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## **NEW KENT COUNTY WATER SUPPLY PLAN SUMMARY**

Prepared for: New Kent County, Virginia  
Board of Supervisors

Prepared by: URS Corporation, Virginia Beach, Virginia  
On behalf of New Kent County, Department of Public Utilities

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Virginia has been fortunate to have a varied supply of water resources, which have historically been sufficient to meet water supply needs. However, the drought in 2002 caused Virginia to recognize that water is an essential resource that must be maintained and conserved for future generations. To heighten awareness and improve water management behavior, the Code of Virginia requires the development of a comprehensive statewide water supply planning process. Virginia subsequently awarded grants to various localities and regions, including New Kent County (NKC), to assist with these planning efforts.

Virginia state law requires all counties, cities and towns to develop a water supply plan or participate in a regional effort to develop a water supply plan. The primary objectives of creating a water supply include guaranteeing a potable water supply plan for the public, preserving water resources for other constructive uses, and promoting alternative processes for obtaining potable water such as desalinization.

Although developed by the Department of Public Utilities (DPU), the New Kent County Water Supply Plan (Plan) addresses the entirety of New Kent County (County), and not just the County-owned or community water systems (CWS). During the development of the plan, local governments were required to consult with local water system owners, and in turn, local water system owners were required to assist and contribute to the water supply plan. The intentions of the resulting programs were to guarantee potable water for the public, protect the natural habitat for fish and wildlife, allow for continued recreational, navigational, agricultural, commercial and industrial uses, preserve cultural and aesthetic value, continue generation of electric power, and promote the research and use of alternative water sources.

The Local and Regional Water Supply Planning Regulation (9VAC 25-780), hereafter referred to as the Regulation, was developed by the Virginia Department of Environmental Quality (VDEQ) and State Water Control Board (SWCB) to outline the specific components to be addressed in the Plan. These components include existing water sources, uses, projected water demands, water management actions, water source alternatives and maps displaying relevant information.

A schedule was developed to provide deadlines for the creation of locality water supply plans. Counties, cities and towns with populations:

- Greater than 35,000 were required to submit a plan by November 2, 2008;
- Between 15,000 and 35,000 were required to submit a plan by November 2, 2009;
- Less than or equal to 15,000 are required to submit a plan by November 2, 2010;
- or,
- Regional water supply plans must be submitted by November 2, 2011.

As of the 2000 U.S. Census, the population of New Kent County was 13,462. Therefore, the original New Kent County Water Supply Plan is due by November 2, 2010. The Plan was required to comply with regulations determined by the VDEQ and the SWCB. It is considered to be a living document. If it is determined by the State Water Control Board to be in compliance with the required regulations, the Plan will be reviewed again after five years to determine if amendments to the Plan have since been made. If changes have been applied to the original document, a revised Plan must be submitted for review. Revised Plans shall be submitted when the review indicates that circumstances have changed or new information has been made available that will result in water demands that will not be met by alternatives contained in the Plan. However, all Plans shall be resubmitted every ten (10) years after the date of last approval. To aid in the development of the Plan, the State Water Control Board provided technical and financial support, direction on compliance options, suggested sources for existing resources, use and water management sections, and provided acceptable techniques for determining future water demands.

The local programs presented in the Plan will be reviewed by the SWCB, the Virginia Department of Health (VDH), and other agencies to confirm compliance with the regulations. Upon acknowledgement of compliance, VDH, the Virginia Department of Conservation and Recreation (VDCR), the Marine Resources Commission, the Department of Historic Resources, and the Virginia Department of Game and Inland Fisheries (VDGIF) will then be given 90 days to submit written comments regarding the Plan. The public will also be given 30 days to comment on the Plan and can request a public meeting to present comments.

All local and regional water plans will be submitted to the Governor, the Senate Committee on Agriculture, Conservation and Natural Resources, the House Committee on Agriculture, Chesapeake Bay and Natural Resources, and the State Water Commission as a state water resources plan. The State Plan will include a qualitative and quantitative description of water resources in Virginia, a statewide snapshot of what the water supply needs are, where they are met, and an estimate of the resource's ability to meet those needs, existing areas where water availability may be insufficient now or in the near future, and other relevant issues facing Virginia's water supply.

Currently, New Kent County relies solely on groundwater sources to meet potable water needs. For the purposes of the Plan, 2007 data were used to provide a baseline of existing water source and use. In 2007, there were 21 community water systems in the County: 13 county-operated systems and 8 privately-operated systems.

The majority of County water consumption is for residential use. Unaccounted for losses for most water systems are within acceptable ranges. The County is actively working to reduce UAW in county-operated systems. Based on 2007 data, the population of New Kent County was 17,109. An estimated 47%, 8,003 people, were served by community water systems. The remaining 53%, or 9,106 people, were served by individual wells.

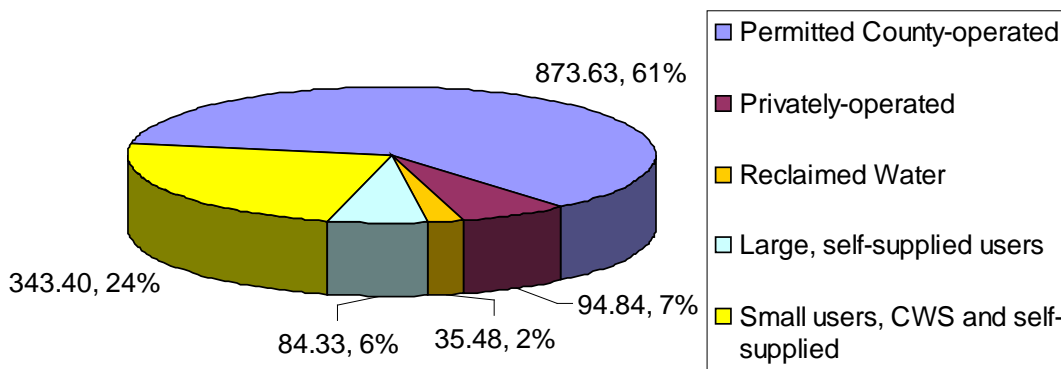
Pursuant to the Groundwater Act of 1973, the General Assembly determined that unrestricted usage of ground water was and will continue to contribute to pollution and shortage of ground water, thereby jeopardizing the public welfare, safety, and health. The Virginia Ground Water Management Act of 1992 mandates the regulation of large ground water withdrawals in certain portions of the Commonwealth to prevent adverse impacts on the ground water supply due to over-utilization. New Kent County is located in the Eastern Virginia Groundwater Management Area. Therefore, substantial groundwater withdrawals are regulated and must be approved by the VDEQ. The confined aquifer system underlying the County has become stressed due to an increase in water demands experienced in the region. Based on the results of recent Virginia Coastal Plain Model 2005 Simulations and discussions with VDEQ staff, New Kent is not confident that additional groundwater sources will be available to meet future demands. Additionally, the potential for reduced permitted withdrawals exists if development does not occur as projected.

Increased groundwater withdrawals from the major water-bearing confined aquifers of the Virginia Coastal Plain which underlie New Kent County may lead to increased cones of depression and interference among wells. The Eastern Virginia Groundwater Management Area and the Ground Water Withdrawal Regulations are currently undergoing review and revision to ensure that they adequately protect local groundwater sources. Therefore, New Kent County cannot rely on groundwater sources to meet future water demand increases. In addition to existing or anticipated permitted groundwater withdrawals, the County plans to provide reclaimed water for irrigation and dust control to three (3) local users. Implementation of an aggressive water conservation plan should also help to reduce per capita water demands and minimize water deficits.

Projected water demands were determined using County population projections provided by the Department of Community Development (DCD) service area boundaries, future land use from the Vision 2020 New Kent County Comprehensive Plan (Comp Plan), and the unit water demands and nonresidential ratios developed in the County's Draft Master Water and Sewer Plan.

Based on County water demand projections developed in accordance with section 9 VAC 25-780-100 of the Local and Regional Water Supply Planning Final Regulation (9 VAC 25-780), the county-wide annual average water use at the end of the 2059 planning period is estimated as 6.71 MGD. Assuming that the County is able to effectively implement the conservation activities required to achieve a 20.6% demand reduction, the resulting annual average water use at the beginning of 2060 will be 5.33 MGD or 1.945 billion gallons per year (BGY). Of the 1.945 BGY, it is assumed that approximately 1.432 BGY is available from anticipated demand reductions due to conservation, and existing and planned water sources identified during the water supply planning process. The sources presented in the following figure comprise the 1.432 BGY.

Figure. Water Supply (MGY) Available Based on Existing & Planned Water Supply Sources



Therefore, after consideration of all available water sources and demand reduction goals, the County must develop a new water supply source to provide 512.97 MGY or approximately 1.5 MGD, the projected water deficit in 2060. Based on expected development, certain portions of the County will experience a water supply deficit as early as 2017.

Many high-quality, readily available water sources, such as groundwater from the Potomac Aquifer, are already being used. Therefore, based on population and growth projections, the need is for a long term, sustainable and cost effective water supply solution. Interim solutions may also be considered based on a cost/benefit analysis. Water conservation measures, as well as segregation of the water supplies by potable and non-potable uses, may extend the timeframe for consideration and development of the County’s water supply solutions and associated costs. Therefore, development of a new source is anticipated to be more costly per gallon to obtain, treat and distribute, and may involve lengthy permitting, approval, and construction processes.

An alternatives analysis was conducted to identify viable future water supply source alternatives. Several alternatives, including aquifer storage and recovery, using sand and gravel quarries as reservoirs, and increased groundwater withdrawals, deserve additional study. However, there is not currently enough information available to identify these as viable alternatives.

Two of the identified alternatives have been considered viable based on consideration of: available capacity, potential environmental impacts, stakeholder and neighbor satisfaction, and feasibility.

The two viable alternatives identified thus far are:

➤ Water Purchase from the City of Richmond

The costs associated with this alternative were provided by the City of Richmond and consider transporting the purchased water to the New Kent County southwest border, near the Bottoms Bridge service area.

The major component associated with this alternative is 70,000 feet of 30-inch transmission main. Overall project costs were estimated as \$37.4 million for an average of 1.88 MGD, this is the maximum allowable average daily flow (ADF) to remain below the 3 MGD proposed purchase volume incorporating a 1.66 peaking factor. Current projections have identified a water supply deficit of 1.5 MGD ADF.

New Kent would be responsible for paying the following:

- \$2.8M One-time Contribution-in-Aid of Construction Fee
- \$2.0M Annual Capacity Fee beginning in Year 4 and increasing to \$2.4M in Year 11
- \$1.24 per 1000 gallons Volumetric Rate to cover O&M costs.

➤ Stream Intake on the Pamunkey River and Reverse Osmosis Water Treatment

Capital costs associated with this alternative were estimated using U.S. Environmental Protection Agency (USEPA) linear regression cost models that were developed to estimate costs associated with the 2003 Drinking Water Infrastructure Needs Assessment. Design capacity is the only data required to apply the cost models. A value of 1.5 MGD has been used which corresponds to the identified water supply deficit.

The following items (or needs) have been included in the cost estimate for this alternative: a surface water intake, raw water pump station (including pumps), complete reverse osmosis treatment plant, and finished water pump station (including pumps).

The resulting cost estimate, which includes design, materials, and installation costs, is approximately \$6.71 million or \$4.48 per gallon. Total water costs, including operating and capital recovery costs, for RO systems using brackish water, can range between \$1.00 and \$1.50 per 1000 gallons of water produced. The cost of concentrate disposal can range from 5-33% of the total produced water cost depending on the chosen disposal method.

New Kent will maintain an open dialog with Henrico County and NNWW regarding the potential for a partnership or purchase agreement.

The costs associated with either of the alternatives identified so far are considerably significant. County funding for such expensive options would require the borrowing of funds from one of the state funding agencies, such as the Virginia Resources Authority (VRA). The number of connections could not support the proposed funding level at this time. The funding also does not address the problem with the different water systems and their connection to the Richmond water source. Money would have to be borrowed and the County would have to undertake a major water expansion program to connect the larger systems (i.e. Bottoms Bridge, Kenwood/Greenwood, Quinton Estates, Farms of New Kent, Colonial Downs, and the New Kent Courthouse systems). This would require a large diameter water main to be constructed from the Richmond delivery point (at Bottoms Bridge) to the named systems, probably down Route 249 and/or Interstate 64. Some of the County's smaller and more remote water systems (Sherwood Estates, Whitehouse Farms, and the Colonies) may have to remain on groundwater indefinitely. The costs associated with design and construction of water transmission mains could be upwards of \$870,000 per mile. The County will also investigate other potential funding methods including proffers from developers, dedicating other funding methods towards future water supplies (such as imposition of a water availability fee for future water supplies)."

The Richmond water purchase alternative may be the best short-term solution identified thus far. However, the estimated cost does not ensure sole supply for the 50-year planning period, nor does it provide water to systems beyond the Bottoms Bridge service area. The cost estimate presented would provide the County with slightly more than the estimated 2060 annual average water demand deficit, 1.5 MGD. The total estimated annual average water demand at the beginning of 2060 is 6.71 MGD, 5.25 MGD within community water systems. While the City of Richmond has developed water supply alternatives providing up to 12 MGD (7.5 MGD ADF) of treated water to New Kent County in the long term, provision of additional water above the proposed purchase volume of 3 MGD, or 1.88 MGD ADF, would require amending the James River MIFs and upgrades to water treatment facilities. A portion of those costs would be passed along to New Kent County resulting in a substantial cost increase per unit of water. While the purchase option is not as appealing on a cost-basis as the Pamunkey River stream intake with RO water treatment option, it requires much less County effort and avoids permitting and brine discharge issues. Implementation of this alternative, if selected, should begin within the next couple years to allow 6 to 12 months for contracts and negotiations and several years for design and construction.

The Pamunkey River option, though a lengthy process, should also be considered as a long-term supply solution as it would provide a water supply source on the opposite end of the County as the purchase option. The Pamunkey River option may also prove to be more reliable and cost-effective in the long run.

Alternatives were identified and analysis performed based on the best information available at the time this Plan was developed. The discussion provided above in no way requires the County to develop a source identified in this Plan. The County will continue to explore other alternative water supply sources as new information and/or technologies become available. The only foreseeable way to avoid massive expenditures in providing potable water to all County residents, businesses, and industries would be continued reliance on groundwater as a sole supply. The potential for additional permitted groundwater withdrawals may arise as other localities move from groundwater to other supply sources. However, with localized deficits estimated to begin prior to the end of this decade, the County cannot afford to wait.

As evidenced by the County's Comprehensive Plan, the Water Conservation & Management Plan, and the Reclaimed Water Management Plan, New Kent County is dedicated to providing a reliable, cost effective and sustainable water supply to the residents, businesses and industries which call it home. The County's goal is to balance resource management and economic development, support approved development and plan appropriately for future needs.

Through implementation of water-wise planning, water conservation & management strategies and the development of alternate potable and non-potable supplies and uses, the County can achieve its economic and development goals, while being a leader in water resource management. Careful water use now can extend the planning horizon for gathering the financial resources that research, development, permitting and construction of these alternatives will require.

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The New Kent County Water Supply Plan is not a static document. The Plan will be updated, and resubmitted to the State, on a regular basis. Revisions to demand projections and the addition of water supply source data, either existing or planned, are anticipated.