EXECUTIVE SUMMARY

In December 2011, EA was contracted by the WSSC to conduct an independent evaluation of the WSSC owned buffer property surrounding the Rocky Gorge and Triadelphia reservoirs, and provide recommendations on current and future uses and management of the property that might affect or improve water quality, and reduce storage capacity losses.

This report provides an overview of the approximately 5,500 acres of WSSC-owned buffer property surrounding the Rocky Gorge and Triadelphia reservoirs with specific discussions of soil erosion, water quality impairments, and impacts from public uses of the WSSC watershed buffer property. The report summarizes the results of field observations by EA staff to evaluate the condition of the WSSC Access Roads and buffer property trails, the results of a desktop analysis to map highly erodible soils (HES) within the buffer, and provides recommendations for reducing the potential for negative impacts to reservoir water quality. Information from two public stakeholder meetings conducted as part of the project is also discussed.

The report also presents the results from a limited survey of several national water supply utilities in order to characterize the range of source water protection policies that other organizations are taking in different regions of the country to protect reservoir water quality. The focus was on policies related to recreational uses and shoreline buffer restrictions. It is clear from this survey that there are no consistent recommendations for what is required to reasonably achieve source water protection from specific recreational uses. Nevertheless, the existence of such restrictions acknowledges the special protection that is afforded to drinking water supply sources.

EA's report then presents detailed observations and maps of all the existing trails, WSSC Access Roads, and public access points within the Rocky Gorge and Triadelphia reservoir buffer properties. The report summarizes results from the approximately 80 miles of GPS trail mapping, slopes and observed erosion impact zones, suitability of specific trails for equestrian riding, public parking at designated access areas, safety issues, trail alignment and location of highly erodible soils (HES), and observations of trash, horse manure, and signage. One of the study's major findings is that the vast majority of actively used shoreline trails is unauthorized. The same is true for the old interior horse trails within the Rocky Gorge buffer property that were closed in May 2011, but were found to still be actively used.

The report concludes with detailed discussions of the results and observations from the study, and recommendations to better manage the Commission's buffer property to maintain and improve reservoir water quality. Topics include: observations and results from the stakeholder meetings, an evaluation of erosion potential and relative sediment loadings, suitability of the Access Road and interior trails for equestrian use, policing and enforcement, forest and reservoir management issues and a variety of specific property management issues. Key observations and recommendations from this study are then summarized in the final section of the report.

1 Introduction and Background

1.1 Introduction and Study Goals

In December 2011 EA Engineering, Science, and Technology, Inc. (EA) was contracted by the Washington Suburban Sanitary Commission (WSSC) to conduct a study of the property that WSSC owns around the Patuxent Reservoirs. Much of this property bordering the Triadelphia and Rocky Gorge Reservoirs was purchased in the 1940s and 1950s, respectively, by WSSC on behalf of its customers to serve as a water supply protection buffer.

The purpose of this study was to conduct an independent evaluation of the buffer property and provide recommendations on current and future uses and management of the property that might affect or improve water quality, and reduce storage capacity losses. The discussions and recommendations presented in this report are based upon EA's field observations of the 5,500 acre WSSC-owned buffer property including assessments of the existing WSSC Access Roads and certain trails designated for recreational use, reviews of policies and practices enacted in other national and regional drinking water reservoir watersheds, and the information obtained during two stakeholder meetings conducted for this study. This study does not directly discuss the broader 85,000 acre Patuxent watershed; although a Plan Outline was prepared internally by WSSC staff that includes a second phase of this program to address these broader watershed issues.

1.2 Need for Reservoir Protection

WSSC provides drinking water to 1.8 million customers residing in Montgomery and Prince George's Counties. The drinking water supplied to customers must be safe and protective of public health. To achieve this, the U.S. Environmental Protection Agency (USEPA) has developed a Multiple Barrier Approach against contamination of drinking water, with Risk Prevention being its first barrier. This barrier is described by the USEPA as quoted below (http://www.epa.gov/ogwdw/smallsystems/pdfs/guide_smallsystems_mba_09-06-06.pdf).

> *"Barrier #1: Risk Prevention*
> *The first barrier in a water system's multiple barrier approach is risk prevention. Risk prevention focuses on the selection and protection of drinking water sources. Systems should be aware of potential contamination caused by agricultural drainage, urban runoff, organic materials, and other factors.*
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> *When selecting sources, systems should examine:*
> - *The quality of the raw water (e.g., does it contain pathogens, chemicals, radionuclides, nitrates, or high turbidity?)*
> - *The risk of contamination (e.g., will development encroach on the water source?)*
> - *The ability of the supply to meet current and future needs.*
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> *Water systems, unless they are new systems, rarely have the opportunity to select their water source. But existing systems can and should take steps to protect their water sources, including:*

- *Identifying sources of contamination in watersheds and recharge areas*
- *Identifying the conditions under which the risks increase*
- *Developing and implementing source water protection strategies.*

By properly selecting and protecting its water source, a system can reduce its need for and reliance on treatment and increase the reliability of its water quality and quantity.

The financial incentive for systems to prevent risks is significant. It is almost always more cost-effective for a water system to protect its source water from contamination than to remove or inactivate contamination during treatment."

WSSC owns and operates two drinking water supply reservoirs within the Patuxent River watershed, the Triadelphia Reservoir and the T. Howard Duckett (Rocky Gorge) Reservoir. Together these reservoirs hold approximately 11 billion gallons of water and provide approximately one-third of the drinking water supply for WSSC's 1.8 million customers. Although water quality in the reservoirs is affected by all activities that occur within the entire 85,000-acre Patuxent River watershed draining to the reservoirs (i.e., all the land upstream of the T. Howard Duckett Dam), it is important to recognize that WSSC only has control over approximately 5,500 acres of land that it owns surrounding the reservoirs – land which serves as a buffer against water quality degradation. WSSC is responsible for maintaining and protecting the long-term water quality and the storage capacity for these drinking water sources. Therefore, WSSC must manage its buffer property to minimize the introduction of sediments, nutrients, hazardous chemicals, microbial contaminants and invasive species into the reservoirs. These reservoirs are non-renewable resources and their ability to meet current and future needs (as envisioned by USEPA's Multiple Barrier Approach) can be threatened by water quality degradation and capacity loss due to sedimentation. It is also recognized that the ability of reservoirs to meet current and future needs can be significantly impacted by accidental or intentional contamination.

Along with their role as a major regional drinking water source, the two reservoirs also provide managed recreational opportunities under policies established by WSSC. Recreational use of domestic water supply reservoirs is an important national issue, and for this reason a policy has been developed by the American Water Works Association (AWWA), the primary professional organization addressing public water supply issues in the United States, to manage recreational use of water supply reservoirs in a manner that is consistent with USEPA's risk prevention framework. AWWA's Statement on Policy for Recreational Use of Domestic Water Supply Reservoirs (2012) reads:

"The American Water Works Association (AWWA) supports the principle that water of the highest quality should be used as the source of supply for public water systems. Accordingly, the risks and potential mitigation requirements of any recreational activity on domestic source water reservoirs should be identified and evaluated. In the evaluation, utility- and customer-determined acceptable levels of risk should be given the highest consideration. No recreation should be permitted on finished-water reservoirs under any circumstances.

Protection of public health and drinking water quality should be the highest priority in operational decisions for reservoirs used jointly for water supply and recreation. Decisions on recreational use of domestic water supply reservoirs should be consistent with the intent of the source water protection program developed and implemented by the utilities and other responsible parties.

Recreational uses of domestic water supply reservoirs and the land-based infrastructure necessary to support such uses can add sources of microbial, physical, and chemical contaminants to the drinking water produced from the reservoirs. Water utility decisions on permitting recreational uses of water supply reservoirs should consider the following issues: (1) the potential for water quality degradation, (2) the public health risk, (3) the acceptance of such health risk by the customers, (4) the current level of treatment, and (5) additional treatment requirements, uncertainties, and costs that may be incurred. Recreational uses should be prohibited in those instances where a scientifically-based risk assessment, or in the absence of a risk assessment, the best available scientific data demonstrates a probable or imminent degradation of water quality or hazard to public health that cannot be controlled or mitigated in a cost effective manner.

When considering proposals for recreational use of domestic water supply reservoirs, the water utility should work with stakeholders to develop an integrated reservoir management plan, including appropriate water quality monitoring, to evaluate and, if necessary, mitigate water quality impacts and to minimize increased risks. Body-contact recreation (e.g., swimming, waterskiing, wind surfing) and use of gasoline engines on boats should be strongly discouraged because of potential contamination with fecal microorganisms and hazardous chemicals. In addition, boat inspection/washing stations and restrictive use of live bait should be mandated to prevent the introduction of foreign and invasive species (such as zebra mussels or non-native algal species) that could potentially destabilize a reservoir's ecology and water quality. Shoreline recreation such as picnicking, horseback riding and dog walking should be discouraged because contaminants such as feces and trash could be washed into the water supply. Where such recreational uses are allowed, costs for monitoring, evaluations, and mitigation should be borne by those proposing or benefiting from the recreational activity, not by the utility or its customers.

If recreation already exists on a reservoir, the water utility should work or continue to work with stakeholders to develop an integrated reservoir management plan and associated implementation actions to mitigate water quality impacts and to minimize increased risks." Policy adopted by the AWWA Board of Directors June 13, 1971, reaffirmed Jan. 28, 1979, and Jan. 25, 1987, revised June 23, 1996, June 13, 2004, and Jan. 25, 2009, June 2012.

This AWWA policy serves as a useful guide for the evaluation of public uses of WSSC's Patuxent reservoir properties.

WSSC publishes specific regulations for the purpose of preventing contaminants from entering the Rocky Gorge and Triadelphia reservoirs associated with public access. These regulations affect the buffer land owned by WSSC, which is termed the WSSC Watershed [for current regulations see http://www.wsscwater.com/home/jsp/content/watershed.faces]; the regulations do not apply to land within the broader Patuxent River drainage basin (or watershed) that is not owned by the Commission. These regulations also provide for the protection of WSSC's property surrounding the reservoirs against damage from vandalism, fire, and soil erosion, while authorizing the limited use of portions of the reservoir property for fishing, recreational boating, picnicking, hunting, and horseback riding during designated seasons. Users of the watershed (except picnickers) must obtain and carry a WSSC-issued watershed permit which is subject to specific conditions and annual fees for the activity [http://www.wsscwater.com/home/jsp/content/watershed.faces#permitfees].

All recreational uses have the *potential* to negatively impact trails. WSSC is particularly concerned about negative impacts from horseback riding due to connections between horse use and vegetation loss, trail widening, erosion and runoff, muddiness, informal trail development and manure on trails (USFS, 2005). Such impacts could result in water quality impacts, substantial costs for the maintenance and rehabilitation of trails, as well as the need for policing and visitor management programs (USFS 2005).

It is recognized that these recreational opportunities are allowed only to the extent that they do not interfere with the purpose for which the reservoirs were created – that of providing and protecting a valuable regional public drinking water supply. The WSSC regulations explicitly state that:

> *"The WSSC reserves the right, without prior notice, to close a portion of the watershed or close it entirely if the water levels drop to unacceptable levels, or for any other reason that in the WSSC's sole discretion may place the health and safety of the watershed, WSSC's systems or WSSC's customers at risk."*

WSSC has authorized specific recreational trails for shoreline fishing and equestrian use. However, in May 2011 WSSC enacted revised watershed regulations prohibiting equestrian use of all interior trails due to concerns of erosion and water quality impacts, and transferred horseback riding to a 10.1 mile stretch of the WSSC Access Road along the southern perimeter of the WSSC-owned buffer of the Rocky Gorge reservoir. WSSC then authorized EA to conduct reconnaissance-level surveys to inventory existing trails and recreational uses around both reservoirs, and evaluate the potential for reducing water quality impacts to the reservoirs associated with authorized trail uses.

The report sections below present the following:

- Section 2 provides an overview of the Rocky Gorge and Triadelphia reservoirs with discussion of water quality impairments, public uses of the WSSC watershed buffer property, Total Maximum Daily Loads (TMDLs) adopted by Maryland Department of the Environment (MDE) and USEPA, and microbial/parasitic contaminants.

- Section 3 addresses existing WSSC reports and summarizes the field methods used by EA staff to evaluate the condition of the WSSC Access Roads and buffer property trails, and assess their potential for impacting reservoir water quality. Information about the stakeholder meetings is also presented in this section.
- Section 4 discusses the policies and procedures that other regional and national water supply utilities are using to protect drinking water reservoir water quality.
- Section 5 contains detailed descriptions of the nature of the trails and access points surveyed as part of this study.
- Section 6 presents the results and observations of the studies and EA's recommendations for actions that could improve water quality that are consistent with USEPA’s risk prevention guidance.