 1 mgd. This deficit would be eliminated by the planned 2050 replacement of ACSA's interconnecting mains with the City of Lynchburg. The County is also projected to need an additional 3.7 mgd from private sources to meet the needs of customers that are not supplied by the County's PWS.

Figure 8.2.2.1: Amherst County – Statement of Needs

8.2.3 Appomattox County

With the exception of the Town of Pamplin and Holiday Lake State Park, both of which are on central wells, the remainder of Appomattox County is generally rural and is currently served by individual wells not requiring a public water system. However, current growth plans (particularly along the Route 460 corridor) have resulted in PWS potable water demand projections that will cause the County to experience a shortage starting around 2009, when PWS demands are expected to be on the order of 6.7 MG/year. Without the development of a PWS source, or purchase agreement to buy water from another community, Appomattox County is expected to experience a total water deficit of approximately 1 mgd by the Year 2060 (see Figure 8.2.3.1). It should be noted that the County currently has plans to purchase water from Campbell County through an interconnection at Concord. This purchase will reduce the deficit by XX mgd. Further discussion of these plans can be found in the Alternatives Description section. It is estimated that an additional 0.18 mgd of supply will be required by 2060 to meet growing private water supply needs within the County.

Figure 8.2.3.1: Appomattox County – Statement of Needs

8.2.4 Bedford County (BCPSA)

Based on water produced by Bedford County Public Service Authority (BCPSA), they would already be experiencing a water supply shortage without current purchasing arrangements (Figure 8.2.4.1). The total PWS capacity for BCPSA is 0.79 mgd, which includes an estimated 7.5 MG/Year that is purchased from Western Virginia Water Authority (WVWA). The total deficit by 2060 is projected to be 3.0 to 3.5 mgd, based on a PWS capacity of 0.79 mgd. However, BCPSA purchases approximately 1.4 mgd from the City of Lynchburg, which is almost twice the total capacity of BCPSA's own system. Assuming that the amount of water purchased from Lynchburg remains the same, BCPSA is expected to experience a shortage around the Year 2015. Without the development of an additional PWS source or purchase agreement to buy additional water from another community, Bedford County is expected to experience a total water deficit of approximately 1.8 mgd by the Year 2060. It is estimated that an additional 11.6 mgd of supply will be required by 2060 to meet growing private water supply needs within the County.

Figure 8.2.4.1: Bedford County – Statement of Needs

8.2.5 Campbell County (CCUSA)

Campbell County Utility and Service Authority (CCUSA) currently sells water to an industry in the Town of Altavista. When the water sales are excluded from the demand projections, CCUSA is projected to experience a shortage of water around the Year 2057 (see Figure 8.2.5.1). This is based on a current PWS capacity of 4.4 mgd. If sales to Altavista are removed from the PWS demand projections, CCUSA is expected to have a surplus of approximately 0.6 mgd by 2060. CCUSA is also projected to need an additional 0.6 mgd from private sources to meet the needs of customers that are not supplied by the County's PWS.

Figure 8.2.5.1: Campbell County – Statement of Needs

8.2.6 Nelson County

Nelson County is expected to experience a water supply shortage starting around 2058, when projected PWS demands exceed the 0.79 mgd current PWS capacity (see Figure 8.2.6.1). Without the development of a PWS source, or purchase agreement to buy water from another community, Nelson County is expected to experience a total water deficit of approximately 0.02 mgd by the Year 2060. It is estimated that an additional 0.45 mgd of supply will be required by 2060 to meet growing private water supply needs within the County.

Figure 8.2.6.1: Nelson County – Statement of Needs

8.2.7 City of Bedford

The City of Bedford is projected to have sufficient PWS capacity to satisfy demand through 2060, based on their current 2 mgd capacity (safe yield of sources). The City's Stoney Creek Water Treatment Plant (WTP) has a capacity of 3 mgd, so additional potable supply is possible if a new raw water source was identified. By 2060, the City is expected to have a surplus of approximately 0.32 mgd (see Figure 8.2.7.1).

Figure 8.2.7.1: City of Bedford – Statement of Needs

8.2.8 City of Lynchburg

The City of Lynchburg currently sells water to several surrounding communities. When the water sales are excluded from the demand projections, the City is projected to experience a surplus of approximately 8.27 mgd in 2060. This is based on a total 2060 demand of 17.75 mgd and a total PWS capacity of 26.02 mgd. If sales to other Region 2000 communities are factored into the demand projection (increasing the 2060 demand to 22 mgd), the surplus for the City is reduced to approximately 4.0 mgd by the Year 2060. Figure 8.2.8.1 illustrates the total surplus (with and without sales) for 2006 through 2060. Lynchburg is also projected to need an additional 0.06 mgd from private sources by 2060 to meet the needs of customers that are not supplied by the City's PWS.

Figure 8.2.8.1: City of Lynchburg – Statement of Needs

8.2.9 Town of Altavista

The Town of Altavista is expected to experience a water supply shortage starting around 2052, when projected PWS demands exceed the 3.0 mgd current PWS capacity (see Figure 8.2.9.1). Without the development of a PWS source, or purchase agreement to buy water from another community, the Town of Altavista is expected to experience a total water deficit of approximately 0.3 mgd by the Year 2060. It is estimated that an additional 0.02 mgd of supply will be required by 2060 to meet growing private water supply needs within the Town.

Figure 8.2.9.1: Town of Altavista – Statement of Needs

8.2.10 Town of Amherst

The Town of Amherst currently provides water to residences and businesses in portions of Amherst County, which is included as part of their residential and employment demand. In addition, they sell water to Sweet Briar College, on the order of 21 MG per year. When the sales to Sweet Briar College are excluded from the demand projections, the Town is projected to experience a surplus of approximately 0.03 mgd in 2060. This is based on a total 2060 demand of 0.97 mgd and a total PWS capacity of 1.0 mgd. However, when peak day demands are considered (1.2 mgd peak day demand in 2060), the Town would be unable to supply enough water from its existing sources to meet the max day demand. If sales to Sweet Briar College or other Region 2000 communities are factored into the demand projection (increasing the average day 2060 demand to 1.14 mgd), the Town is projected to experience a deficit of approximately 0.14 mgd by the Year 2060. Figure 8.2.10.1 illustrates the total surplus/deficit (with and without sales) for 2006 through 2060.

Figure 8.2.10.1: Town of Amherst – Statement of Needs

8.2.11 Town of Appomattox

The Town of Appomattox is expected to experience a water supply shortage starting around 2051, when projected PWS demands exceed the 0.33 mgd current PWS capacity (see Figure 8.2.11.1). Without the development of a PWS source, or purchase agreement to buy water from another community, the Town of Appomattox is expected to experience a total water deficit of approximately 0.03 mgd by the Year 2060. It is estimated that an additional 0.03 mgd of supply will be required by 2060 to meet growing private water supply needs within the Town.

This projected deficit starting in 2051 is based on the Town's ability to continue use of all of their existing groundwater wells. Based on recent water quality issues associated with some of the Town's wells, and reduced groundwater well yields, this assumption may not be realistic, meaning that the Town could experience a water supply shortage much sooner than projected. Water quality issues are related to a Department of Environmental Quality consent order for the Town to lower copper levels in the discharge from one wastewater treatment plant, a problem that is likely caused by the water's natural acidity corroding pipes

Recently measured groundwater well yields are significantly lower than their developed capacities; therefore, it is reasonable to assume that the Town could experience a water supply shortage well in advance of 2051. The Town is considering installing additional wells or a new intake along the James River to supplement the current supply as discussed in Section 9.

Figure 8.2.11.1: Town of Appomattox – Statement of Needs

8.2.12 Town of Brookneal

The Town of Brookneal is projected to have sufficient PWS capacity to satisfy demand through 2060, based on their current 0.38 mgd capacity (VDH permitted capacity for source). By 2060, the Town is expected to have a surplus of approximately 0.14 mgd (see Figure 8.2.12.1). It is estimated that an additional 0.81 mgd of supply will be required by 2060 to meet growing private water supply needs within the Town.

Figure 8.2.12.1: Town of Brookneal – Statement of Needs

8.2.13 Town of Pamplin City

The Town of Pamplin City PWS demand projections are only expected to increase by approximately 0.86 MG/Year (0.002 mgd) between now and 2060; therefore, they are projected to have a surplus of approximately 0.02 mgd in 2060 (see Figure 8.2.13.1). This surplus is based on the assumption that the Town's groundwater wells will continue to produce 0.04 mgd of supply through the end of the planning horizon. Due to the potential for reliability problems with groundwater wells, this assumption may not be realistic for the Town. The Town may need to pursue another water supply source, whether it is a purchase from a neighboring community, or a new source of supply, in order to ensure that the Town will continue to be able to supply water to its customers. It is estimated that an additional 0.15 MG/Year of supply will be required by 2060 to meet growing private water supply needs within the Town.

Figure 8.2.13.1: Town of Pamplin – Statement of Needs

9.0 WATER SOURCE ALTERNATIVES AND ALTERNATIVES EVALUATION

9.1 Description of Water Source Alternatives

9.1.1 Introduction:

Numerous water supply source alternatives have been studied by the Region 2000 partners in the past as a part of their individual water supply planning processes. In order to thoroughly assess the water source alternatives for the Region as a whole, all of these potential alternatives were evaluated in this Water Supply Plan. This includes alternatives that individual communities have already eliminated from their plans, as well as alternatives that are currently being implemented. Because this Water Supply Plan is a living document, future updates to the list of water supply alternatives may include new sources that have not been looked at in this version of the Plan.

The water source alternatives are broken down by type of alternative, since one particular alternative may benefit more than one of the region 2000 partners. The categories of alternatives include the following:

- Groundwater Sources
- Reservoir/Surface Water Impoundments
- River or Stream Intakes
- Interconnections
- Reuse and Recycling (an alternative to reduce demand)
- Demand Management

A map showing the existing PWS service area, locations of stream intakes, wells, and reservoir intakes, and the locations of potential water source alternatives is included as Plate 1 in this Water Supply Plan. A map ID code has been included for each alternative in the following section that corresponds to a location on Plate 1.

A description of the Alternatives Evaluation and the outcome of the evaluation process are discussed in Section 9.2.

9.1.2 Groundwater Sources:

<u>Town of Appomattox – New Groundwater Wells (Map ID G-1)</u>

The Town of Appomattox has considered developing a new reliable groundwater source to replace an existing groundwater source that has been experiencing water quality issues due to high metal levels resulting from wastewater discharge effluent during low flow periods. Currently, the Town of Appomattox utilizes eight interspersed underground wells (see Figure 9.1.2.1) ranging in depth from 100 to 300 feet, with a maximum pumping capacity of 1.05 mgd (which is based on 24-hour pumping). These wells have a combined total VDH permitted capacity of 0.33 mgd. Recently measured well yields are significantly less than the developed well yields. This alternative is still conceptual in nature; therefore, the actual location, number and depth of potential new groundwater wells are not known at this time.

9.1.3 Reservoir Alternatives:

<u>Smith Mountain Lake Alternatives:</u>

Bedford County Public Service Authority (BCPSA) currently owns and operates the High Point water treatment plant (WTP) located in the Smith Mountain Lake area (see Figure 9.1.3.1). High Point WTP receives raw water from Smith Mountain Lake and has a current rated design capacity of 0.06 mgd. The WTP was designed to be expanded to an ultimate treatment capacity of 1.0 mgd. BCPSA has a DEQ permitted withdrawal capacity of 0.5 mgd; however American Electric Power (AEP) will allow BCPSA to withdraw up to 0.999 mgd from Smith Mountain Lake.

Based on the size of the lake and its use along with Leesville Lake as a pump-back electrical power generation/storage facility, it is believed that a relatively large volume of water could be withdrawn for water supply in the surrounding area without impacting downstream flows. An expansion of the existing BCPSA, or construction of a new WTP would be required to treat additional Smith Mountain Lake withdrawals. The 2000 Update to the 1994 Comprehensive Water and Wastewater Study for Bedford County, Virginia (Anderson & Associates, December 2000) looked at four potential options for utilizing Smith Mountain Lake water as a source for all areas of the County:

- Upgrade the existing High Point WTP to 1.0 mgd
- Construct a new 2.0 mgd Lakes Regional WTP near Camp 24 to serve the Lakes area of Bedford County
- Construct a new 5.0 mgd Lakes Regional WTP near Camp 24 to serve all of the Lakes area and other areas within Bedford County
- Construct a new 10.0 mgd Lakes Regional WTP near Camp 24 to serve long term needs of Lakes Region, Stewartsville, the City of Bedford, and Franklin County.

Upgrade High Point WTP to 1.0 mgd (Map ID R-1.1)

This alternative would expand the existing High Point WTP to its ultimate capacity of 1.0 mgd, which would involve some pump replacements, additional equipment, additional clearwell, and a new building to reach this capacity. This option meets the initial needs of the High Point area of Bedford County and some of the needs of the Lakes Region, but does not meet long term water requirements for the County. The total cost for this option was estimated in 2000 at approximately $4.9 million.

Lakes Regional WTP with 2.0 mgd Capacity (Map ID R-1.2)

This alternative would involve acquisition of property near Camp 24 (see Figure 9.1.3.2), construction of 14,000 linear feet of new 12-inch raw water line to the plant site, extensive modification of the raw water intake and pump station as well as the construction of a new microfiltration treatment plant. It is expected that this plant would meet most of the long term needs of the Lakes area of Bedford County, but would not provide excess supply for other parts of the County or for sales to Franklin County. In 2000, the estimated cost of this alternative was approximately $17 million.

Lakes Regional WTP with 5.0 mgd Capacity

This alternative would involve acquisition of property near Camp 24 (see Figure 9.1.3.2), construction of 14,000 linear feet of new 24-inch raw water line to the plant site, extensive modification of the raw water intake and pump station as well as the construction of a new microfiltration treatment plant. It is expected that this plant would meet all of the Lakes area water needs while supplying excess water to other parts of Bedford and Franklin County. In 2000, the estimated cost of this alternative was approximately $38.8 million.

Lakes Regional WTP with 10.0 mgd Capacity

This alternative would involve acquisition of property near Camp 24 (see Figure 9.1.3.2), construction of 14,000 linear feet of new 30-inch raw water line to the plant site, construction of a new raw water intake and pump station as well as the construction of a new microfiltration treatment plant. It is expected that this plant would meet all of the needs of the Lakes region, Stewartsville, the City of Bedford, and Franklin County. In 2000, the estimated cost of this alternative was approximately $67.1 million.

While the Smith Mountain Lake alternatives are discussed here in the "Reservoir Alternative" section, these projects would involve some degree of interconnections to be able to supply excess water to other parts of the County, as well as to the City of Bedford.

The interconnection project that will be discussed in this section is the alternative that has been evaluated to utilize Smith Mountain Lake water from the Lakes Regional WTP through an interconnection with the City of Bedford. This alternative includes approximately 73,300 linear feet of 20-inch finished water main along Route 360, and one booster pump station. In 2000, the estimated cost of this alternative was approximately $6.5 million.

CCUSA - Leesville Lake Transfer to Otter River (Map ID R-2)

A Leesville Lake transfer to the Otter River would benefit CCUSA during periods of low flow so that withdrawals from the Otter River could continue during these periods. This alternative would require a pumping station located on the Roanoke (Staunton) River that would pump to Johnson Creek on Johnson Mountain. A 500-foot diversion ditch would be needed to direct the discharge of Johnson Creek above the intake of the Otter River WTP under dry conditions. Approximately 20,000 feet of a minimum 12-inch pipe and a new pumping station would be required, at an estimated cost of $2,000,000 or more. It is anticipated that this project would be relatively difficult to implement because of the low chance of receiving regulatory approval. The installation of this infrastructure is not feasible at this time, and would only benefit CCUSA for a few weeks out of the year.

<u>Lynchburg - Raising Dam at Pedlar Reservoir (Map ID R-3)</u>

An integral part of the City of Lynchburg's public water supply is the Pedlar Reservoir, which is located in Amherst County, between the Blue Ridge Parkway and Route 60 in the George Washington National Forest (see Figure 9.1.3.3). Additional supply is available to the City from two James River intakes located at Abert Water Treatment Plant and the Downtown Pump Station. The City's Utilities Department may chose to use either source solely or in combination as it deems best for the overall operation of the system based on a variety of situations including, but not limited to: drought (reservoir levels), water quality, system limitations, or emergencies.

According to the Pedlar Reservoir Safe Yield Study (WW Associates, September 2003), the current safe yield of the Pedlar Reservoir is 6.87 mgd when the reservoir level is below the spillway and the total storage capacity is approximately 1.033 billion gallons (BG). The Pedlar Reservoir dam has been modified three times since its original construction to increase storage capacity. In 1964, the dam was raised to its current elevation and is approximately 462 feet long and 65 feet high. This alternative is still conceptual in nature; therefore, the safe yield and cost of the option are unknown at this time.

<u>Lynchburg - Replace Pipeline from Pedlar Reservoir with Higher Capacity (Map ID R-4)</u>

This alternative is conceptual in nature, therefore pipeline capacity and costs are not available at this time. This pipeline is aging, and therefore will need to be replaced or rehabilitated in order to continue use of Pedlar Reservoir. Additional costs would also be incurred to maintain this pipeline. Based on current operating procedures, Lynchburg utilizes either source solely or in combination as it deems best for the overall operation of the system based on a variety of situations. Replacing the pipeline from Pedlar Reservoir would allow Lynchburg to reduce leakage from an aging water supply infrastructure. However, without additional capacity in the reservoir, this alternative may not be beneficial at this time.

Amherst Co. & Town of Amherst - Current Mill Creek Reservoir Use (Map ID R-5.1)

During severe droughts, when flows are inadequate at the Town of Amherst's Buffalo River Intake, Amherst County releases up to a maximum of 1.0 mgd from Mill Creek Reservoir, which is owned by the County, to flow downstream to the Town's intake. The reservoir releases may be made until such time as the drought condition is deemed to no longer exist in the Buffalo River.

Amherst County & Amherst County Service Authority (ACSA) - Future Mill Creek Reservoir Use (Map ID R-5.2)

In 1980 Amherst County used funding to add a public water supply component to construction of Mill Creek Reservoir, which was primarily constructed as a flood control/recreational lake. Raw water from the 194-acre Mill Creek Reservoir may be combined with a direct intake on the Buffalo River near its confluence with Mill Creek and a new 4.0 mgd water filtration plant would need to be constructed near the intake site. The reservoir has an 816 million gallon (MG) water supply storage capacity. According to the Year 2000 DEQ estimates, the safe yield of this alternative is 4.76 mgd, with 3.57 mgd of safe yield from the reservoir and 1.19 mgd from the Buffalo River. This safe yield was based on the 1950's drought, rather than the 1930's drought. The safe yield for this alternative is currently being updated, and therefore may be lower than the 4.76 mgd estimate. A summary of the project components and the estimated costs (revised in March 2003) are presented in Table 9.1.3.1. The locations of Mill Creek Reservoir, the potential Buffalo River Water Treatment Plant and associated distribution water lines are shown on Figure 9.1.3.4.

Table 9.1.3.1

Description of Alternative Components and Estimated Cost

Project Component	Cost Estimate[1]
Construct main distribution line from Faulconerville to the Buffalo River Filtration Plant Site	$7,900,000
Construct 4.0 mgd Buffalo River Filtration Plant, raw water intake on the Buffalo River and raw water line to the Mill Creek Reservoir	$9,400,000
Construct 20" finished water line from Lanum Filtration Plant to the Faulconerville area to carry additional flows of the distribution system	$3,200,000
Total Project Cost	$20,500,000

[1] Costs are taken from Tables 5 and 6 in *Water and Wastewater Plan for Amherst County, Virginia* (Updated March 2003).

The source and treatment plant locations for this alternative are remote from County population centers; therefore, this alternative only becomes cost effective after the implementation of existing Lanum Water Filtration Plant capacity upgrades and the interconnection between Amherst County and Lynchburg, once both are approaching full capacity.

Amherst County Service Authority - Buffalo River Reservoir (Map ID R-5.3)

Amherst County owns the site where a potential new reservoir on the main channel of the Buffalo River could be constructed, west of the intersection of U.S. Route 60 and Route 610 (see Figure 9.1.3.4). This alternative would provide additional water to the Buffalo River Water Treatment Plant (discussed earlier), and would be constructed after the dual intake system using the Mill Creek Reservoir and the Buffalo River are built and approaching full capacity, providing water to both the County and Town of Amherst. This would be a 40 foot deep, 161 acre reservoir with a 651 MG water supply storage and 426 MG sediment pool storage. According to the Year 2000 DEQ estimates, the additional safe yield benefit of the Buffalo River Reservoir to the Mill Creek Reservoir/Buffalo River dual intake system is 3.56 mgd (with 30% MAF release requirement) or 4.72 mgd (with 20% MAF release requirement). While impacts to wetlands are not known at this time, it is estimated that approximately 12,000 feet of streams would be impacted by the reservoir footprint.

The cost associated with the construction of the dam for the Buffalo River Reservoir was estimated by the County in 1980 to be $16,000,000, which equates to approximately $3.4 million per mgd of additional safe yield. This estimated is grossly outdated and does not include the potential wetland and stream mitigation costs, which would add a substantial cost to the project. Assuming an annual inflation rate of 3.5%, the cost per mgd in 2008 dollars is approximately $8.9 million (approximately $42 million) without mitigation costs.

Appomattox County & Town of Appomattox – New Reservoir Sites (Map ID R-6)

In 2003, the County and Town of Appomattox commissioned Wiley & Wilson to perform an investigative study to evaluate possible future development and water supply source scenarios to provide up to 2.0 mgd for a future water system. This study, titled Water Source Study for the Appomattox Area (August 2003), evaluated nine prospective reservoir sites within reasonable transmission distances of the Town of Appomattox. Of these nine sites, the study recommended two potential multipurpose reservoirs (Sites 2 and 3) to meet the future needs of the County and Town. At the conceptual level, this alternative assumes that the Town of Appomattox will only use existing groundwater sources as emergency backup supply for use during severe drought events, and the County and Town will commit to a joint venture to develop a new source of water for their respective service areas.

Site 2 is located on the Middle Appomattox River and Site 3 is located on the Lower Appomattox River (see Figure 9.1.3.5). Site 2 is a 134-acre reservoir, with a 12.7 square mile drainage area, 805 MG of storage, and a dam height of 55 ft. With a release requirement of 20% MAF, the safe yield of the Site 2 reservoir is 2.3 mgd. Site 3 is a 137-acre reservoir, with a 14.3 square mile drainage area, 1001 MG of storage, and a dam height of 55 ft. With a release requirement of 20% MAF, the safe yield of the Site 3 reservoir is 2.8 mgd.

Utilization of raw water from either of these potential reservoirs would also require construction of a new intake, pump station, 2.0 mgd water treatment plant and a 16-inch finished water transmission line. The April 2003 estimated cost breakdowns for the two reservoirs are presented in Table 9.1.3.2.

Table 9.1.3.2

Appomattox Reservoir Sites – Estimated Costs

Reservoir Site 2 – Middle Appomattox River	**Cost Estimate[1]**
Dam	$6,687,913
Intake and Pump Station	$750,341
2.0 mgd Water Treatment Plant	$6,000,000
Transmission Line (16-inch)	$1,948,968
Total:	$15,387,222
Reservoir Site 3 – Lower Appomattox River	**Cost Estimate[1]**
Dam	$6,357,550
Intake and Pump Station	$750,341
2.0 mgd Water Treatment Plant	$6,000,000
Transmission Line (16-inch)	$2,572,229
Total:	$15,680,120

[1] Costs are taken from Table D-1 in *Water Source Study for the Appomattox Area* (August 2003).

Nelson Co. – Tye River Withdrawal to Supply Black Creek Impoundment (Map ID R-7)

The Nelson County Service Authority (NCSA) owns and operates a water system that provides service to the communities of Colleen, Lovingston, and Shipman. An extension to the Piney River community will be complete by January 2009 that will add 110 additional residential customers with the potential to serve approximately 250 additional customers in the future. The water system is supplied with a combination of several wells with an aggregate permitted safe yield of 134,400 gpd and a surface water treatment plant at Black Creek.

The treatment plant is currently a single train plant operating at 2 gpm/square ft with a treatment capacity of up to 201,600 gpd. With some additional instrumentation, the plant can be upgraded to 4 gpm/square ft and a second treatment train can be added, which would ultimately increase the treatment capacity to 403,200 gpd. However, the safe yield of the Black Creek reservoir is only 125,000 gpd, so until this capacity is increased, the upgrade in treatment capacity will not provide any increase to the permitted capacity of the waterworks. Currently, the Authority provides most of the water from the plant and uses the wells as the redundant back up.

The Black Creek Water Treatment Plant is located upstream of the Nelson County Regional Wastewater Treatment Plant. The wastewater facility has recently received a new discharge permit that has limits for copper and zinc that will be difficult to meet with the current discharge location. It may be necessary to change the discharge location to a larger river to get additional dilution.

NCSA is considering two options for long term planning for increase in water supply capacity. The only water source of significant size within a reasonable proximity to the Black Creek facility is the Tye River. The Authority had submitted a water withdrawal permit for a direct withdrawal from the Tye River near the Route 56 Bridge back in 2000. Due to public comments concerned with the lack of available water from the Tye, the Authority opted to withdraw the application and proceeded with the construction of an impoundment at Black Creek. Black Creek is a small watershed, which is the reason for the low safe yield of the reservoir. Long term water supply options will involve a scheme that will allow pumping from the Tye River during high water events in order to fill the reservoir, which will provide equalization during droughts. There are two options that are being considered.

Option 1 (Map ID R-7.1) would be a new raw water main that would run along Route 56 from the Tye River to the Black Creek Impoundment (see Figure 9.1.3.6). The 2008 estimated cost is presented in Table 9.1.3.3, below.

Table 9.1.3.3

Cost Estimate for Tye River Intake (Option 1)

to Supply Black Creek Impoundment and WTP

Item	Quantity	Unit Price	Cost
10-inch water main	9,500 LF	$60	$570,000
Raw Water Pump Station	1	EA	$300,000
		20% Contingency:	$174,000
		Power Service:	$15,000
		Engineering:	$150,000
		Land and Rights:	$100,000
		Inspection:	$75,000
		Legal:	$25,000
		Project Total:	**$1,409,000**

Advantages:

- Three phase electric power is readily available
- There is old VDOT right of way of sufficient size for a pump station
- Wetland impacts will be minimal

Disadvantages:

- Riverbanks are known to have significant bedrock, which will be a construction challenge when locating the pump station above the flood plain.
- The linear footage is slightly longer than Option 2, thus higher capital costs.
- Construction of raw water line in Right of Way is not practical due to steep slopes and conflicts with guard rail and fiber optic cable.
- Construction will require property acquisition from landowners who have specifically required previous easements exclude the possibility of a raw water line. It is unlikely that these property owners would grant an easement voluntarily.
- This option does not address the outfall for the wastewater treatment plant.

Option 2 (Map ID R-7.2) is a new water line that would follow Black Creek to the confluence with the Tye River, which is located several miles downstream of the location for Option 1 (see Figure 9.1.3.6). The 2008 estimated cost is presented in Table 9.1.3.4, below.

Table 9.1.3.4

Cost Estimate for Tye River Intake (Option 2)

to Supply Black Creek Impoundment and WTP

Item	Quantity	Unit Price	Cost
10-inch water main	9,000 LF	$60	$540,000
Raw Water Pump Station	1	EA	$300,000
		20% Contingency:	$168,000
		Power Service:	$75,000
		Engineering:	$100,000
		Land and Rights:	$28,000
		Inspection:	$75,000
		Legal:	$15,000
		Project Total:	**$1,301,000**

Advantages:

- Lower capital cost
- Property owner more likely to grant easement voluntarily
- Project could be done in conjunction with new discharge line for WWTP, which would save design, easement, and inspection costs
- Utility conflicts will be minimal

Disadvantages:

- This alignment is likely to have slightly more wetland impacts
- Pump station siting may be more difficult due to a wider flood plain
- Three phase power is not readily available

Nelson County - Reservoir for Short Term Storage Needs (Map ID R-8)

In order to provide additional storage to meet the 94-day drought storage requirement by VDH, Wintergreen Resort in Nelson County has evaluated several reservoir options. According to the Rockfish Valley/Wintergreen Resort Water Source and Capacity Study, prepared by Draper Aden Associates (August 2007), the preferred site for this reservoir is near Rode's Farm (Reservoir #13). This reservoir would have a usable storage of 39 MG, which exceeds the minimum capacity of 18 MG needed to satisfy the VDH requirement. The reservoir would be 13 acres in area, with a 537 foot long dam, 35 feet in height, and have a normal pool elevation of 680 feet. The footprint of this potential reservoir is shown on Figure 9.1.3.7. This reservoir would be filled from Lake Monocan using the Allen Creek Pump station and 4,600 feet of new 10-inch pipe. A new pump station would also be built to pump water back to Lake Monocan, using the same 10-inch pipeline, so that this reservoir could be used to supplement Lake Monocan when needed. This study also recommends the construction of a 5 MG equalization tank to provide approximately eight days of raw water for domestic use.

Construction of this reservoir would require mitigation for 1,917 feet of intermittent streams. The site is located in a zone C floodplain, so minimal flooding can be expected, and three properties would be affected by the reservoir footprint. The estimated project cost presented in the August 2007 study was $7,416,000.

Nelson County – Long Term Reservoir Options (Map ID R-9)

In the short-term, Nelson County plans to continue using groundwater sources to satisfy demands for the Rockfish Valley corridor, which includes the Wintergreen Mountain and Stoney Creek communities. In the Rockfish Valley/Wintergreen Resort Water Source and Capacity Study (August 2007), several reservoir sites were evaluated that would satisfy the long-term needs of the Rockfish Valley corridor. This study concluded that Nelson County should construct one large reservoir (Reservoir #9) to satisfy demands of 100% buildout, or incrementally construct several smaller reservoirs as the growth in the Rockfish Valley Corridor increases (combination of Reservoirs 4, 5, 6 and 20). Figures 9.1.3.8 through 9.1.3.12 show the locations of these potential reservoir sites.

Table 9.1.3.5 presents the reservoir options which are possible with the various end of planning horizon demands for the Rockfish Valley Corridor. The costs presented in this table do not include property acquisition and the safe yields presented may end up lower, depending on the level of drawdown that is determined to be acceptable. Detailed environmental assessments for each reservoir site have not yet been performed.

Table 9.1.3.5

Nelson County Long Term Reservoir Options vs. Build-out Demands

Build-out (%)	Demand Projections (MGD)	Reservoirs Meeting Demand Projections	Number of Parcels Affected	Total Safe Yield (MGD)	Total Cost
25	0.615	4	8	0.737	$22,696,000
		5	1	0.671	$24,215,000
		6	13	0.987	$33,796,000
		9	9	2.535	$83,257,000
		20	38	1.328	$30,513,000
50	1.231	9	9	2.535	$83,257,000
		20	38	1.328	$30,513,000
		4 + 5	9	1.408	$46,911,000
		4 + 6	21	1.724	$56,492,000
		5 + 6	14	1.658	$58,011,000
100	2.458	9	9	2.535	$83,257,000
		4 + 5 + 6	22	2.395	$80,707,000
		4 + 5 + 20	47	2.736	$77,424,000
		4 + 6 + 20	59	3.052	$87,005,000
		5 + 6 + 20	52	2.986	$88,524,000

Source: Table 10 (on pg 48) of Rockfish Valley/Wintergreen Resort Water Source and Capacity Study, Draper Aden Associates, August 2007

Town of Amherst – Raw Water Line Extension to Mill Creek Reservoir (Map ID R-10)

In November 2008, WW Associates completed a study that provided a preliminary analysis to determine the feasibility of constructing a raw water line to Mill Creek Reservoir to allow the Town of Amherst to directly withdraw water for treatment at the Town's water plant (Preliminary Raw Water Line Extension Study for the Town of

Amherst, Virginia, November 2008). As discussed earlier in this section, currently water is released from the Mill Creek Reservoir by ACSA at the request of the Town to allow adequate supply for the Town's WTP. Released water flows approximately six miles to the Town's intake along Mill Creek and the Buffalo River to the Town's intake point. According to the study, the advantages of installing a raw water line extension to allow direct transmission of water from Mill Creek Reservoir to the WTP include:

- Conservation of the Raw Water Supply – losses due to evaporation and infiltration during transmission will be eliminated.
- Emergency Preparedness – if the Buffalo River becomes contaminated, withdrawing from the reservoir would provide an alternative source of water for the Town.
- Water Quality – a direct withdrawal eliminates the risk that the water quality becomes degraded by run-off into the Buffalo River,
- Flexibility – having the flexibility to mix water from the river with water from the reservoir will allow the WTP to optimize the influent wet weather sediment load, minimizing treatment costs.

The study concluded that the raw water line would satisfy a primary short-term concern of the Town of Amherst by ensuring that there is adequate water available at the WTP during times of drought. The concern is that the 1.0 mgd of water released from the reservoir has many opportunities to for losses along the six mile stretch to the Town's intake through evaporation and infiltration. The study evaluated four potential routes for a new raw water line from Mill Creek Reservoir, and concluded that Route No. 3 (Turkey Mountain Road) scored the highest based on the chosen evaluation criteria. Further analysis was recommended before a final alternative is selected; however, for the purposes of this water supply plan, the Turkey Mountain Road alternative will be evaluated against other alternatives for the Town. All four pipeline routes are shown on Figure 9.1.3.13.

The Turkey Mountain Road Route (Route No. 3) involves approximately 5.6 miles of new 18-inch raw water transmission line, including 1,600 feet cross-country to reach the Town's intake. The majority of this proposed route follows the Appalachian-Electric power lines. This route would require a new raw water pump station, a new intake at Mill Creek Reservoir, and is estimated to cost between $7 and $8 million.

Campbell County (CCUSA) – Boxley Rock Quarry and Pump-over to Harvey Branch (Map ID R-11)

The Campbell County Utilities Service Authority has discussed the possibility of utilizing the water storage capacity of the existing Boxley Rock Quarry on Lawyers Road in Campbell County. This facility is expected to close within 10 to 15 years and will hold approximately 3 billion gallons of water.

The utilization of this facility would consist of releasing water to Flat Creek. After flowing approximately 7 miles, a pumping facility would be placed in the vicinity of Good Shepherd Church to pump from Flat Creek over to Harvey Branch. Harvey Branch discharges into the Otter River above the intake of the Otter River Water Treatment Plant (see Figure 9.1.3.14). At this point, no studies have been performed to fully evaluate this option, but CCUSA may wish to re-visit this alternative at a later date.

Figure 9.1.3.14: CCUSA – Boxley Quarry

9.1.4 Interconnection Alternatives:

Campbell County (CCUSA) Interconnection with Appomattox at Concord (Map ID I-1)

Several studies have been performed to evaluate the extension of Campbell County Utilities and Service Authority (CCUSA) service area to serve Concord (on the eastern edge of Campbell County) and the Town and/or the County of Appomattox (see Figure 9.1.4.1). A study performed in 2007 by Draper Aden Associates (Rustburg/Concord/Appomattox Water System Analysis, October 2007), determined that the project would involve storage tank improvements in Rustburg, a new storage tank in Concord, two new pump stations and approximately 100,000 linear feet of new pipeline. The goal of this project would be to utilize potential excess capacity at the Otter River Water Treatment Plant (WTP) to supply the eastern portion of Campbell County and the Town and County of Appomattox and provide emergency storage for fires, power outages, equipment failures and water line breaks.

It was estimated that CCUSA would be able to supply 1.07 MGD of treated water to serve both Concord and Appomattox. At this time, the County of Appomattox is in the process of moving forward with this option, while the Town of Appomattox has opted to develop its own new water source to meet future needs.

The 2007 estimated cost of the project is $12.7 million, which does not include plant upgrades at Otter River WTP that are needed to be able to produce excess supply.

Lynchburg-Appomattox Interconnection through Concord (Map ID I-2)

The transmission of water from Lynchburg through Campbell County along the Route 460 corridor to the Town and County of Appomattox has been considered for many years (see Figure 9.1.4.2). According to a study completed by Wiley & Wilson in 2003 (Appomattox Water Source Study, August 2003), the ultimate demand along the Route 460 corridor would require a 24-inch diameter line to a booster pump station in Concord and a 20-inch line from the station to connect with the existing 12-inch line in Appomattox. This alternative would also require a one million gallon storage tank at Spout Spring to ensure adequate fire flows between Concord and Appomattox.

According to the study, this alternative would be able to provide the ultimate demand of 1.57 MGD to the Town and County of Appomattox, 0.796 MGD to the portion of Campbell County East of Mt. Athos and 1.05 MGD to the Mt Athos area of Campbell County. The estimated cost per MGD supplied is $7.1 million, which would equate to approximately $24.3 million (based on supplying a total ultimate demand of 3.42 MGD).

Another study looked at the potential of a joint venture between the County and Town of Appomattox to purchase all of their water needs from Lynchburg, and get out of the water production business completely. This joint venture would construct a new five-mile long, 20-inch diameter transmission main and a one million gallon storage tank in Concord, and eight miles of 16-inch transmission line along the U.S. 460 corridor, as shown on Figure 9.1.4.2. Under this scenario, the current water source for the Town of Appomattox could be used as an emergency source during severe drought events. According to the Joint Appomattox Long-Term Water Supply Study (September 2005), the estimated cost to construct the new water lines is approximately $11 million and the costs associated with asset purchases is approximately $2 million.

Lynchburg-Amherst County Interconnection (Map ID I-3)

One alternative to meet the future needs of Amherst County involves an interconnection with the City of Lynchburg to utilize their excess capacity (see Figure 9.1.4.3). Amherst County Service Authority (ACSA) water demand is expected to approach the expanded capacity of the Lanum Plant (ACSA Increase Lanum WFP Capacity to 4.0 mgd Alternative) in approximately 2050. Since the water lines in Rt. 29 will be 95 years old and approaching the average life expectance of cast iron pipes, this alternative becomes cost effective at that time. The estimated the cost of this interconnection at $5.67 million (D. French correspondence referencing 9/9/04 estimate by Hurt & Proffitt). This alternative only becomes cost effective after the expanded capacity of the Lanum WFP is exhausted.

Town of Amherst-County of Amherst Interconnection (Map ID I-4.1)

As of 2007, ACSA water lines were extended to interconnect with the Town of Amherst's lines, to supply partial emergency back-up supplies for both water systems (see Figure

9.1.4.4). Capacities are currently restricted by meter and booster pump sizes, due to the respective water treatment capacities. The Town is currently able to supply up to 0.29 MGD to ACSA; and ACSA is able to supply up to 0.40 MGD to the Town.

As ACSA proceeds with the Lanum WFP expansion and the Town's filtration plant begins to approach its 1.0 MGD capacity, the ACSA metering station piping could be upsized to provide additional treated water. After these upgrades are completed, ACSA would be able to supply approximately 0.9 MGD to the Town of Amherst. The estimated cost for this alternative is approximately $50,000.

Town of Pamplin-Campbell County Interconnection (Map ID I-6)

No studies have been performed to date on this alternative, so the location and cost of the interconnection is unknown. Conceptually, if a connection is made between Pamplin and the Town of Appomattox via Route 460, approximately 10 miles of transmission water line would be needed. This alternative is only feasible if the Town of Appomattox pursues an interconnection with CCUSA through Appomattox County so that additional supply is available in that area. If an interconnection with CCUSA through Appomattox is not feasible, another option for Pamplin to investigate is an interconnection with Farmville/Prince Edward County, which is approximately 8 miles further away than the Town of Appomattox. Either interconnection would provide an alternative source of supply in case problems arise with the reliability of their existing groundwater wells.

Bedford County and Roanoke County Interconnection

This alternative is related to the Smith Mountain Lake alternatives in that it involves construction of a regional water treatment plant on the Lake, and piping finished water to portions of Bedford County as well as the City of Roanoke and Roanoke County. According to the Long-Range Water Supply System Study prepared for the Roanoke Valley-Alleghany Regional Commission (Black & Veatch, July 2003), it was assumed that the existing High Point WTP (owned and operated by Bedford County Public

Service Authority) could be expanded to meet the 8.0 mgd average daily demand of Bedford, Franklin and Roanoke Counties, and the City of Roanoke. This Smith Mountain Lake Regional WTP would be designed with a 26.9 mgd treatment capacity. This alternative also includes a 4 mgd pumping station in Franklin County, a 14 mgd pumping station in Roanoke County, 11,000 linear feet of 16-inch pipeline to serve Franklin County and 116,500 linear feet of 30-inch pipeline to serve Roanoke (City and County). The total estimate project cost, based on this 2003 study, is $121 million.

City of Bedford-Lynchburg Interconnection (Map ID I-8 & I-9)

Two potential interconnection alternatives between the City of Bedford and Lynchburg have been evaluated. One involves a two-phased project that would connect the two systems via a 16-inch water main along Route 460 (see Figure 9.1.4.5), and the other involves a three-phased project that would connect the two systems via a 12-inch water main along Route 221 (see Figure 9.1.4.5). Both alternatives would connect from the City of Bedford to the Forest system in Bedford County, which currently purchases water from the City of Lynchburg.

According to the 2000 Update to the 1994 Comprehensive Water and Wastewater Study completed for Bedford County (December 2000), the estimated costs for the interconnection along Route 460 are $3.1 million ($1.6 million for Phase 1 and $1.5 million for Phase 2). The estimated costs for the interconnection along Route 221 are $2.98 million ($931K for Phase 1, $1.46 million for Phase 2 and $588K for Phase 3).

9.1.5 Stream/River Intake Alternatives:

Amherst County (ACSA) Current Lanum WFP Capacity Increase (Map ID S-2)

Amherst County currently has a treated water capacity of 2.0 MGD via the Henry L. Lanum, Jr. WFP on Route 130 (see Figure 9.1.5.1). The Henry L. Lanum, Jr. WFP draws most of its raw water from Harris Creek and uses the Graham Creek Reservoir during periods of low stream flow and a James River emergency intake during severe droughts.

ACSA has submitted a withdrawal permit application for all three sources that will allow an expansion of the Lanum WFP to a treated water capacity of 4.0 MGD. This projection will also require a new intake and pump station on the James River that will convey water from the existing Reusens Hydroelectric Impoundment to the Lanum WFP via the Graham Creek Reservoir. Once the Lanum WFP is expanded, the James River intake will be used whenever the Graham Creek Reservoir declines below normal pool elevation. The current 2008 cost estimate of the James River intake is approximately 3.0 million dollars.

The planned expansion of the Lanum WFP to the treated water capacity of 4.0 MGD will also involve replacement of the water line between the plant and the prices store water tank (ACSA's central storage facility), and one additional finished water storage facility. According to March 2003 cost estimates, the total estimated cost of this work is projected to be approximately 3.88 million dollars.

Lynchburg to Supply Entire Region's Needs

As noted in the other alternatives involving interconnections with the City of Lynchburg, one alternative is for all surrounding Region 2000 partners to purchase their water from the City. Several of the partners already purchase water from Lynchburg, and continue to do so into the foreseeable future. Based on their current treatment plant capacities and projected demands (including sales to existing wholesale customers), Lynchburg is expected to have an additional 4 mgd of capacity by the Year 2060, which it could supply to surrounding communities. This estimate is based on the current 26 mgd capacity, Lynchburg 2060 demand of 17.75 mgd, and sales in 2060 of 4.3 mgd. Lynchburg has a combined intake pumping capacity of 44 mgd (24 mgd at Abert WTP and 20 mgd at College Hill WTP); therefore, the option of increasing treatment capacity at one or both of the City's WTPs may be explored in the future if needed to supply additional water to other Region 2000 localities. Based on the existing intake capacities, an additional 18 mgd of raw water is potentially available for withdrawal from the James River for use at one of the City's WTPs if the plant is expanded.

Town and County of Appomattox – New Intake on James River near Bent Creek (Map ID S-4)

The Town and County of Appomattox have evaluated a new intake on the James River near Bent Creek as a potential water source alternative. The Virginia Department of Health (VDH) definition of safe yield for a simple river intake is defined as the minimum withdrawal rate available during a day and recurring every 30 years, which is equivalent to the 30 year-one day low flow. State Planning Studies have estimated that the 1Q30 in the James River at Bent Creek is 167 mgd (258 cfs), which is significantly larger than the proposed 2.0 mgd withdrawal for this new James River intake.

Low flow events recorded in the James River by the USGS James River at Bent Creek gage (USGS gage number 02026000) for the period on record (April 1, 1925 to the present) are presented in Table 9.1.5.1. The proposed 2.0 mgd withdrawal is less than two percent of the lowest flow on record (143.5 mgd), which occurred on October 13, 1930.

Table 9.1.5.1

James River at Bent Creek Gage – Low Flow Events

Date	Lowest Daily Mean Flows	
	cfs	Mgd
10/13/1930	222	143.5
9/7/1966	240	155.1
9/11/1966	250	161.6
9/12/1966	250	161.6
10/6/1930	256	165.5

The proposed 16-inch diameter transmission line would run along Route 26 to the Town of Appomattox, and would be 62,500 feet in length. This alternative would require the construction of a new water treatment plant, approximately 2 1/2 miles from the river.

The approximate locations of proposed facilities are presented in Figure 9.1.5.2. According to the August 2003 Water Source Study for the Town and County of Appomattox, the estimated cost of this alternative is $16.4 million in capital cost with O&M costs of approximately $1,000 per MG, and $730,000 annual WTP costs.

9.1.6 Reuse and Recycling

A current trend in reducing potable water demands includes the reuse of treated wastewater effluent for non-potable uses, such as irrigation and industrial process water. In Region 2000, Lynchburg owns and operates the Lynchburg Regional Wastewater Treatment Plant (WWTP), with a design capacity of 22 mgd, which treats a large portion of the wastewater from the surrounding communities. Conceptually it makes sense to utilize the treated effluent from this WWTP at local facilities. The City has identified two potential users for treated WWTP effluent; however, no plans have been implemented at this time. A local industry, Rock-Tenn Company, is a potential customer for treated WWTP effluent. Also, the local landfill, which may be converted to ball fields upon its closure in seven years, may also be able to use treated WWTP for irrigation purposes. Any potable water demand that can be met through wastewater effluent reclamation provides additional water supply capacity that can be utilized by Lynchburg or surrounding communities.

Water conservation is the conscious effort by a utility, business or individual to save water. Every gallon of water not used is one less to be stored, purified, and distributed. It also may represent one less gallon that must be heated for washing or bathing, thus saving energy costs, or one less gallon of water that must pass through some form of wastewater treatment before it is returned to the environment. Normal conservation practices can provide long-term benefits by permanently reducing water demands during normal operating conditions.

As discussed in Section 6.0, the Region 2000 partners have adopted numerous water conservation measures, including the following:

- Adjustment of standard operating procedures to improve water conservation
- Installation of low-flow and/or no-flow fixtures in their facilities and/or government buildings and facilities

- Provided “yard taps” to their customers for purchase, so that customers can track their outdoor water use
- Implementation of educational programs to address water conservation through reduction of use
- Water conservation rate structures that encourage reduction of water use by increasing water rates with increasing water usage
- Incentive programs to customers that retrofit or replace older fixtures and appliances to reduce water use
- Leak detection and repair programs with regularly scheduled water audits
- Replacement of aging water distribution pipes
- Implementation of practices or policies to track unauthorized connections

Greater water conservation in the region could be achieved if all of the Region 2000 partners implemented the measures listed above, as well as other water conservation measures, such as “smart” irrigation systems, outdoor water use allocation calculations (to support a conservation rate structure), informative billing, or a new ordinance with outdoor use provisions.

9.2 Evaluation of Alternatives

9.2.1 Overview of Screening Criteria

This section describes the methods used to evaluate potential water source alternatives for Region 2000 partners. Each water supply alternative has the potential to provide some public water supply benefit for one or multiple Region 2000 partners; therefore, each alternative was evaluated with respect to the following feasibility or practicability criteria:

- Applicability – determine the degree to which the alternatives match the local and regional needs of the partners
- Safe Yield or Reliable Capacity – look for some measure of the maximum quantity of water that may be withdrawn throughout a critical dry period without depleting the source. Reliable capacity may refer to the potential water treatment plant capacity or the capacity of a piped interconnection between communities.
- Potential Environmental Impacts – assessment of alternatives on the basis of general environmental suitability.
- Potential Human Impacts – stakeholder satisfaction is often very important for the viability of an alternative. Human impacts such as land acquisition or easements, traffic impacts, etc. factor into the screening criterion.

- Relative Cost – alternatives may be economically infeasible if they are too costly to implement relative to other options. For this analysis, unit cost rates in million dollars per mgd were calculated for all alternatives that had available cost figures. These unit costs were inflated at a rate of 3.5% per year to estimate the current (2008) cost of the alternative.
- Availability – some alternatives may have legal, regulatory or institutional issues that could severely delay or event prevent implementation.

Alternatives were rated as “good”, “fair”, or “poor” for the applicability, safe yield, relative cost and availability criteria. Environmental and human impact criteria resulted in “minor”, “moderate” and “major” rankings. Alternatives could be eliminated from further consideration if a fatal flaw was recognized with respect to any one of the criterion. Remaining practicable alternatives were then carried forward for comparison against each other based on the aforementioned criteria. Red light/Yellow Light/Green Light summaries were utilized so that overall ratings for each alternative could be compared to each other for all of the evaluation criteria.

As discussed in the Statement of Needs section, not all of the Region 2000 partners are projected to experience a water supply deficit by the end of the planning horizon. In fact, the region as a whole is projected to have a surplus of approximately 1.98 mgd (723 MG/year) in the Year 2060. Based on existing PWS capacities and projected 2060 demands, the following partners are projected to experience a water supply deficit sometime within the planning horizon:

- Appomattox County (2060 deficit = 0.96 mgd)
- Town of Appomattox (2060 deficit = 0.03 mgd)
- Nelson County (2060 deficit = 0.02 mgd)
- Bedford County (2060 deficit = 3.12 mgd)
- Town of Altavista (2060 deficit = 0.29 mgd)
- Amherst County (2060 deficit = 3.03 mgd)
- Campbell County (2060 deficit = 0.21 mgd ONLY when sales are included in demand projections)

The following sections will highlight the alternatives that scored the best and worst under each screening criterion, and the reasons for those rankings. A summary of the top-ranked alternatives and the current status of these projects will also be presented.

The ratings for all alternatives (including those that rated "fair" or "moderate" are included in Attachment F. Also included in Attachment F is a matrix containing all alternatives and how they ranked for each evaluation criterion.

9.2.2 Applicability

Lowest Rated Alternatives:

Alternatives also received a "poor" rating for the applicability criterion if the alternative does not meet the needs of the partner, or would not be needed at the time that it is planned for implementation because other options that are in the pipeline will provide water supply needs. The following alternatives were not eliminated from consideration, but received "poor" applicability ratings:

- Amherst County Buffalo River Reservoir – because this alternative would only be constructed after the dual Mill Creek Reservoir – Buffalo River intake and 4.0 mgd WTP are constructed, this additional water supply would not be needed according to 2060 projections.
- Nelson County/Wintergreen Resort Reservoir (near Rhode's Farm #13) – while the County may choose to build this reservoir to satisfy VDH short-term storage requirements, this alternative does not meet the long-term PWS needs of the County.

Highest Rated Alternatives:

Several of the water source alternatives received "good" ratings for applicability because they met the needs of the community that they would benefit, or it was applicable for more than one community:

- Amherst County Service Authority (ACSA): Lanum WFP Expansion to 4.0 mgd – this alternative would expand the existing treatment facility to supply an additional 2.0 mgd of water to ACSA customers. This alternative satisfies ACSA's projected needs until approximately 2050.
- Appomattox (Town & County): New Reservoir – this alternative would supply an additional 2.0 mgd to the Town and County of Appomattox, which satisfies their needs through 2060.
- Town of Amherst: Current Mill Creek Reservoir Use – this alternative provides up to 1.0 mgd of relief to the Town during times of drought when the Buffalo River flows are low, which has been determined to be adequate through 2060.

- ACSA: Future Mill Creek Reservoir Use – this alternative would provide an additional 4.0 mgd of supply from an existing source, satisfying the County's needs through 2060 and beyond.
- Nelson County: Withdrawal from Tye River to Fill Impoundment – this alternative would supply additional water to impoundment so WTP capacity can be fully utilized.
- Nelson County Reservoir Alternatives – all variations of this alternative (one large reservoir or several smaller reservoirs) meet the future water needs of the County.
- Appomattox (County & Town): New Intake on the James River at Bent Creek – this alternative would supply an additional 2.0 mgd, which meets the 2060 needs of the County and Town of Appomattox.
- All of the Interconnection Alternatives rated "good" with respect to the applicability criterion, excluding the Bedford County-Roanoke Interconnection (no information available).

9.2.3 Safe Yield or Reliable Capacity:

Lowest Rated Alternatives:

One alternative received a "poor" rating for safe yield or reliable capacity:

- Town of Appomattox: New Groundwater Source – this alternative received a poor rating because it does not provide another reliable source of supply. Current groundwater wells are being contaminated by surface water, and in general, groundwater levels in the region are susceptible to drought conditions.

Highest Rated Alternatives:

Several of the water source alternatives received "good" ratings for safe yield or reliable capacity. An alternative received a "good" rating if the source met most or all of the needs of the benefitting community (or communities) and/or if the alternative provides a new source of supply to supplement an existing source, which provides additional reliability to a community's PWS. The following alternatives received a "good" rating for Safe Yield or Reliable Capacity:

- All of the Smith Mountain Lake Alternatives – based on the size of the Lake and its use along with Leesville Lake as a pump-back electrical power generation/storage facility, a large volume of water is available to be withdrawn. Utilization of this lake as a source provides Bedford County with their own source, reducing their dependency on purchased water from

Lynchburg. One of the Smith Mountain Lake options (the 10.0 mgd Lakes Regional WTP) would also provide water to the City of Bedford through an interconnection with Bedford County. While the City of Bedford is not projected to experience a water supply shortage by the Year 2060, utilization of Smith Mountain Lake water would provide additional reliability to the City's PWS.

- All of the Reservoir Alternatives (excluding the Nelson County Reservoir near Rhode's Farm, for which the safe yield is unknown). The reservoir options all provide enough safe yield to satisfy the projected 2060 needs of the benefitting community (or communities). Many of these alternatives also provide a secondary source of supply to an existing PWS system. For example, the reservoir options for the Town and County of Appomattox would provide the Town with another source of water to supplement a system of groundwater wells that are currently under the influence of surface water.
- Two of the Stream/River Intake Alternatives – the ACSA Lanum WFP capacity increase will provide most of the County's needs (through 2050), while the Appomattox New Intake on the James River Alternative would also supply the needs of the Town & County while providing an additional source for the Town of Appomattox.
- All of the Interconnection Alternatives – these alternatives all provide water supply redundancy for the Region 2000 partners by utilizing excess capacity in one location to meet needs of locations with projected deficits, while also serving as backup supply to communities with their own sources and treatment facilities.

9.2.4 Environmental Impacts

<u>Lowest Rated Alternatives:</u>

An alternative was rated "major" with regards to its environmental impacts if it would substantially impact wetlands, streams, or other environmental factors. While many of the alternatives have not been fully assessed for environmental impacts, conceptual level evaluations resulted in the following alternatives receiving "major" ratings:

- Nelson County/Wintergreen Resort - Reservoir near Rhode's Farm. This reservoir option is expected to impact 1,917 linear feet of intermittent streams within the 13 acre reservoir footprint. Wetland impacts are not known at this time, but it is reasonable to assume that there would be some wetlands impacted by the reservoir footprint.
- ACSA Buffalo River Reservoir – While a full environmental assessment has not been performed, it can be assumed that new reservoir would have substantial environmental impacts from the 152-acre reservoir footprint and the dam construction.

- Appomattox County and Town Reservoir - While a full environmental assessment has not been performed on the proposed reservoir sites; it can be assumed that a new reservoir would have substantial environmental impacts from the 134-acre or 137-acre reservoir footprint, dam construction and new transmission main.

Highest Rated Alternatives:

Several of the water source alternatives received “minor” ratings for the environmental impacts criterion. An alternative received a “minor” rating if the planned project did not involve substantial impacts to wetlands, streams or other environmental resources. The following alternatives received a “minor” rating for Environmental Impacts:

- Town of Amherst - Current Mill Creek Reservoir Use. Since this alternative is already in place, environmental impacts are negligible.
- Smith Mountain Lake Upgrade of High Point WTP (1.0 mgd) – The WTP would need to be expanded, and intake upgrades would be required. New transmission mains would follow existing right of ways.
- Amherst County Service Authority (ACSA): Lanum WFP Expansion to 4.0 mgd. This alternative requires a new intake on the James River, but the WFP and transmission mains are already in place.
- All of the Interconnection Alternatives – these alternatives only require new finished water transmission mains, most of which are planned to follow the right of way of existing roadways, limiting the environmental impact. Some alternatives may require stream crossings, but permit requirements for these crossings would ensure that the impacts to the streams are minimal.

9.2.5 Human Impacts

Lowest Rated Alternatives:

An alternative was rated “major” with regards to its human impacts if it would require land acquisition, excessive easements or other impacts to the public. Conceptual level evaluations resulted in the following alternatives receiving “major” ratings:

- ACSA Buffalo River Reservoir – It was assumed that some land acquisition would be required for the reservoir and/or dam construction. Also, substantial construction impacts on the public would occur.
- Appomattox County and Town Reservoir - It was assumed that some land acquisition would be required for the reservoir and/or dam construction. Also, substantial construction impacts on the public would occur.
- Nelson County - Withdrawal from Tye River to Fill Impoundment (Option 1, new intake near Route 56). Property acquisition from landowners that have

previously required easements excluding the possibility of a raw water line. Temporary construction impacts. Note that Option 2 (new intake on Black Creek) received a "fair" rating with regards to the Availability criterion.

- Nelson County Reservoir Alternatives – Land acquisition required. Nine parcels affected for larger Reservoir #9; 22 to 59 parcels affected for various combinations of Reservoir 4, 5, 6, and 20. Temporary construction impacts.

Highest Rated Alternatives:

Several of the water source alternatives received "minor" ratings for the human impacts criterion. An alternative received a "minor" rating if the planned project did not require land acquisition or excessive easements. The following alternatives received a "minor" rating for Human Impacts:

- Amherst County Service Authority (ACSA): Lanum WFP Expansion to 4.0 mgd. Some temporary construction impacts are assumed. This alternative provides water to customers at lower rate than if water were purchased from the City of Lynchburg.
- Town of Amherst - Current Mill Creek Reservoir Use. Since this alternative is already in place, human impacts are negligible.
- Smith Mountain Lake Upgrade of High Point WTP (1.0 mgd) – The WTP would need to be expanded, and intake upgrades would be required. New transmission mains would follow existing right of ways. Temporary construction impacts are assumed and minor easements would be required for the new transmission mains.
- All of the Interconnection Alternatives – these alternatives only require new finished water transmission mains, most of which are planned to follow the right of way of existing roadways, limiting the human impact. Some alternatives may require easements and temporary construction impacts are assumed.

9.2.6 Relative Cost

Most of the alternatives that were evaluated for this Water Supply Plan have been studied in the past, at which time cost estimates were developed. These estimates were divided by the total safe yield or reliable capacity to calculate the cost (in million dollars) per million gallons per day (mgd) of capacity that the alternative could supply. To provide a more objective comparison, these unit cost rates were inflated by 3.5 percent annually to reflect approximate unit costs in 2008 dollars. A summary of the original project cost estimate, unit cost, and inflated 2008 unit cost is presented in Table 9.2.6.1, below. The original costs versus the inflated 2008 costs are also presented graphically, in Figure 9.2.6.1.

In general, the reservoir alternatives present the highest cost per mgd of capacity, while the interconnection alternatives present the lowest cost per mgd. Because cost estimates are not available for all alternatives, or the exact safe yield or capacity are not available, unit costs could not be calculated for all of the alternatives. The cost of purchasing water from another Region 2000 partner versus the cost of producing water themselves was also excluded from the relative cost evaluation.

Highest Cost Alternative

As shown on Figure 9.2.6.1, the unit cost for the Nelson County Long Term Reservoir alternative (Map ID R-9) is substantially higher than the rest of the estimates. This is due to the relatively low safe yield for this project (approximately 2.5 mgd) compared to the large estimated cost of approximately $83 million.

Lowest Cost Alternatives

The Amherst County-Town of Amherst Future Interconnection Upgrade Alternative had the second lowest unit cost at $60,000 per mgd of capacity, right behind the Amherst County-Town of Amherst Current Interconnection, which has a cost of $0 per mgd (since it is an existing connection). The low cost of the Interconnection Upgrade is due to the limited nature of the project, which involves upgrades to some existing water distribution infrastructure in several locations.

The Amherst County-Lynchburg Interconnection Alternative had the third lowest unit cost at $950,000 per mgd of supply. This low unit cost can be attributed to the small scope and overall cost of the project, which involves replacement of existing water mains sized for an ultimate capacity of 6 mgd.

Cost Ratings for All Alternatives

Information was available to calculate unit cost rates for 17 of the alternatives. These unit rates were ranked from high to low, and approximately 1/3 of the alternatives fell into each of the following ranges:

Low Cost ($0 to $5.0 Million/mgd):

- Nelson County - Withdrawal from Tye River to Fill Impoundment (Option 1)
- Smith Mountain Lake - Upgrade Existing High Point WTP to 1.0 mgd
- Nelson County - Withdrawal from Tye River to Fill Impoundment (Option 2)
- ACSA - current permit application will increase Lanum WFP capacity to 4.6 mgd withdrawal/4.0 mgd treatment
- Amherst Co (ACSA) - interconnection with Lynchburg (replace line on Route 29 and booster pump station) to utilize Lynchburg's excess treatment capacity
- ACSA - Town of Amherst - Future Interconnection Upgrade
- ACSA – Town of Amherst – Current Interconnection
- Bedford –Lynchburg Interconnection with Lynchburg. While the exact amount of water that will be purchased from Lynchburg is unknown, if it is assumed that between 1 and 3 mgd are purchased, the unit rate for this project is very low (between $0.3 and $1.0 Million/mgd).

Medium Cost ($5.1 to $10.0 Million/mgd):

- Appomattox County & Town - New Intake on James River near Bent Creek plus 2 mgd WTP
- Appomattox County & Town - Reservoir
- Lynchburg- Appomattox Interconnection through Campbell County via Route 460
- ACSA Buffalo River Reservoir
- Smith Mountain Lake - New 10.0 mgd Lakes Regional WTP and Interconnection to Bedford City
- Amherst County & Amherst County Service Authority (ACSA) - Future Mill Creek Reservoir Use

High Cost (Greater than $10.0 Million/mgd):

- Nelson County - Reservoir Options (costs for Reservoir #9)
- CCUSA - Appomattox interconnection at Concord
- Smith Mountain Lake - New 2.0 mgd Lakes Regional WTP
- Smith Mountain Lake - New 5.0 mgd Lakes Regional WTP

Table 9.2.6.1

Summary of Cost Estimates for Water Source Alternatives

Map ID	Alternative:	Safe Yield/ Reliable Capacity	Cost (Million $)	Million $ / MGD	Year of Original Estimate	Estimate in 2008 Dollars (Million $/ mgd) [2]
G-1	Town of Appomattox - new reliable groundwater source to replace an existing groundwater source that is under the influence of surface water					
R-11	Smith Mountain Lake - Upgrade Existing High Point WTP to 10 mgd	0.50	$19	$3.80	2000	$5.00
R-12	Smith Mountain Lake - New 2.0 mgd Lakes Regional WTP	2.00	$17.1	$8.55	2000	$11.26
R-13	Smith Mountain Lake - New 5.0 mgd Lakes Regional WTP	5.00	$38.8	$7.76	2000	$10.22
R-14	Smith Mountain Lake - New 10.0 mgd Lakes Regional WTP and Interconnection to Bedford City	10.00	$67.1	$6.71	2000	$8.84
R-2	CCUSA - Leesville Lake transfer to Otter River					
R-3	Lynchburg - raising dam at Pedlar Reservoir					
R-4	Lynchburg - replacing 24-mile pipeline from Pedlar Reservoir with higher capacity					
R-5.1	Amherst County & Town of Amherst - Current Mill Creek Reservoir Use	100	$0.0	$0.00		
R-5.2	Amherst County & Amherst County Service Authority (ACSA) - Future Mill Creek Reservoir Use	4.00	$20.5	$5.13	2000	$6.75
R-5.3	ACSA Buffalo River Reservoir	4.72	$16.0	$3.39	1980 [3]	$8.88
R-6	Appomattox County & Town - Reservoir	2.00	$15.5	$7.75	2003	$9.20
R-7.1	Nelson County - Withdrawal from Tye River to Fill Impoundment	0.278	$14	$5.04	2008	$5.04
R-7.2		0.278	$13	$4.68	2008	$4.68
R-8	Nelson County/ Wintergreen Resort - Reservoir near Rhode's Farm (Reservoir #13)		$7.4			
R-9	Nelson County - Reservoir Options (costs for Reservoir #9)	2.54	$83.3	$32.80	2007	$33.94
R-10	Town of Amherst - Raw Water Line Extension to Mill Creek Reservoir	100	$7.5	$7.50	2011 [4]	$7.50
S-1	CCUSA - Alta Vista for intake on Roanoke River					
S-2	ACSA - current permit application will increase capacity to 4.6 mgd withdrawal/ 4.0 mgd treatment	2.00	$6.9	$3.44	2003 [1]	$3.58
S-3	Lynchburg excess capacity could potentially supply entire region's needs					
S-4	Appomattox County & Town - New Intake on James River near Bent Creek plus 2 mgd WTP	2.00	$16.4	$8.20	2003	$9.74
S-5	Lynchburg - Increase Capacity of Abert WTP					
I-1	CCUSA - Appomattox interconnection at Concord	107	$12.5	$11.68	2007	$12.09
I-2	Lynchburg- Appomattox Interconnection through Campbell County via Route 460	157	$13.0	$8.28	2005	$9.18
I-3	Amherst Co (ACSA) - interconnection with Lynchburg (replace line on Route 29 and booster pump station) to utilize Lynchburg's excess treatment capacity	6.00	$5.7	$0.95	2008	$0.95
I-4.1	Town of Amherst - Current Interconnection	0.40	$0.0	$0.00		$0.00
I-4.2	Town of Amherst - Future Interconnection Upgrade	0.90	$0.05	$0.06	2008	$0.06
I-5	Appomattox (Co. and Town joint venture) - interconnection with Lynchburg	157	$13.0	$8.28	2005	$9.18
I-6	Town of Pamplin - interconnection with CCUSA					
I-7	Bedford County and Roanoke County Interconnection					
I-8	Bedford City - Lynchburg Interconnection via Route	2.00	$3.1	$155	2000	$2.04
I-9	Bedford City - Lynchburg Interconnection via Route	2.00	$3.0	$150	2000	$198

Notes:

[1] Cost estimate for Lanum WFP expansion is $3.88M, which is based on March 2003 estimates. Cost for new intake on James River is $3.0M, which is based on 2008 estimates. Only the 2003 estimate was inflated to reflect 2008 dollars.

[2] Original unit cost estimates were escalated by an annual 3.5% inflation rate to estimate 2008 costs.

[3] The cost estimate used for the ACSA Buffalo River Reservoir is from 1980 and is very outdated. The likely costs in 2008 dollars will be at least double the cost that was estimated in 1980 to account for mitigation, permitting and construction costs.

[4] Cost estimates for the Town of Amherst Raw Water Line to Mill Creek Reservoir were inflated to reflect 2011 dollars.

9.2.7 Availability

Lowest Rated Alternatives

Alternatives received a “poor” rating if there were legal, regulatory or institutional issues that could severely delay or even prevent implementation. The following alternatives received a “poor” rating with regards to availability of the project:

- Amherst County & Amherst County Service Authority (ACSA) - Future Mill Creek Reservoir Use. Major permitting requirements would be required for the new intake on Buffalo River, a new WTP, and the addition of a PWS component to the existing Mill Creek reservoir. There is also a potential for USACE/DEQ permits for temporary impacts at stream crossings.
- ACSA Buffalo River Reservoir - Major permits would be required for dam construction and reservoir.
- Appomattox County & Town Reservoir – This alternative assumes a joint venture between Town and County of Appomattox, which has received some opposition from the Town. In addition, major permits would be required for the reservoir and dam construction, which would delay the project implementation. There is also a potential for USACE/DEQ permits for temporary impacts at stream crossings.
- Nelson County - Withdrawal from Tye River to Fill Impoundment (Option 1, new intake near Route 56). There is major public opposition to this alternative and permits would be required for the intake and temporary stream and wetland impacts. Note that Option 2 (new intake on Black Creek) received a “fair” rating with regards to the Availability criterion.
- Nelson County/Wintergreen Resort - Reservoir near Rhode's Farm (Reservoir #13). Major permits (USACE) would be required for the reservoir construction and stream mitigation, which could delay the project. Potential for USACE/DEQ permits for temporary impacts at stream crossings.
- Nelson County - Reservoir Options. Major permits (USACE) would be required for the reservoir construction and stream mitigation, which could delay the project. Potential for USACE/DEQ permits for temporary impacts at stream crossings.

Highest Rated Alternatives

Alternatives received a “good” rating if minimal permitting would be required, and there was political and stakeholder support of the project. Many alternatives received a “fair” rating for this criterion because the project would require one or more minor permits that are not expected to delay implementation. The following alternatives received a “good” rating with regards to availability of the project:

- Amherst County Service Authority (ACSA): Lanum WFP Expansion to 4.0 mgd. Planning and permitting has already begun for this alternative. Additional permits will be required for increased withdrawals.
- Amherst Co (ACSA) - interconnection with Lynchburg. While this alternative does not become economically feasible until the expanded Lanum WFP is approaching its 4.0 mgd capacity, the timing of project implementation is ideal. Existing water lines along Route 29 in Amherst County will be approaching their average life expectancy around the time that ACSA would need to purchase additional supply from the City of Lynchburg, which is projected to occur around 2050. A wholesale water agreement, without a volume limit, already exist between the City of Lynchburg and Amherst County. Additionally, the City has performed hydraulic modeling studies and determined their existing distribution system can deliver up to 6.0 mgd of water to the Amherst County side of the James River.
- Town of Amherst: Current Mill Creek Reservoir Use – Recent arrangements allow ACSA to release water from Mill Creek Reservoir whenever the Town requests a release and Buffalo River flows are low due to drought.
- Town and County of Amherst: Current Connection Upgrade – this alternative is available after the Lanum WFP upgrades are complete, when the County has the excess capacity, which will occur before the Town needs additional water sources.

9.2.8 Summary of Evaluation

Alternatives were compared using the criteria described above, and were compared to each other to determine the short list of water source options that would satisfy the needs of the Region 2000 partner (or partners) with the least environmental and human impacts. A summary of the red light-yellow light-green light analysis is shown on Figures 9.2.8.1 and 9.2.8.2. An alternative was included on the short list if it resulted in a GREEN overall rating.

The following water source alternatives are recommended to satisfy the future demands of the Region 2000 partners:

<u>Appomattox County and Town of Appomattox</u>

The highest rated alternatives to supply the future needs of the County and Town of Appomattox is the interconnection with Campbell County (CCUSA) or the interconnection with Lynchburg. Plans are currently underway in the County to pursue the interconnection with Campbell County alternative, even though the Town of Appomattox has opted out of the project at this time. By utilizing existing (and future) excess capacity from the CCUSA Otter River PWS, Appomattox will be able to support their planned growth without development of a new source of supply. This option also provides the Town of Appomattox with an alternative source of supply, which is greatly needed due to recent water quality issues and reduced yields with their existing groundwater wells.

<u>Nelson County</u>

The highest rated alternative to supply the future needs of Nelson County is the withdrawal from the Tye River (along the Black Creek, Option 2) to supply the existing Black Creek Impoundment. While the County may still decide that short term water storage needs at the Wintergreen Resort should be met through the construction of a reservoir near Rhode's Farm, the Tye River withdrawal alternative provides the least environmentally damaging and least expensive option to utilize an existing impoundment and water treatment plant. In the future, the County may evaluate options that would involve an interconnection with Amherst County.

<u>Bedford County</u>

Two alternatives received a "good" rating to supply the future needs of Bedford County. These options are (1) the interconnection with the City of Lynchburg via Route 460 or Route 221; and (2) the construction of a new 10.0 mgd Lakes Regional Water Treatment Plant on Smith Mountain Lake and an interconnection to the City of Bedford. Estimated costs per mgd of supply were calculated for the Lynchburg-Bedford interconnection by assuming that an average of 2 mgd would be purchased from Lynchburg. It is reasonable to assume that this alternative will cost substantially less than the Lakes Regional WTP alternative. Both of these options also provide the City of Bedford with alternate sources of supply and support the County's plans for growth along the interconnection corridors. At this time, the major limiting factor for obtaining additional supply from Smith Mountain Lake is

the cost of a new WTP and the potential problems with a new withdrawal permit for that quantity of water.

Town of Altavista

At this time, the only alternative that was listed as a potential water source for the Town of Altavista is the CCUSA-Altavista intake on the Roanoke River. No information is available for this alternative; therefore, a proper evaluation could not be performed.

Amherst County

The highest rated alternative to supply the future needs of Amherst County is a two-phased approach, starting with current plans to expand the Lanum WFP to 4.0 mgd and then purchasing water from the City of Lynchburg once demands in the County approach 80% of the Lanum WFP capacity. Design and permitting has already started for the Lanum WFP expansion. Financially, it makes sense for ACSA to expand this plant now because they are able to produce water for approximately half of the cost of purchasing water wholesale from the City of Lynchburg. The additional 2.0 mgd capacity of the Lanum WFP will satisfy the needs of the County until approximate 2050, at which time, water lines along Route 29 will be approaching their 100-year life expectancy. At that time, those lines may be replaced to handle an ultimate interconnection capacity of 6.0 mgd. The interconnection with Lynchburg is the least environmentally damaging alternative at that time, and would be the easiest to implement.

Campbell County

Campbell County is only projected to experience a water supply shortage if water sales are factored into their future demands. Since their current plans include selling water to Appomattox County as well as others, Campbell County will need to expand their current capacity or look into purchasing water from Lynchburg or Bedford County through an interconnection. Limited information is available at this time to explore potential water source alternatives for Campbell County.

Town of Amherst

The Town of Amherst is only projected to experience a water supply shortage if water sales to Sweet Briar College are factored into their future demands. As discussed in Section 8.2.10, the Town would also not be able to meet their peak day demand of 1.2 mgd in 2060 without an additional water supply source. It is recommended that the Town of Amherst pursue an interconnection upgrade with ACSA, perhaps in conjunction with a reliability improvement project such as the raw water line extension from Mill Creek Reservoir. Increasing the reliability of an existing source, along with utilization of ACSA's excess supply and an existing interconnection would provide adequate supply for the Town of Amherst through the end of the planning horizon.

Town of Pamplin

Although the Town of Pamplin is not projected to experience a water supply shortage based on their current PWS capacity and projected demands, it is recommended that an interconnection with a neighboring community such as Campbell County (through the Town of Appomattox) or Farmville/Prince Edward County be investigated further because it would provide additional reliability for their existing groundwater-reliant system. Without a backup water source, Town of Pamplin PWS customers would not have a sufficient water supply if some or all of the existing groundwater wells were to fail.

10.0 PUBLIC PARTICIPATION

Region 2000 recognizes that preparation of a successful plan will be more likely with active participation of the general public, local governments (i.e., county boards of supervisors and city and town councils) as well as regional stakeholders.

10.1 Local Government Involvement

Region 2000 recognizes that preparation of a successful plan will be more likely with active participation of the local governments (i.e., county boards of supervisors and city and town councils). A total of 12 meetings were held with the participating local governing bodies within the region. Six meetings were held during the initial phase of the planning process and the remaining six meetings were held near the end of the planning process. The purpose of the meetings was to introduce the regulatory requirements and scope of the planning process, seek input on the overall planning process, and present the results of the planning process.

10.1.1 Presentation of Initial Planning Results

Beginning in November 2006, six meetings were held to introduce the regulatory requirements and scope of the planning process to the local governments within the region. One meeting was held for each of the five counties and included the participating towns within the county (Amherst County including the Town of Amherst, Appomattox County including the towns of Appomattox and Pamplin, Bedford County including the City of Bedford, Campbell County including the towns of Altavista and Brookneal, and Nelson County). The sixth meeting was held for the City of Lynchburg. During these meetings, a Draper Aden Associates presented the requirements of the regulation, provided a brief summary of the overall planning process and general budget breakdown, and answered questions regarding the regulatory requirements and overall planning process for the region.

10.1.2 Presentation of Planning Results

Beginning in October 2008, six meetings will be held to present the results of the planning effort. Again, one meeting will be held for each of the five counties and will include the participating towns within the county (Amherst County including the Town of Amherst, Appomattox County including the towns of Appomattox and Pamplin, Bedford County including the City of Bedford, Campbell County including the towns of Altavista and Brookneal, and Nelson County). The sixth meeting will be held for the City of Lynchburg. During these meetings, Draper Aden Associates will present the results of the planning effort and answer questions regarding the Plan.

10.2 Public and Regional Stakeholder Involvement

Region 2000 recognizes that preparation of a successful plan will be more likely with active participation of the general public and regional stakeholders. Regional stakeholders include but are not limited to, elected officials, planning commissioners, Economic Development Authorities, Industrial Development Authorities, and local well drillers. In an effort to involve these parties, Region 2000 conducted a series of three workshops throughout the planning process. Each workshop was advertised in a paper of general circulation. In addition, Region 2000 mailed individual invitations to many of the stakeholders in the region. Each workshop is discussed in more detail below.

10.2.1 Workshop 1 – Informational Session

The first stakeholder workshop was conducted on February 28, 2008. The purpose of the first workshop was to educate the general public and regional stakeholders on the requirements of the regulation and the benefits of participating in a Regional Water Supply Plan. In addition, the workshop was set up with five workstations presenting the data collection efforts to date. Workstation one included handouts and materials regarding the regulatory requirements of the Plan; workstation two presented maps showing water source data collected for both the public and private community water systems in the region; workstation three presented maps showing future growth area in the region along with the population and household density; workstation four presented drafts of the demand projections (one from a rural jurisdiction and one from an urban jurisdiction); and workstation five presented a map showing existing regional cooperation between localities in the region. During the workshop, planning commissioners and elected officials were given an opportunity to provide input into projections for growth and development and regional stakeholders provided input on areas where water supply is stressed by planned growth as well as providing possible solutions to those water supply issues.

10.2.2 Workshop 2 –Demand Projections and Alternatives Analysis

The second workshop was conducted on May 8, 2008. The second workshop was held once draft demand projections (9 VAC 25-780-100) for each locality were completed and the statement of need was in the initial stages. The results of the demand projections and initial stages of the statement of need were presented and input was sought regarding the findings.

10.2.3 Workshop 3 – Presentation of Draft Plan

The third and final workshop was conducted on July 31, 2008. The purpose of the third workshop was to present the findings of the draft Plan. Draper Aden Associates presented the overall results of the planning process and Malcolm Pirnie focused on the statement of need and alternatives analysis. In addition, the workshop was set up with five workstation similar to workshop one. Workstation one presented maps showing water source data collected for both the public and private community water systems in the region; workstation two presented maps showing natural resource information throughout the region; workstation three presented maps showing future growth area in the region along with the population and household density; workstation four presented the demand projections for each jurisdiction; and workstation five provided information on the statement of need and presented a map showing potential alternatives in the region.

11.0 SUMMARY

The Plan complies with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning, and is a functional plan supporting sustainable growth and economic development. The purpose of the regulation is to establish a comprehensive water supply planning process for the development of local, regional, and state water supply plans. This process is designed to:

- Ensure that adequate and safe drinking water is available to all citizens within the region;
- Encourage, promote, and protect all other beneficial uses of the region's water resources;
- Encourage, promote, and develop incentives for alternative water sources; and
- Promote conservation.

Local governments participating in the regional plan notified VDEQ of their intent to participate in the Plan before the November 2, 2008 deadline. The Plan was submitted to the VDEQ prior to the November 2, 2011 deadline. A public hearing was held by each participating jurisdiction and the local governments passed resolutions approving the Plan and adopting other policies or ordinances that were developed during the planning process.

The Region 2000 regional water supply planning group (Region 2000) is made up of twelve local governments. Participating jurisdictions include the counties of Amherst, Appomattox, Bedford, Campbell, and Nelson; cities of Bedford and Lynchburg; and the towns of Altavista, Amherst, Appomattox, Brookneal, and Pamplin. The Amherst County Service Authority (ACSA), Bedford County Public Service Authority (BCPSA), Campbell County Utilities and Service Authority (CCUSA), and Nelson County Service Authority (NCSA) also participate.

Region 2000 recognized the benefits of a regional plan and began developing their Plan in January 2006. Region 2000 was one of the first regions in the Commonwealth of Virginia to begin developing a Plan. Beginning in April 2006 through August 2006, the Region 2000 Local Government Council conducted a series of four workshops with representatives from the Region 2000 participants. The representatives for the Region 2000 participants included utility directors, water plant operators, county administrators, and city and town managers. The purpose of the workshops was to develop a consensus scope of services, work plan, and budget for completing the Plan.

Many of the participants in the region are already working together on water supply issues; therefore, it made sense for the region to continue to work together. One of the most important benefits to result from this regional planning effort is continued communication between participants. Many of the utility directors and water plant operators in the region are getting together on a regular basis (once a month or at least once a quarter) to share information with one another.

Region 2000 is located in the central portion of Virginia in the Blue Ridge Mountains and western piedmont region. According to an estimate provided by the U.S. Census Bureau, the total population for the region in 2000 was estimated to be 243,068, but has increased to an estimated 258,125 in 2007. The region is served by both surface water and groundwater sources. The major streams utilized in the region as water sources include the James River, Big Otter River, Buffalo River, Harris Creek, Reed Creek, and Staunton River. The major reservoirs in the region utilized as water sources include Smith Mountain Lake, Pedlar Reservoir, Graham Creek Reservoir, Black Creek Reservoir, Stoney Creek Reservoir, and Phelps Creek Reservoir. Much of the region is also dependent upon groundwater as well as several springs. The City of Lynchburg is one of the major water providers in the region selling water to the ACSA, BCPSA, and CCUSA.

Overall the region is considered to be a water rich region. Based on projected demands and the total existing public community water system capacities for the each locality, Region 2000 is projected to experience a water supply surplus of approximately 2.0 MGD by the year 2060. It should be noted that there is some uncertainty associated with any point estimate of future deficit (or surplus) 50 years out into the future. This surplus is based on current limiting capacities and total demands (excluding sales to jurisdictions). The majority of this surplus is due to the large surplus from the City of Lynchburg, which provides support to potential alternatives that involve an interconnection with the Lynchburg system; however, several other localities (such as Amherst and Bedford Counties) are projected to experience large water supply deficits by the Year 2060.

Additional private demand (from groundwater and surface water sources) of approximately 17.0 MGD may be needed to supply residential and agricultural users outside the service areas of the public community water systems. It is important to note should any of the private community water systems become part of a public community water system; this may increase the future public community water system deficit projections.

12.0 REFERENCES

Amherst County. 2001. Code of Amherst County – Appendix A – Zoning and Subdivisions.

Amherst County. May 22, 2007. *Amherst County Comprehensive Plan*.

Appomattox County. 2003. *Appomattox Community Development Plan, A Guidebook for Elected Officials, Government Staff, Civic Groups, and Concerned Citizens of Appomattox County and the Towns of Appomattox and Pamplin.*

Anderson & Associates. December 2000. *The 2000 Update to the 1994 Comprehensive Water and Wastewater Study for Bedford County, Virginia.* Bedford County, Virginia.

Bedford County. Code of Bedford County. Article III – District Regulations Zoning Ordinance. Section 30-76 Wellhead Protection Overlay District.

Bedford County Planning Commission. June 8, 2007. *Bedford County 2025 Comprehensive Plan*.

City of Bedford. January 23, 2003. *City of Bedford Comprehensive Plan, prepared by the City of Bedford Planning Commission with the assistance of the City Department of Planning and Community Development at the request of the Bedford City Council.*

City of Lynchburg. 2002. *City of Lynchburg Comprehensive Plan 2002-2020.* Department of Community Planning and Development.

DAA. August 2007. *Rockfish Valley/Wintergreen Resort Water Source and Capacity Study.* Nelson County, Virginia.

Dietrich, Richard V., 1990. *Geology and Virginia*, DMME - VDMR.

EPA. *Safe Drinking Water Information System.* http://www.epa.gov/enviro/html/sdwis/sdwis_query.html

Hurt & Proffitt, Inc. November 14, 2004. *Graham Creek Reservoir Population Projections, Amherst County Service Authority, Amherst County, Virginia.* H&P 20000691.

Hurt & Proffitt, Inc. 1995. *Water and Wastewater Facility Plan.* Amherst County, Virginia.

Hurt & Proffitt, Inc. 2003. *Alternative of Water Systems Interconnection Between Amherst County Service Authority and City of Lynchburg.* Amherst County, Virginia. 2003 Update Addendum.

McGuire, Woods, Battle & Boothe, LLP. January 15, 1997. Memorandum – Lynchburg Water Rights.

Nelson County Planning Commission, October 8, 2002. Nelson County Comprehensive Plan as Approved by the Nelson County Board of Supervisors and Nelson County Planning Commission.

NPS. *National Rivers Inventory*. Rivers, Parks, and Conservation Program. March 31, 2008. http://www.nps.gov/ncrc/programs/rtca/nri/states/va.html

Rader, E.K. and N.H. Evans, eds. 1993. Geologic Map of Virginia – expanded explanation. VDMR. Charlottesville, Virginia.

Clarke, Anne Marie. 2004. Robert E. Lee Soil and Water Conservation District's Buffalo River Watershed Progress Report for: *The Town of Amherst Water Protection Plan.* Robert E. Lee Soil and Water Conservation District.

USGS. *Groundwater Atlas of the United States, Publication HA 730-L Piedmont and Blue Ridge Aquifers*. March 30, 2008. http://capp.water.usgs.gov/gwa/ch_l/L-text4.html

USDA. *Major Land Resource Regions Custom Report*. Agriculture Handbook 296 (2006). March 27, 2008. http://soils.usda.gov/MLRAExplorer

USDA. NRCS Web Soil Survey 2.0. March, April, May, June 2008. http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

USEPA. Envirofacts Data Warehouse. Permit Compliance System. March 30, 2008. http://www.epa.gov/enviro/html/pcs/pcs_query_java.html

USFWS. National Wetlands Inventory Interactive Mapper. March 30, 2008. http://www.fws.gov/nwi

VDGIF. *Fish Species and Game Fish*. March 27, 2008. http://vafwis.org/fwis/?Menu=Home.Species+Information

VDCR. *Natural Heritage Resources*. Division of Natural Heritage. June 2, 2008. http://192.206.31.46/cfprog/dnh/naturalheritage/select_counties.cfm

VDCR. *State or Federally Listed Threatened or Endangered Plant Species.* Division of Natural Heritage. June 2, 2008. http://plants.usda.gov/threat.html

VDCR. *Virginia Conservation Lands Database*. Virginia Natural Heritage Program. June 2, 2008. http://www.dcr.virginia.gov/land_conservation/tools02a.shtml

VDCR. Virginia's Scenic Rivers. March 31, 2008. http://www.dcr.virginia.gov/recreational_planning/documents/srlist.pdf http://www.dcr.virginia.gov/recreational_planning/documents/srmap.pdf

VDEM. June 2, 2008. http://www.vaemergency.com/threats/geological/types.cfm

VDEQ. Final 305(b)/303(d) Water Quality Assessment Integrated Report. October 30, 2006.

VDEQ. Water Use Database. 2001-2006.

VDH. Engineering Description Sheets.

VDH. June 17, 2002. *Source Water Assessment Report.* Town of Brookneal

VDH. October 25, 2002. *Source Water Assessment Report.* Town of Pamplin

VDHR. National Register of Historic Places. March 27, 2008. http://www.dhr.virginia.gov/registers/RegisterMasterList.pdf

VDHR. Virginia Landmarks Register. March 27, 2008. http://www.nr.nps.gov/

VFWIS. *State or Federally Listed Threatened and Endangered Species*. March 27, 2008. http://vafwis.org/fwis/?Menu=Home.Species+Information

VOF. June 2, 2008. http://www.virginiaoutdoorsfoundation.org/VOF_pub-bycounty.php

Virginia Council on Indians. March 27, 2008. http://indians.vipnet.org/tribes.cfm

Virginia's Region 2000 Local Government Council. March 10, 2006. *Community Water and Sewer Needs Evaluation for Region 2000.* SERCAP Project Number – 2237.

Water Purchase Agreement between the City of Lynchburg and ACSA. July 1, 2007.

Water Purchase Agreement between the City of Lynchburg and BCPSA. July 1, 2007.

Water Purchase Agreement between the City of Lynchburg and CCUSA. July 1, 2007.

W&W Associates. September 19, 2003. *Pedlar Reservoir Safe Yield Study for City of Lynchburg.* WWA Project No. 203052.00

Wiley & Wilson. August 2003. *Water Source Study for the Appomattox Area.* Appomattox County, Virginia.

13.0 ACRONYMS

ACSA	Amherst County Service Authority
AMR	Automatic Meter Reading
BCPSA	Bedford County Public Service Authority
CCUSA	Campbell County Utilities and Service Authority
CIP	Capital Improvement Plan
CVTC	Central Virginia Training Center
CWA	Clean Water Act
CWSRF	Clean Water State Revolving Funds
DCR	Department of Conservation and Recreation
DGIF	Department of Game and Inland Fisheries
DHR	Department of Historic Resources
DNH	Department of Natural Heritage
DWSRF	Drinking Water State Revolving Funds
EDW	Environfacts Data Warehouse
ERC	Equivalent Residential Connections
FC	Federal Candidate
FE	Federal Endangered
FS	Federal Species of concern
FT	Federal Threatened
gpd	gallons per day
gpm	gallons per minute
GIS	Geographic Information System
HUC	Hydrologic Unit Code
MHP	Mobile Home Park
MG	Millions Gallons
MGD	Million Gallons per Day
NASS	National Agriculture Statistics Service
NCSA	Nelson County Service Authority
NHPA	National Historic Preservation Act
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NRWA	National Rural Water Association
NWI	National Wetland Inventory
OSSS	On-Site Septic System
PCS	Permit Compliance System
RCRA	Resource Conservation and Recovery Act
SCADA	Supervisory Control And Data Acquisition
SDWIS	Safe Drinking Water Information System
SE	State Endangered
SS	State Special concern
ST	State Threatened
SWAP	Source Water Assessment Plan
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

USGS	United States Geologic Survey
VAFWIS	Virginia Fish and Wildlife Information Service
VANHP	Virginia Natural Heritage Program
VCE	Virginia Cooperative Extension
VDEM	Virginia Department of Emergency Management
VDEQ	Virginia Department of Environmental Quality
VDH	Virginia Department of Health
VDHR	Virginia Department of Historic Resources
VDMR	Virginia Division of Mineral Resources
VDOT	Virginia Department of Transportation
VLR	Virginia Landmark Register
VOF	Virginia Outdoors Foundation
VPDES	Virginia Pollution Discharge Elimination System
VRWA	Virginia Rural Water Association
VUSBC	Virginia Uniform Statewide Building Code
WAP	Wildlife Action Plan
WFP	Water Filtration Plant
WHP	Wellhead Protection
WVWA	Western Virginia Water Authority