

**ROANOKE VALLEY ALLEGHANY
REGIONAL COMMISSION
REGIONAL WATER SUPPLY PLAN
WORK PLAN**

Submitted to:

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EXECUTIVE SUMMARY

The Roanoke Valley Alleghany Regional Commission (RVARC) regional water supply planning group is made up of thirteen (13) local governments and two (2) service authorities. Participating jurisdictions include the cities of Bedford, Roanoke, and Salem, the counties of Bedford, Botetourt, Franklin, and Roanoke, and the towns of Boones Mill, Buchanan, Fincastle, Rocky Mount, Troutville, and Vinton. The Bedford County Public Service Authority and Western Virginia Water Authority also participate. This work plan documents the completion of Phase I and outlines the approach for Phase II of the planning process.

The RVARC Regional Water Supply Plan (Plan) is being developed to comply with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning and to produce a functional plan to support 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 are required to provide notification of their intent to participate in the regional plan to the Virginia Department of Environmental Quality (VDEQ) no later than November 2, 2008. The Plan is due to the VDEQ for review no later than November 2, 2011. Prior to submission of the Plan to the VDEQ for review, a public hearing must be held by each participating jurisdiction.

One of the primary activities in the water supply planning process is to evaluate the existing water supplies by collecting information on existing water sources, existing water use, and existing natural resources. The region collected water source, water use, and natural resource data in Phase I and has begun to compile GIS layers documenting existing water supply information. Meetings with engineering and planning staff from each jurisdiction will be held in the next phase (Phase II) of the planning process to review the data collected to date and discuss additional data needs.

Water demand management will also be addressed in the Plan by correlating water resources and use data with growth and development projections. The region developed a methodology approved by VDEQ in Phase I and has begun to prepare demand projections for the next 50 years. Conservation and drought response measures will also be discussed in the final Plan and completed in Phase II of the planning process.

The existing water source and water demand management evaluations will determine the region's ability to meet current and projected water demands resulting in a Statement of Need. Based on the Statement of Need, potential future water supply alternatives will be evaluated.

The statement of need and alternatives analysis will be completed in Phase II of the planning process.

The participants of RVARC recognize that the preparation of a successful plan will be more likely with involvement of local governments (i.e., county boards of supervisors and city and town councils), regional stakeholders, and relevant engineering and planning staff. An estimated two workshops will be held throughout the planning process. The purpose of the workshops will be 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.

The final Regional Water Supply Plan will be provided to RVARC as well as all participants in paper and electronic formats, including data files, maps and GIS databases.

1.0 INTRODUCTION

The Roanoke Valley Alleghany Regional Commission (RVARC) regional water supply planning group is made up of thirteen (13) local governments and two (2) service authorities. Participating jurisdictions include the cities of Bedford, Roanoke, and Salem, the counties of Bedford, Botetourt, Franklin, and Roanoke, and the towns of Boones Mill, Buchanan, Fincastle, Rocky Mount, Troutville, and Vinton. The Bedford County Public Service Authority and Western Virginia Water Authority also participate. This work plan documents the completion of Phase I and outlines the approach for Phase II of the planning process.

The RVARC Regional Water Supply Plan (Plan) is being developed to comply with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning and to produce a functional plan to support 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 are required to provide notification of their intent to participate in the regional plan to the Virginia Department of Environmental Quality (VDEQ) no later than November 2, 2008. The regional water supply plan is due to the VDEQ for review no later than November 2, 2011. Prior to submission of the Plan to the VDEQ for review, a public hearing must be held by each participating jurisdiction. Additionally, the local governments must pass a resolution approving the Plan and adopting other policies or ordinances that are developed during the planning process.

The initial phase (Phase I) of the water supply planning process included collection of data on existing water sources, existing water use, and existing water resources; verifying and updating current population estimates and population projections; verifying and updating current and future water supply demand projections; and development of a work plan for preparation of a Regional Water Supply Plan. The next phase of the planning process (Phase II) will include plans and strategies to address conservation in accordance with 9 VAC 25-780-110; development of drought response and contingency plans in accordance with 9 VAC 25-780-120; preparation of a statement of need and alternatives analysis in accordance with 9 VAC 25-780-130; public hearings consistent with § 15.2-1427 of the Code of Virginia; and completion of the final Plan. The final Plan will be provided to RVARC as well as all participants in paper and electronic formats, including data files, maps and GIS databases. The proposed schedule for completion of the Plan is included in Appendix A.

2.0 DATA COLLECTION

One of the most challenging aspects of regional water supply planning is establishing a GIS framework that will allow the integration of data from the 15 entities involved in the project. A second challenge is meeting the regulatory requirement (9 VAC 25-780) to address groundwater resources.

Information on existing surface water supplies and water distribution lines in the region are generally readily available, although the format can vary from decades – old paper maps to electronic data in a GIS format. This data, which needs to be collected for the Plan, can also be used to identify the areas in the region that rely on groundwater. Areas where development has occurred and public water is not available rely on groundwater. These regions can be evaluated relative to projected growth estimates to identify specific areas within the region where more detailed data collection could be prioritized.

One of the primary activities in the water supply planning process is to evaluate the existing water supplies for participating jurisdictions and service authorities within the region. The evaluation of the existing water supplies will be addressed by collecting information on existing water sources, existing water use, and existing water resources as discussed below.

2.1 Existing Water Source Information

The region has collected water source data and begun to compile GIS layers documenting existing water source information as required by 9 VAC 25-780-70. Information on the following has been collected:

- Community water systems using groundwater, surface water reservoirs, or stream intakes;
- Self-supplied users utilizing more than 300,000 gallons per month of surface water or groundwater for nonagricultural uses;
- Agricultural users utilizing more than 300,000 gallons per month of surface water or groundwater;
- Amount of groundwater or surface water purchased outside the geographic boundaries of the region;
- Amount of water available to be purchased outside of the geographic boundaries of the region;
- Estimate of self-supplied users of less than 300,000 gallons per month and population served by individual wells; and
- Summary of findings and recommendations from applicable source water assessment plans or wellhead protection programs.

2.1.1 Community Water Systems

A list of active water systems was queried from the Environmental Protection Agency (EPA) Safe Drinking Water Information System (SDWIS) for each county within the region. The SDWIS divides the community systems into three categories: community water systems,

non-transient non-community water systems, and transient non-community water systems. Community water systems are defined as systems that serve the same people year-round (e.g. in homes or businesses). Non-transient non-community water systems are defined as systems that serve the same people, but not year round (e.g. schools). Transient non-community water systems are defined as systems that do not consistently serve the same people (e.g. gas stations, campgrounds, rest stops). Additionally, a list of municipal water supply owners and operators was queried from the Virginia Department of Health (VDH). The lists from SDWIS were compared to the VDH lists of municipal water supply owners and operators and used to collect additional information on community water systems from the VDH regional offices in Lexington and Danville.

Initial review of community water system information collected from VDH identified two main data gaps. The source either contained detailed information for a community system with no information on the location of the system or the source contained the location with minimal or no detailed information about the system. These data gaps will be addressed during the next phase of the planning process. Additional data collection and/or meetings with engineering staff will be necessary to identify missing information and are included in the scope for the next phase of the project.

Available information on community water systems was also provided by each participating jurisdiction and/or service authority as well as from published studies. Water source information for community users in the region was collected from the *Long-Range Water Supply System Study* completed in 2003 by Black & Veatch of Roanoke, Virginia. The study included the counties of Bedford, Botetourt, Franklin, and Roanoke; the cities of Roanoke and Salem; and the town of Vinton. The purpose of the study was to evaluate the existing water supply sources, consider future water needs, and identify possible solutions to satisfy anticipated growth in the Roanoke Valley over a 50 year period. The study examined each localities existing water demands, developed future demand projections, and investigated alternative sources of supply for the region.

The city of Bedford and the towns of Boones Mill, Buchanan, Fincastle, Rocky Mount, and Troutville did not participate in the *Long-Range Water Supply System Study*. Water source information for these localities was collected from each locality. Additional information for Botetourt County was also collected from the *Countywide Water and Wastewater Analysis Report for Botetourt County* completed by Draper Aden Associates in 2003.

Finally, available water source information was also collected from the VDEQ through their water use database. The water use database includes information where the daily average withdrawal exceeds 10,000 gallons per day, with the exception of crop irrigation, as required by the Virginia Water Withdrawal Reporting Requirements (9 VAC 25-200-100 et seq.). Reporting of crop irrigation applies to withdrawals exceeding one million gallons in any single month. The water use database contains monthly and annual data as well as identifying the owner, source, source type and subtype, and category of use. Source types include surface water, groundwater, and transferred water. The source types are then broken down into subtypes, which include reservoirs and streams for surface water and wells and springs for groundwater. Examples of

categories of use include, but are not limited to, commercial, manufacturing, public water supplies, and irrigation.

2.1.2 Self-Supplied Users

Available information on self-supplied users utilizing more than 300,000 gallons per month of groundwater or surface water was provided by the VDEQ through their water use database. The water use database includes information where the daily average withdrawal exceeds 10,000 gallons per day, with the exception of crop irrigation, as required by the Virginia Water Withdrawal Reporting Requirements (9 VAC 25-200-100 et seq.). Reporting of crop irrigation applies to withdrawals exceeding one million gallons in any single month. The water use database contains monthly and annual data as well as identifying the owner, source, source type and subtype, and category of use. Source types include surface water, groundwater, and transferred water. The source types are then broken down into subtypes, which include reservoirs and streams for surface water and wells and springs for groundwater. Examples of categories of use include, but are not limited to, commercial, manufacturing, public water supplies, and irrigation.

Information on individual groundwater wells within the region was provided by the VDEQ through the STORET database. The STORET database (short for STORage and RETrieval) includes information collected before 1999 on approximately 25,000 groundwater wells in Virginia.

In addition, regional groundwater data can be compiled from published studies. Site specific groundwater data including geology, well construction logs, and specific yields can be obtained from local VDH offices, well drillers, and property owners. The availability and completeness of this information varies greatly and is nearly always available only in paper format; it therefore becomes time-consuming and expensive to incorporate all of that data into a regional GIS database. Representative groundwater data will be collected in order to characterize groundwater use across the region and meet the requirements of the regulation. More detailed groundwater data may be collected where warranted and requested by a participating jurisdiction. The more detailed groundwater evaluation will be an addition to the scope of services and the costs will not be shared by the region but by the jurisdiction requesting additional information. Available self-supplied user data will be reviewed and supplemented as needed during implementation of this work plan.

Existing resources such as E-911 maps and public water supply service area data will be used to determine the areas within the region that are served by individual wells.

2.1.3 Additional Groundwater Evaluation

Jurisdictions that request a more detailed groundwater evaluation will be provided with two options that involve the collection and interpretation of existing groundwater well logs. It is important to note that neither option involves collection of new groundwater data (e.g., installation of new wells). The purpose of the additional evaluation will be to collect a

representative sampling of existing private water well data so that each locality will have a better understanding of areas where groundwater issues may appear in the future and/or areas where groundwater may be considered as an alternative source in the future.

Option one will involve spending a day at VDH collecting additional groundwater information from well logs and option two will involve spending 2-3 weeks at VDH. Prior to visiting VDH, tax tile maps will be reviewed to determine where additional groundwater information would be most beneficial based on the hydrogeology of the area.

The VDH office(s) will be contacted and appointments will be made for a technician(s) to collect well log information from their files. The well log records will likely consist of hard copy paper folders in boxes, filing cabinets, etc. and the folders will likely be organized differently at each VDH office (e.g., alphabetically, by tax tile). With the cooperation of the VDH office(s), the technician(s) will set up a laptop and scanner and well logs will be scanned directly into a PDF file and named by its VDH permit number. An effort will be made to collect well log files that are representatively distributed across study area. Once well log information has been collected from the VDH office(s), the well locations will be georeferenced.

Georeferencing the wells is a critical component of accurately depicting and analyzing the data. Georeferencing refers to the process of accurately locating the wells with respect to the “X, Y, and Z axes.” The X and Y axes refers to a well’s horizontal location, or latitude and longitude. The Z axis refers to the elevation of the well.

The well will be placed on a map as near to its true horizontal and vertical coordinates as possible using available information. Wells are generally drilled in close proximity to the building they are intended to serve. Accordingly, it makes sense that the most accurate location will be to place the wells on the respective buildings wherever possible. In most cases this is a home. This approach is significantly more accurate than placing the well in the middle of the lot.

Larger lots are more likely to encompass a greater range of elevation. The elevation of the center of the parcel may be significantly higher or lower than the elevation of the building. By putting the well on the building the true elevation of the well will be better approximated so that the vertical or ‘Z’ position has useful meaning.

The following georeferencing assumptions will be made:

- The well is near the building.
- The well is at the same elevation as the building.
- On lots with no building, if small (<4ac.) – center on parcel, if larger – individually evaluate for best placement.

A comments field will be added to the data table to record how each well was georeferenced.

Once the data has been georeferenced, it will be incorporated into the GIS database for the Plan and will serve as a beginning for a comprehensive database of private water wells in the region.

2.1.4 Agricultural Users

Virginia Cooperative Extension (VCE) agents for each county within the region were contacted in order to collect available information on agricultural users utilizing more than 300,000 gallons of groundwater or surface water. Each VCE agent was provided a brief explanation of the regulatory requirements, the purpose of the Plan and asked to provide available information for agricultural users. The VCE agents were not cooperative and have not provided available information at this time.

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 by county. In addition, available information on livestock (i.e. number of head of cattle) and crops (i.e. type of crop planted, total acres harvested) for the region was collected from 2000 through 2006. This data will be reviewed and supplemented as needed during the implementation of this work plan.

2.1.5 Water Purchases

Information regarding water purchase agreements currently in place were provided by each participating jurisdiction or service authority. This data will be reviewed and supplemented as needed during implementation of this work plan.

2.2 Existing Water Use Information

The region has collected current water use information and begun to compile GIS layers documenting existing water use information as required by 9 VAC 25-780-80. Available water use information was provided by each participant as well as the VDEQ through their water use database. The water use database includes information where the daily average withdrawal exceeds 10,000 gallons per day, with the exception of crop irrigation, as required by the Virginia Water Withdrawal Reporting Requirements (9 VAC 25-200-100, et seq.). Reporting of crop irrigation applies to withdrawals exceeding one million gallons in any single month. The water use database contains monthly and annual data as well as identifying the owner, source, source type and subtype, and category of use. Source types include surface water, groundwater, and transferred water. The source types are then broken down into subtypes, which include reservoirs and streams for surface water and wells and springs for groundwater. Examples of categories of use include, but are not limited to, commercial, manufacturing, public water supplies, and irrigation. Additional water use information will be collected during implementation of this work plan.

The following information will be documented in the Plan for each community water system within the regional planning area: population, number of connections, average and maximum daily withdrawal, amount of water used in millions of gallons per day on an average annual and average monthly basis, and peak day water use by month. Estimates will also be determined for disaggregated amounts of water used in categories of use appropriate for the system such as:

- Residential use
- Commercial institutional and light industrial use
- Heavy industrial use
- Military water use
- Water used in water production processes
- Unaccounted for losses
- Sales to other community water systems and the names of systems
- Subtotals of the above categories for all systems

Evaluation of community systems using stream intakes will include a qualitative description of existing in-stream beneficial uses inside or outside the region that may be affected by the point of stream withdrawal.

Water use estimates will be determined for self-supplied nonagricultural and self-supplied agricultural users of more than 300,000 gallons per month as well as self-supplied nonagricultural users of less than 300,000 gallons per month.

Water use estimates will also be determined for self-supplied nonagricultural users and self-supplied agricultural users withdrawing more than 300,000 gallons per month outside the service area of community water systems and self-supplied users of less than 300,000 gallons outside the service area of community water systems.

2.3 Existing Resource Information

The Plan will include a description of existing geologic, hydrologic, meteorological conditions within the region and in proximity to the point of withdrawal if outside the region as well as a description of existing environmental conditions that pertain to in-stream flow, in-stream uses, and sources that provide current supply. Environmental resource conditions, issues, and impacts will include:

- Threatened or endangered species
- Fisheries
- River segment status
- Historic or archaeologically significance sites
- Unusual geologic formations or special soil types
- Wetlands
- Riparian buffers and conservation easements
- Land use and land coverage items
- Stream impairment status

- Location of point source discharges
- Other potential threats to existing water quality and quantity

A majority of the existing resource information was collected from the Virginia Department of Conservation and Recreation (DCR). Other sources for existing resource information include, but are not limited to, the EPA, United States Department of Agriculture (USDA), United States Geological Survey (USGS), National Wetlands Inventory (NWI), Virginia Department of Game and Inland Fisheries (VDGIF), Virginia Department of Historic Resources (VDHR), Virginia Division of Mineral Resources (VDMR), VDEQ, and Comprehensive Plans.

Geologic information for the region can be collected from USGS National Geologic Map Database as well as from the VDMR. USGS also provides land use and land cover (LULC) data, which will need to be collected. The Soil Survey Status Database from DCR provides information on counties that have published soil surveys or digital versions of the soil layer. The completed soil surveys are usually available from local United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) or local soil and water conservation district offices.

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, and land trusts.

In addition, DCR has also 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.

In 2001, the USDA NRCS, USGS, EPA, and other federal agencies developed new Federal Standards for Delineation of Hydrologic Unit Boundaries. The result is the National Watershed Boundary Dataset. GIS data is available for the Virginia portion of the National Watershed Boundary Dataset (NWBD) through DCR.

The NWI is part of the United States Fish and Wildlife Service. The NWI produces and provide information on the characteristics, extent, and status of the Nation's wetlands and deepwater habitats and other wildlife habitats.

VDGIF is responsible for the management of inland fisheries, wildlife, and recreational boating for the Commonwealth of Virginia. Information on threatened and endangered species in Virginia can be obtained through the VDGIF.

VDHR oversees the National Register of Historic Places and the Virginia Landmarks Register. These two programs are designed to recognize Virginia's historic resources and encourage their continued preservation. The National Register of Historic Places is the official list of structures, sites, objects, and districts that represent the historical and cultural foundations of the nation. It was established in 1966 and is managed by the National Park Service. The Virginia Landmarks Register is the state's official list of properties important to Virginia's history. It was also established in 1966 and is managed by VDHR.

2.4 Data Compilation

The existing water source, water use, and natural resource data collected, will continue to be compiled, evaluated, and supplemented as needed. Meetings with engineering staff from each jurisdiction will be conducted to review the data that has been collected and discuss additional data needs. The engineering staff for each jurisdiction will have the opportunity to make corrections to the data and assist in identifying data gaps. Meetings with engineering staff will be scheduled in the beginning of the next phase (Phase II) of the planning process. Following data review with each jurisdiction's engineering staff, additional data will be collected if necessary. Finally, the data will be incorporated into the GIS and evaluated in conjunction with growth and development information for the region.

3.0 WATER DEMAND MANAGEMENT

3.1 Future Demand

A critical predictor of future water demands is population growth. Population in aggregate and disaggregate formulations will be estimated according to information collected from the U.S. Census Bureau, Bureau of Economic Analysis, the Virginia Employment Commission (VEC), or local or regional sources. The U.S. Census of Population is prepared by the U.S. Department of Commerce, Bureau of the Census and provides estimates of total population by jurisdiction. The VEC is vested with the authority to prepare official short- and long-term population projections for use by State agencies and the General Assembly.

Demand projection methodologies will be consistent with those outlined in the American Water Works Association or American Society of Civil Engineers manuals. There are many different models that can be used to determine future demand for the region including, but not limited to, per capita, land use, and disaggregate models. A brief description of each model is presented below.

3.1.1 Per Capita Model

The per capita model calculates the total production or consumption per capita for a historical period and applies the current year per capita consumption to population projections for future periods. The per capita model is the simplest demand projection method and requires only historical production and consumption data, population, and a population estimate for the demand projection period.

3.1.2 Land Use Model

Land use models concentrate on current and projected uses of residential, commercial, industrial, and public lands within the region. Growth rates are established for each land use segment, usually by census tract, allowing for public land, infill development, and growth into undeveloped areas. Water use factors are developed for each land use segment and applied to the projections of population, households, employment, and other applicable variables used to predict the segments.

3.1.3 Disaggregate Model

The billing system in most large utilities permits at least some disaggregation of total billings, usually by residential, commercial, industrial, and municipal or public facilities. Further breakdowns may also be available for single family and multifamily residential, institutional, and irrigator accounts. Many utilities can also provide billing data by land-use patterns, region, district, pressure zone, microclimate area, and topography areas. The accuracy of the demand projections is generally improved by disaggregation as long as the water use or trend patterns are different among the segments. If two or more segments are experiencing the same water use and

growth rate, separate forecasts are unlikely to improve the accuracy and are unnecessary. The disaggregate water use model is one of the most commonly used demand projection methods.

Following review of each model and previous demand projections completed by Black & Veatch in the 2003 *Long-Range Water Supply System Study* as well as discussion with VDEQ, the Plan will use a disaggregated model. The region has begun to prepare demand projections for the next 50 years using a disaggregated model. The model is based upon existing data provided by the VDEQ through their water use database and each locality as well as population and employment projections from the U.S. Census Bureau and the Virginia Employment Commission. The following assumptions are made based on previous water supply planning experience:

1. The average residential demand is 75 gallon per capita day.
2. Residential demand will increase at the same rate as the annual average percent change in population.
3. Commercial, institutional, industrial, military, process production, sales and other demands will increase at the same rate as the annual average percent change in employment.
4. To account for the unanticipated arrival of unique large demand users (e.g., a bottling plant like Coca-Cola) a new bottling plant will begin operation every ten years.

3.2 Projected Water Demand Information

Water demand projections for the region will be made for a maximum of 50 years into the future and will include future water use estimates at the beginning of each decade. The Plan will include the following projections for community water systems:

- Population estimate within the region served by each community system
- Maps depicting the service area of each existing and proposed system
- Water demand estimates for each existing or proposed system as well as the total projected water demand disaggregated into categories of use appropriate for the system such as:
 - Residential use
 - Commercial use
 - Industrial use
 - Military use
 - Water production process use
 - Unaccounted for losses
 - Sales to other community systems
 - Subtotals for all systems

Water demand projections will also be included for self-supplied nonagricultural and self-supplied agricultural users of more than 300,000 gallons per month as well as self-supplied nonagricultural users of less than 300,000 gallons per month.

An explanation will be provided for how the projected needs of domestic consumption, in-stream uses, and economic development have been accounted for in the demand projection for the planning period.

Graphic plans will be prepared in order to provide the region a better understanding of the conclusions. Among those graphics will be population density maps to identify where the people in the region currently reside. This information will be overlaid with comprehensive plan information, current public water supply network infrastructure and private water supply information. In this manner, future water sources for growth areas can be readily identified and the probable timing of additional sources can be forecast. Topography and proposed land use will be reviewed to further define the future character of the region. Water demands will be shown by jurisdiction or areas within a jurisdiction to determine whether each area will ultimately have a surplus of water resources or a deficiency. Finally, these surplus and deficit results will provide the basis for identifying the infrastructure that is needed in the future that will allow sharing of existing water supplies (surplus to feed deficits), if desired, and identify potential new supplies or expanding existing supplies from sources that have available capacity. The alternatives evaluation in this study can then be framed from these results.

3.3 Conservation

Water conservation is the conscious effort by a utility, business or individual to save water. Normal conservation practices can provide long-term benefits by permanently reducing water demands during normal operating conditions. In order to address conservation as part of the overall water demand management, existing conservation ordinances within the region will be reviewed.

In accordance with 9 VAC 25-780-110, the Plan will describe current practices in the region for more efficient use of water. The type of measures to be described may include, but are not limited to, the adoption and enforcement of the Virginia Uniform Statewide Building Code sections that limit maximum flow of toilets, urinals and appliances, use of low-water use landscaping, and/or increases in irrigation efficiency. The Plan will also describe water conservation measures, such as technical, educational, and/or financial programs, the region currently uses to conserve water through the reduction of use. Finally, the Plan will address unaccounted-for water losses.

Unaccounted-for water (UAW) is the difference between a water utility's finished water production and all metered water usage. A distinction can be made between authorized UAW uses and other UAW losses. Authorized uses are specific unmetered uses of water that a water utility recognizes to be beneficial and/or necessary. Examples of authorized UAW and other UAW losses that may be addressed in the Plan include, but are not limited to, the following:

- Unmetered use from fire hydrants (e.g., fire fighting and training, street-washing, construction, main-flushing, sewer-cleaning, and storm drain flushing);
- Unmetered connections (e.g., public buildings, schools, cemeteries, or parks);
- Treatment facility process water; and
- Other UAW losses comprise all other uses, losses, and measuring errors such as:
 - Distribution system leakage

- Service line leakage
- Unauthorized use (e.g., theft, deliberate bypass of meters, and illegal tapping)
- Inaccurate meters
- Inadequate system controls (e.g., malfunctioning valves)
- Incorrect meter-reading and billing.

UAW estimates for water supply systems vary greatly depending on the types and degrees of authorized UAW uses and other UAW losses. To estimate the percentage of UAW for systems within the region, utilities records of finished water production (i.e., raw water withdrawals less process use) and total system sales (i.e., metered demand) for systems within the region will be reviewed.

3.4 Drought Response and Contingency Plans

In accordance with 9 VAC 25-780-120, existing drought response and contingency plans for community water systems and self-supplied users withdrawing more than 300,000 gallons per month of groundwater or surface water currently in place throughout the region will be reviewed. The drought response and contingency plans will address the unique characteristics of the water source being utilized and the nature of the beneficial use of water as well as the stages of response to droughts. Three typical stages of response are defined as follows:

1. Drought watch stage – public outreach activities
2. Drought warning stage – voluntary conservation by reducing water use 5-10%
3. Drought emergency stage – mandatory conservation by reducing water use by 10-15%

Some jurisdictions may have expanded this drought response process into a four stage process. The Plan will include references to local ordinances, if adopted, and procedures for the implementation and enforcement of drought response and contingency plans.

4.0 STATEMENT OF NEED AND ALTERNATIVES

4.1 Statement of Need

Based on the results of the existing water supply evaluation and water demand management evaluation, the adequacy of existing water supply to meet current and projected demand will be evaluated and a detailed Statement of Need will be produced.

Source adequacy (surplus and shortfall) will be determined for each community water system service area within the regional planning area, for each self-supplied nonagricultural and self-supplied agricultural users of more than 300,000 gallons per month, and for self-supplied users of less than 300,000 gallons per month. Self-supplied users of less than 300,000 gallons per month will be grouped according to jurisdiction and by geographic and hydrologic areas within each jurisdiction. These disaggregated determinations of source adequacy will be compiled to determine the overall adequacy of existing water supply within each jurisdiction and for the regional planning area.

Source adequacy will be determined for each disaggregated user group, each jurisdiction, and the regional planning area under current demand conditions and for each decade's projected demands within the 50 year planning period.

The Statement of Need will establish a uniform basis for consideration of water supply alternatives and allow VDEQ to play a greater advocacy role with other state and federal environmental review agencies.

4.2 Statement of Alternatives

Based on the Statement of Need and stakeholder input, potential water supply alternatives for the region will be evaluated. The focus will be on water source alternatives available within the boundaries of those jurisdictions that are within the region, although projects that extend or overlap into neighboring jurisdictions may also be considered.

Water supply alternatives to be considered will include the following:

- Water demand management actions that are in addition to those currently in use and accounted for in the demand projections. Potential water savings from these additional actions will be specifically projected for each decade within the planning period.
- Individual wells for self-supplied users
- Expansion of community system service areas
- Community wells
- Interconnection of existing community systems within the region
- Interconnection of existing community systems within the region with community systems outside the area
- Expanded use of existing stream intakes
- New stream intakes
- New reservoirs or impoundments
- Recycling and reuse

Once potential alternatives have been identified, each alternative will be described and a map depicting the general location of alternatives to be considered will be produced. The description for each alternative will include:

- Conceptual description
- Assessment of engineering feasibility at the conceptual level
- Estimated volume or capacity of the alternative as an independent facility
- Institutional/political constraints
- Environmental resource conditions, issues, and impacts specifically related to each alternative, based on information developed under the existing resource evaluation, such as:
 - Threatened or endangered species
 - Fisheries
 - River segment status
 - Historic or archeologically significant sites
 - Geologic formations or soil types
 - Wetlands, based on available NWI mapping, riparian buffers and conservation easements
 - Land use and development plans
 - Stream impairment status and location of point source discharges
 - Other potential threats to water quality or quantity
- Long-term and short-term options related to the alternative, as appropriate

A preliminary screening process in order to produce a shortlist of potentially feasible alternatives will be developed and a map depicting the location of these short listed potentially feasible alternatives will be produced. Using an Alternative Evaluation Ratings table and Screening Matrix for Short-Listed Sites, the potentially feasible alternatives will be screened and ranked based on relevant criteria such as yield, availability, reliability, and cost. Alternatives will not be eliminated during the screening process but may be considered impracticable at the time. As growth and demand increase and political and institutional constraints change, the region will be able to efficiently reconsider alternatives that originally were not considered feasible.

Finally, the Plan will include the following:

- Short narrative description of the approach to development of the Statement of Need
- Statement of Need, including tables presenting the disaggregated and aggregated surpluses and shortfalls of the region
- Narrative description of all alternative sources of supply considered, addressing all applicable items listed above
- Map of all alternative sources of supply considered
- Narrative description of preliminary screening process
- Graphic presenting the results of preliminary screening
- Summary of descriptions of the short listed alternatives
- Map of short listed alternatives

5.0 JURISDICTIONAL INVOLVEMENT AND PUBLIC PARTICIPATION

5.1 Local Government and Regional Stakeholder Involvement

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) and regional stakeholders. Such stakeholders include but are not limited to, elected officials, planning commissioners, Economic Development Authorities, Industrial Development Authorities, and the local well drillers. Involvement of these parties will be conducted in an estimated two workshops, which are discussed in detail below.

If a jurisdiction requests additional informational meetings for local governments and/or regional stakeholders, the meetings will be in addition to the scope of services and the costs will not be shared by the region but by the jurisdiction.

5.1.1 Workshop 1 – Informational Meeting and Water Demand Management

The first workshop will be conducted in two sessions. The first session will involve relevant engineering and planning staff from each jurisdiction that will be able to aid in the decision making. During the first session, staff will be educated on the requirements of the regulation and the benefits of participating in a Regional Water Supply Plan. In addition, an overview of the scope for the Plan and a general budget breakdown will be presented. Finally, input will be sought on the overall planning process.

The second session will involve relevant engineering and planning staff as well as regional stakeholders from each jurisdiction. During the second session, the findings of the demand projections will be presented and the planning commissioner and elected officials will have an opportunity to discuss the results. In addition, stakeholder input will be sought on areas where water supply is stressed by planned growth and will have the opportunity to provide possible solutions to those water supply issues.

5.1.2 Workshop 2 – Alternatives Analysis

The second workshop will be held once the alternatives analysis has been completed. The results of the alternatives analysis will be presented and input will be sought on those alternatives identified. The second workshop will involve relevant engineering and planning staff from each jurisdiction.

5.2 Public Participation

Prior to submission of the Plan to the VDEQ for review, each participating jurisdiction will hold a public hearing consistent with § 15.2-1427 of the Code of Virginia. Prior to the public hearing, each jurisdiction will provide a notice that will be published on the VDEQ website as well as a newspaper of general circulation in each jurisdiction in accordance with 9 VAC 25-780-160.

The purpose of the public hearing is to inform the public of the purpose, requirements, and need for the regional water supply plan and attempt to obtain public input on the planning process. If requested, the VDEQ representative for this region, Tammy Stephenson from the West Central Regional Office, will be invited to attend the public hearing and will be available to answer specific questions regarding the regulation. It is also important to mention that the VDEQ has hired a public participation specialist, Angela Neilan, who can provide additional assistance to individual localities on obtaining a higher level of public participation and input.

The VDEQ is considering allowing regions to hold combined regional public hearings. If approved by the VDEQ, the region will consider holding five (5) joint public hearings. One public hearing will be held for each of the three (3) counties and will include the participating towns within each county (Botetourt County including the towns of Buchanan, Fincastle, and Troutville; Franklin County including the towns of Boones Mill and Rocky Mount; and Roanoke County including the town of Vinton). In addition, one public hearing will be held for each city (City of Salem and City of Roanoke).

6.0 PLAN SCHEDULE AND BUDGET

6.1 Plan Schedule

The next phase (Phase II) of the planning process will begin in July 2007 and is anticipated to take approximately 16 months to complete. A copy of the proposed schedule for completion of the Plan is included in Appendix A.

6.2 Budget Spreadsheet

The budget estimate for the Plan is broken down into five (5) categories: demand projections and management evaluation, the statement of need and alternatives analysis, public and jurisdictional involvement, preparation of the water supply plan, and project management. The budget estimate totals \$176,115. Additional services available upon request that were not included in the scope are also included. A copy of the budget spreadsheet is included in Appendix B.

7.0 SUMMARY

The RVARC water supply planning group is made up of 13 local governments and 2 service authorities. Participating jurisdictions include the cities of Bedford, Roanoke, and Salem; the counties of Bedford, Botetourt, Franklin, and Roanoke; and the towns of Boones Mill, Buchanan, Fincastle, Rocky Mount, Troutville, and Vinton. The Bedford County Public Service Authority and Western Virginia Water Authority also participate. This work plan documents the completion of Phase I and outlines the approach for Phase II of the planning process.

The RVARC Regional Water Supply Plan (Plan) is being developed to comply with the State Water Control Board's regulation 9 VAC 25-780, Local and Regional Water Supply Planning and produce a functional plan to support 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 are required to provide notification of their intent to participate in the regional plan to the Virginia Department of Environmental Quality (VDEQ) no later than November 2, 2008. The regional water supply plan is due to the VDEQ for review no later than November 2, 2011. Prior to submission of the Plan to the VDEQ for review, a public hearing must be held by each participating jurisdiction. Additionally, the local governments must pass a resolution approving the Plan and adopting other policies or ordinances that are developed during the planning process.

One of the primary activities in the water supply planning process is to evaluate the existing water supplies by collecting information on existing water sources, existing water use, and existing natural resources. The region collected water source, water use, and natural resource data in Phase I and begun to compile GIS layers documenting existing water supply information. Meetings with engineering and planning staff from each jurisdiction will be held in the next phase (Phase II) of the planning process to review the data collected to date and discuss additional data needs.

The region developed a methodology approved by VDEQ in Phase I and has begun to prepare demand projections for the next 50 years. Meetings will be held in the next phase (Phase II) of the planning process with each jurisdiction's planning staff to review the growth and development projections and compare those projections with their comprehensive plans. Conservation and drought response measures will also be discussed in the final Plan and completed in Phase II of the planning process.

The existing water source evaluation and water demand management evaluations will determine the region's ability to meet current and projected future water demands resulting in a Statement of Need. Based on the Statement of Need, potential future water supply alternatives will be evaluated. The Statement of Need and Alternatives Analysis will be completed in Phase II of the planning process.

The participants of RVARC recognize that the preparation of a successful plan will be more likely with active participation of local governments (i.e., county boards of supervisors and city and town councils), regional stakeholders, and relevant engineering and planning staff. An estimated two workshops will be held throughout the planning process. The purpose of the workshops will be 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.

Upon completion of the Plan, electronic copies of the Plan, data files, maps, and GIS database will be provided to RVARC as well as all participants.

APPENDIX A
PLAN SCHEDULE

RVARC WATER SUPPLY PLANNING SCHEDULE

	3rd QTR 2007			4th QTR 2007			1st QTR 2008			2nd QTR 2008			3rd QTR 2008			4th QTR 2008					
	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08			
I. Demand Projections and Management Evaluation																					
A. Additional demand projection work																					
B. Drought management evaluation																					
C. Conservation evaluation																					
II. Alternatives Analysis																					
A. Statement of need																					
B. Define alternatives																					
C. Describe alternatives																					
D. Screen alternatives																					
III. Public Participation																					
A. Public Information Meeting																					
B. Regional Public Hearing																					
IV. Prepare Water Supply Plan																					
A. Prepare Water Supply Plan																					
V. Submit Plan to DEQ																					
A. Submit Plan to DEQ																					

APPENDIX B
BUDGET SPREADSHEET

**Roanoke Valley Alleghany Regional Commission
Water Supply Plan
Budgeted Costs**

Task	Units	Rate	Total	Schedule
I. Demand Projections and Management Evaluation			\$77,455	4 months
			<u>Budget Breakdown</u>	
Tasks Include:	300	\$70	\$21,000	
- Additional work on demand projections	175	\$80	\$14,000	
- Drought management evaluation	250	\$90	\$22,500	
- Conservation evaluation	100	\$110	\$11,000	
- Other management techniques	60	\$145	\$8,700	
Travel costs (\$0.51/mi)	500	\$0.51	\$255	
II. Alternatives Analysis			\$43,350	9 months
			<u>Budget Breakdown</u>	
Tasks Include:	75	\$80	\$6,000	
- Statement of Need	300	\$110	\$33,000	
- Define Alternatives	30	\$145	\$4,350	
- Describe Alternatives				
- Screen Alternatives				
III. Public Participation			\$11,260	
A. Public hearing	30	\$145	\$4,350	1 month
	9	\$90	\$810	
B. Additional public involvement	40	\$80	\$3,200	1 month
	20	\$145	\$2,900	
IV. Prepare Water Supply Plan			\$36,800	
A. Write plan	200	\$80	\$16,000	15 months
B. Review plan	40	\$145	\$5,800	
C. Clerical assistance	100	\$50	\$5,000	
D. Reimbursables (e.g., copies, color printing, postage)	1	\$10,000	\$10,000	
V. Project Management			\$7,250	Ongoing
	50	\$145		
			Total \$176,115	

Additional Services (not included in scope)				
Data Collection Add-ons				
1. Additional groundwater evaluation - Level 1	80	\$80	\$6,400	1 month
Data collection, evaluation and report (1 day at VDH)	5	\$145	\$725	
QA/QC review			\$7,125	
2. Additional groundwater evaluation - Level 2	240	\$80	\$19,200	
Data collection, evaluation and reporting	40	\$90	\$3,600	
GIS integration of data	10	\$145	\$1,450	3 months
QA/QC review			\$24,250	