

# CAPITAL IMPROVEMENT PLAN

FISCAL YEARS  
2016 – 2020

ADOPTED  
FEBRUARY 2016



RIVANNA WATER & SEWER AUTHORITY  
695 MOORES CREEK LANE, CHARLOTTESVILLE, VIRGINIA 22902



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## MEMORANDUM

**TO: RIVANNA WATER & SEWER AUTHORITY  
BOARD OF DIRECTORS**

**FROM: THOMAS L. FREDERICK, EXECUTIVE DIRECTOR**

**SUBJECT: APPROVAL OF 2016-20 CAPITAL IMPROVEMENT PROGRAM**

**DATE: FEBRUARY 23, 2016**

In one of its most important annual actions, the Authority updates its Five-Year Capital Improvement Program to update its capital needs. Capital Improvement and Replacement is the fundamental “back bone” of providing reliable drinking water as well as resource recovery services from wastewater that serve basic needs of the residents and businesses in the City and County. Enormous progress has been made in the last eleven years to transform a wastewater transmission and water resource recovery process that was outdated and falling into disrepair into what is now becoming world class. Further in July 2014 we completed a reservoir expansion that, with appropriate conservation, will serve our water supply needs for decades, and within the past two weeks we reached a new milestone of completely filling this expanded reservoir for the first time. Together, the Board and staff have addressed the fiscal challenges of our capital needs very well, through proper management and strengthening of reserves and timely debt refundings – and this has been recognized by improved bond ratings.

The attached proposed program document is the same as was introduced to the Board in January except that the Urban, Crozet, and Scottsville Granular Activated Carbon projects have been increased by \$625,000, \$60,000, and \$15,000, respectively, to provide for the initial purchase of carbon to fill the newly installed vessels. The financial analysis and debt service rate estimates have also been revised accordingly. This initial purchase of carbon was not in the CIP in January and therefore would have been a significant one-time increase in operating costs, but because the initial carbon purchase aids the performance testing and certification of the contractor’s equipment installation, this expense can be capitalized and amortized as a capital expense using debt service. We would note here that once in operation the regeneration of that carbon will become an ongoing operating expense.

When the CIP was introduced last month there were public comments suggesting that the project to finalize the route and acquire right-of-way for the South Fork to Ragged Mountain project should be moved forward to 2017 as opposed to the schedule in the CIP to begin in Fiscal Year 2018. We acknowledge and empathize with the concern expressed, and admit our

recommendation was a difficult one. We had to weigh the interest in accelerating the water line project against limitations in staff resources to maintain high project management quality, the consequences of delaying a different project, and the higher costs of obtaining and managing additional resources. We are already expecting Urban Water rate increases above inflation over the next three years as we put online the new granular activated carbon treatment. We also believe that this water line project would greatly benefit from a strong public outreach component which needs to be developed and implemented over time. Our organization reconfirms the strong commitment we have made to the pipeline project, and that commitment is not diminished by the timing of its implementation.

**Board Action Requested:**

Staff respectfully recommends to the Board of Directors the adoption of the 2016-20 Capital Improvement Program as revised from the January submittal and is included in today's Board package.

Enclosure

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**MEMORANDUM**

**TO: RIVANNA WATER & SEWER AUTHORITY  
BOARD OF DIRECTORS**

**FROM: THOMAS L. FREDERICK, EXECUTIVE DIRECTOR**

**SUBJECT: INTRODUCTION OF 2016-2020 CAPITAL IMPROVEMENT PLAN**

**DATE: JANUARY 26, 2016**

I am pleased to present to you a submitted copy of the updated Five-Year Capital Improvement Plan for the Rivanna Water & Sewer Authority for Fiscal Years 2016-2020. This Plan provides information to the public regarding the upcoming capital priorities of the Authority and allows for multi-year financial planning to support these priorities. It is being submitted in advance of our proposed FY 2017 Operating Budget, due at the March 2016 Board meeting. A component of our proposed wholesale rates and charges in that Operating Budget will be a debt service charge derived in part from the financial information in this Plan.

The overall size of the 5-Year Plan this year includes \$68 million for water and \$64 million in wastewater for a total of \$132 million. This Plan is slightly smaller than the Plan a year ago which included \$69 million for water and \$67 million for wastewater for a total of \$136 million. Of the \$136 million approved last year, projects that have been completed and are being removed from the Plan represent \$12 million. A total of \$8 million in new projects not included a year ago is now being added to this Plan.

As has been in effect in the past, safety issues and federal or state regulatory mandates receive the highest priorities, followed by renewal of infrastructure at the end of its service life and upgrades necessary to maintain the service needs of the ACSA and City. Discretionary projects carry a lower priority. Over the past several years discretionary projects have been very limited due to the magnitude of regulatory, safety, and renewal projects. The seven projects included in this CIP that we would consider discretionary include the South Fork to Ragged Mountain Pipeline Right-of-Way, South Fork Rivanna Dredging, Route 29 Pump Station Site Acquisition, Wholesale Water Master Metering, and South Fork Rivanna Hydropower Plant Rehabilitation, Scottsville High Service Pump Station Upgrades, and Moores Creek Odor Control. Of these seven, two would reserve land for future priorities and one addresses critical customer service demands.

The immediate needs for the wastewater transmission system from our 2010 Comprehensive Sewer Plan have now been completed with the exception of the New Rivanna Pump Station and final sections of replacing the Schenks Branch Interceptor. With most of the rebuilding of the wastewater system completed, we are continuing to shift our focus to the drinking water side, to include renewal of aging assets at Water Treatment Plants and implementation of future water

transmission needs on the north and southeast ends of the distribution system.

Staff would be pleased to address questions from the Board.

**Board Action Requested:**

The Capital Improvement Program is being introduced in January for the Board of Directors to begin their review. Questions and discussion are encouraged. We would recommend the Board set a target date for approval of this document at the February Board meeting.

## TABLE OF CONTENTS

<b>I.</b>	<b>INTRODUCTION</b>	1
<b>II.</b>	<b>FINANCIAL SUMMARY BY CATEGORY</b>	4
<b>III.</b>	<b>PROJECT DETAILS</b>	5
	Completed Projects	6
	Urban Water	
	Community Water Supply Plan	9
	Observatory WTP and Ragged Mountain/Sugar Hollow Reservoir System	11
	Finished Water Storage/Transmission	13
	South Fork Rivanna Water System	16
	Rural Water	
	Crozet Water System	18
	Scottsville Water System	21
	Urban Wastewater	
	Wastewater Interceptors/Pumping Stations	22
	Moores Creek Advanced Water Resource Recovery Facility	26
	Rural Wastewater	
	Scottsville Wastewater System	28
	Glenmore Wastewater System	29
	All Systems	
	Radio Upgrades	30
<b>IV.</b>	<b>APPENDIXES</b>	
	CIP Financial Summary	32
	Water System Summary	34
	Wastewater System Summary	35

## Introduction

The Capital Improvement Plan (CIP) for Fiscal Years 2016-2020 has been prepared as a guidance document outlining future infrastructure projects needed to meet the Rivanna Water and Sewer Authority's core mission of providing safe, high-quality, cost-effective wholesale water and wastewater services to the Charlottesville and Albemarle community. The CIP is a 5-year planning document, which is updated annually to reflect the needs of the community and progress on adopted projects as they move toward final design and construction. This document provides estimates of project costs and schedules that will help the Board of Directors and staff to understand the financial implications of the program.

The development of the Capital Improvement Plan is a process of bringing together master plans, requests from the Board and community, department manager assessments, safety concerns, renewal and rehabilitation needs, and regulatory mandates. Each year these identified projects are reviewed and prioritized by the Authority management team and brought forth for review by the Board of Directors.

During the past year several capital projects were completed or are very near completion, and as such are being removed from the 2016-2020 CIP. These projects account for approximately \$13.4 million or 9.9% of FY 15-19 CIP and resulted in a savings of \$1.06 million. These projects include:

- New Ragged Mountain Dam Construction
- Mitigation Plan Implementation
- Alderman Road Pump Station Improvements
- Pantops Tank Repairs
- South Fork Rivanna Dam – Dam Safety Improvements
- Crozet Partial Transite Pipe Replacement
- Albemarle-Berkley Interceptor
- Crozet Interceptor Pump Station Automatic Bar Screens
- Digester Heating and Mixing Upgrade
- Scottsville WRRF Solids Processing Improvements

The total 5-year 2016-2020 CIP is approximately \$133.3 million, with the previous expenditures on active projects totaling approximately \$23.2 million, leaving a net proposed 5-year projected expenditure of \$110.1 million.

There are several new projects added to the CIP this year, including:

- Ragged Mountain Reservoir to Observatory WTP Pipeline Condition Assessment (\$285,000)
- Piney Mountain Tank Rehabilitation (\$500,000)
- Rt. 29 Pipeline Betterment (\$3,075,000)
- Avon to Pantops Water Main (\$250,000)
- South Fork Water Treatment Plant Leaf Screen (\$471,000)
- South Fork Water Treatment Plant Filter Press Rehabilitation (\$150,000)
- Buck's Elbow Tank – Interior Coating and Mixing System & Crozet Waterball Painting (\$1,055,000)
- Crozet Water Treatment Plant – Miscellaneous Repairs (\$105,890)
- Crozet Water Treatment Plant – New Finished Water Pump Station (\$2,600,000)
- Crozet Interceptor Pump Station Isolation Valves (\$220,000)
- Moores Creek AWRRF Roof Replacements (\$903,000)
- Moores Creek AWRRF Second Centrifuge (\$1,025,000)
- Radio Upgrades (\$500,000)

There are a few projects where the proposed budgets have been modified based on the anticipated project requirements and necessitate funding adjustments. There is one project where the anticipated funding need has been reduced, Water

Wholesale Master Metering. Additionally, the Beaver Creek Dam Alteration project, has been moved out on the schedule, and as such the latter funding has dropped off of the 5-year CIP. The projects with changes include:

- Observatory Water Treatment Plant Improvements (\$9.25 million existing / \$9.50 million proposed)
- Urban Water GAC and Water Treatment Plant Improvements (\$24 million existing / \$24.925 million proposed)
- Water Wholesale Master Metering (\$6.4 million existing / \$2.8 million proposed)
- Beaver Creek Dam Alteration (\$8.40 million existing / \$6.07 million proposed)
- Crozet Ground Storage Tank Repairs and Upgrades (\$0.45 million existing / \$0.52 million proposed)
- Crozet Flow Equalization Basin (\$0.33 million existing / \$2.33 million proposed)



**FINANCIAL SUMMARY**  
**MAJOR SYSTEM CATEGORIES**

**FINANCIAL SUMMARY**  
**Major System Categories**

System Description	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted (1/27/15)	Proposed Changes	Recommended	Previous Expenditures	FY16	FY17	FY18	FY19	FY20
<b>URBAN WATER (UW)</b>									
Community Water Supply Plan	\$5,795,000	\$0	\$5,795,000	\$152,417	\$0	\$0	\$1,892,583	\$2,250,000	\$1,500,000
Observatory WTP & Ragged Mountain/Sugar Hollow Reservoir System	\$9,250,000	\$535,000	\$9,785,000	\$33,725	\$678,000	\$890,000	\$1,495,000	\$5,089,000	\$1,599,275
Finished Water Storage/Distribution	\$33,380,494	\$1,970,000	\$35,350,494	\$3,647,075	\$16,300,934	\$12,813,510	\$2,528,975	\$60,000	\$0
South & North Fork Rivanna Water System	\$2,000,000	\$621,000	\$2,621,000	\$1,598	\$498,402	\$1,871,000	\$250,000	\$0	\$0
Subtotal (UW)	\$50,425,494	\$3,126,000	\$53,551,494	\$3,834,815	\$17,477,336	\$15,574,510	\$6,166,558	\$7,399,000	\$3,099,275
<b>RURAL WATER (RW)</b>									
Crozet Water System	\$12,040,000	\$1,811,890	\$13,851,890	\$424,229	\$905,391	\$3,425,011	\$2,521,259	\$1,060,000	\$5,516,000
Scottsville Water System	\$1,700,000	\$15,000	\$1,715,000	\$99,767	\$0	\$1,089,518	\$425,715	\$100,000	\$0
Subtotal (RW)	\$13,740,000	\$1,826,890	\$15,566,890	\$523,996	\$905,391	\$4,514,529	\$2,946,974	\$1,160,000	\$5,516,000
<b>WATER TOTAL</b>	\$64,165,494	\$4,952,890	\$69,118,384	\$4,358,811	\$18,382,727	\$20,089,039	\$9,113,532	\$8,559,000	\$8,615,275

System Description	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted (1/27/2015)	Proposed Changes	Recommended	Previous Expenditures	FY16	FY17	FY18	FY19	FY20
<b>URBAN WASTEWATER (UWW)</b>									
Wastewater Interceptors/Pumping Stations	\$50,286,099	\$1,387,656	\$51,673,755	\$18,256,026	\$18,800,421	\$8,596,496	\$3,710,812	\$1,210,000	\$1,100,000
Moore's Creek AWWRF	\$10,055,000	\$1,928,000	\$11,983,000	\$546,964	\$1,435,329	\$6,891,958	\$2,698,749	\$410,000	\$0
Subtotal (UWW)	\$60,341,099	\$3,315,656	\$63,656,755	\$18,802,990	\$20,235,750	\$15,488,454	\$6,409,561	\$1,620,000	\$1,100,000
<b>RURAL WASTEWATER (RWW)</b>									
Scottsville WRRF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Glenmore WRRF	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Radio Upgrades	\$0	\$500,000	\$500,000	\$0	\$0	\$500,000	\$0	\$0	\$0
Subtotal (RWW)	\$0	\$500,000	\$500,000	\$0	\$0	\$500,000	\$0	\$0	\$0
<b>WASTEWATER TOTAL</b>	\$60,341,099	\$3,815,656	\$64,156,755	\$18,802,990	\$20,235,750	\$15,988,454	\$6,409,561	\$1,620,000	\$1,100,000
<b>TOTAL</b>	\$124,506,593	\$8,768,546	\$133,275,139	\$23,161,801	\$38,618,477	\$36,077,493	\$15,523,093	\$10,179,000	\$9,715,275

**PROJECT DETAILS**

<b>Completed Projects</b>	Page	6
<b>Urban Water</b>	Page	9
<b>Rural Water</b>	Page	18
<b>Urban Wastewater</b>	Page	22
<b>Rural Wastewater</b>	Page	28
<b>All Systems</b>	Page	30

## Completed Projects

During fiscal year 2015 several capital improvement projects were completed or are in the final phases of close-out, and as such will be removed from consideration in future planning documents. Presented in the table below are the eleven (11) completed projects, pertinent information on the adopted budgets, as well as the projected final costs and any anticipated savings. There was a total completed projects cost savings of \$1.28 million.

Five-Year Capital Program						
No.	Project Description	Adopted Budget (1/27/2015)	Previous Expenditures (7/1/15)	Final Projected Costs	Savings	Budget Reallocation
1	New Ragged Mountain Dam - Construction	\$2,580,535	\$2,507,487	\$2,507,487	\$73,048	\$115,000
2	Mitigation Plan Implementation	\$60,000	\$47,277	\$47,277	\$12,723	
7	Alderman Road Pump Station Improvements	\$702,000	\$578,218	\$578,218	\$123,782	
11	Pantops Tank Repairs	\$120,000	\$72,588	\$72,588	\$47,412	
13	South Fork Rivanna Dam - Dam Safety Improvements	\$250,000	\$209,643	\$209,643	\$40,357	
19	Partial Transite Pipe Replacement	\$2,225,000	\$1,808,074	\$1,808,074	\$416,926	
26	Albemarle-Berkley Interceptor	\$954,000	\$767,394	\$767,394		
32	Crozet Interceptor PS Automatic Bar Screens	\$139,950	\$64,950	\$64,950		
34	Digester Heating and Mixing Upgrade	\$6,123,000	\$6,098,400	\$6,098,400	\$24,600	
37	Scottsville WRRF Solids Processing Improvements	\$350,000	\$26,986	\$26,986	\$323,014	
	TOTAL	\$13,504,485	\$12,181,017	\$12,181,017	\$1,061,862	\$115,000

1. New Ragged Mountain Dam - Closeout: The construction for the new dam was awarded to Thalle Construction Company with a bid of \$21,528,750, and construction started in late April 2012. Schnabel Engineering was granted a work authorization for construction administration, management, inspection, and testing services during construction. Final project site restoration was completed in late August 2014, with final documentation and project closeout in February 2015. Additional work will be performed when the reservoir has been filled, including installation of an oil containment boom and floating trail bridge. Remaining work items will be completed out of the operating budget.
2. Mitigation Plan Implementation: As a condition of the existing Joint Permit to construct the New Ragged Mountain Dam water supply facility, RWSA was required to mitigate the environmental impacts to streams and wetlands. The completed work included the construction and protection of approximately four acres of wetlands at a site bounded by Moores Creek and Franklin Street (near the Charlottesville Stockyard). Additionally, approximately 80,000 linear feet of stream within the watershed of Buck Mountain Creek has been preserved by permanent deed restrictions, and enhanced with riparian buffer plantings. The project also included the first year of mitigation monitoring, as required by the Virginia Department of Environmental Quality (DEQ) and U S Army Corps of Engineers (USACE) permits. Future monitoring will be required and funded out of the operating budget.
7. Alderman Road Pumping Station Improvements: This project included hydraulic and electrical power, and digital Supervisory Control and Data Acquisition (SCADA) improvements at the Alderman Road Pump Station potable water facility. This existing facility pumps finished water to the Lewis Mountain Tank

portion of the Urban Water System and is co-located with the University of Virginia's (UVA) pump station and back-up power generator. As such, the project included extensive coordination with the University Facilities Management group. In addition to increased flow capacities, the project resulted in the connection of the RWSA pump station to the new UVA stand-by generator system, resulting in a significant improvement to the reliability of service from the station. The project was bid and awarded to Southwood Building Systems, Inc. in spring 2014. Construction closeout was completed in spring 2015, with the final project payment application processed in June 2015.

11. Pantops Tank Repairs: The 5 million gallon Pantops Tank is the largest water storage tank in the Urban Service Area. A routine inspection of the Pantops Tank in September of 2011 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection of the Pantops Tank was performed in early 2012 and a list of recommended roof repairs provided. This project included consultant services for design and bidding of necessary roof repairs, as well as construction, construction administration, and inspection services. The project was completed in January 2015.
13. South Fork Rivanna Dam – Safety Improvements: The South Fork Rivanna Dam is regulated under the Federal Energy Regulatory Commission (FERC) due to the presence of a small co-located hydroelectric facility. FERC operational guidance requires occasional evaluation of elements of a dam facility. During a review of the North side abutment area, it was clear that the soils above the normal pool had the potential for erosion during extreme wet weather events. After further reviews and discussions with FERC about this issue, the following improvements and repairs were identified: fortify the North abutment area with concrete cap reinforcement; fill some eroded, void areas beneath the North side concrete apron by injection grouting techniques, improve foundation drains by placement of mechanical “hat covers” over exposed drain outlets on the concrete overflow spillway wall face and repair and improve existing foundation and chute block drain operation and maintenance in the spilling basin. The project was constructed by Bander Smith, LLC and completed in December 2014. All improvements have been reviewed and approved by FERC.
19. Partial Transite Pipe Replacement: This project included the installation of approximately 4,900 linear feet of new sixteen-inch ductile iron water line and valves along Three Notch'd Road in Crozet. This new waterline replaced the existing twelve-inch transite (asbestos-cement) RWSA water line and the existing six-inch cast iron ACSA water line that ran parallel to each other in Three Notch'd Road from the vicinity of Union Mission Lane to the entrance of the Western Ridge Development. The project was bid in April 2014 and awarded to Linco, Inc. on April 25, 2014. Linco completed the project, including the abandonment of the old water lines and repaving in June 2015.
26. Albemarle-Berkley Interceptor: The Albemarle-Berkley Interceptor is located in Albemarle County and ties into the Meadowcreek Interceptor. The existing interceptor was built in the mid-1970s mostly of clay pipe, and has the capacity to handle the existing and future dry weather flows through build-out. However, based on flow metering and manhole inspections, the interceptor experienced inflow and infiltration and required rehabilitation. A condition assessment was performed on the interceptor, which resulted in the installation of a cured-in-place liner being installed through the entire length of the pipeline. As a result of the condition assessment, defects were also identified in a large number of the manholes. Manhole rehabilitation work was completed in July 2015. This completes all required rehabilitation efforts of this interceptor system. Final project closeout is listed as Project 27 in the current CIP.
32. Crozet Interceptor Pump Station Automatic Bar Screens: There are currently two automatic bar screens at Crozet Pump Station No. 4. These units are original to the pump station which was constructed in the mid-1980s. Only one of the units is operational, and the second unit no was longer serviceable. This project involved the replacement of the latter unit, which was completed in May 2014. The replacement of the second unit is listed as Project 33 in the current CIP.
34. Digester Heating and Mixing Upgrade: This project improved the anaerobic process and structural stability of the three primary digesters through improvements to heating, mixing and gas compression and roof replacement. Following completion of the upgrades, the digester biosolids degradation process has been more efficient and reliable and methane production has increased due to the consistent temperatures and full

tank mixing. The project was bid in August 2012 and the Board of Directors approved the contract award to MEB Contractors at the November 2012 meeting. Construction was completed in September 2014.

37. Scottsville Water Resource Recovery Facility Solids Processing Improvements: The Scottsville Water Resource Recovery Facility (WRRF) currently meets wastewater disinfection requirements through the use of ultraviolet (UV) light. The conversion to UV eliminated the use of gaseous chlorine, thereby reducing the potential for chlorine exposure to the public and employees. Though the facility was operating well enough to remove total suspended solids to well within the permit limits, its capability to remove solids has occasionally been insufficient to maintain adequate luminance of the ultraviolet light that will assure sufficient disinfection of water. After extensive review of operations, the modification of operational practices, and the installation of RWSA fabricated channel screens, the plant is better able to address this issue and as such, this capital project is closed.

## URBAN WATER

### Major System: Community Water Supply Plan

The Community Water Supply Plan represents the program developed with substantial community input to fulfill RWSA’s contractual obligation to the City of Charlottesville (City) and the Albemarle County Service Authority (ACSA) to provide adequate drinking water for their future needs. An initiative started in 2003 to find a long-term solution that could achieve both local support and meet federal and state requirements. After multiple community meetings, updates with local officials, and frequent consultations with federal and state agencies, local support was obtained to apply for federal and state permits to expand the Ragged Mountain Reservoir and build a future pipeline between the South Fork and Ragged Mountain Reservoirs, with stream and wetlands mitigation to be provided through property in the Buck Mountain Creek area and property adjacent to a lower reach of Moores Creek near its confluence with the Rivanna River. Federal and state permits were granted in 2008, and amended in 2011.

The first phase of this long-term program centered around the expansion of the Ragged Mountain Reservoir, a project that would simultaneously address a legal obligation to correct safety deficiencies on the existing site. Through a combination of technical investigations, engineering evaluations, and continued public discussion, a decision was reached in February 2011 through the City Council and Board of Supervisors to build the new dam as an earthen dam, with the initial phase raising the reservoir pool height by 30 feet. The decision also outlined an objective of the further pursuit of water conservation through the City and ACSA, and the pursuit of opportunities for dredging of the South Fork Reservoir, with the second phase of reservoir expansion in the future as necessary.

Projects below represent the proposed focus of this program for the next five years.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
1	South Fork Reservoir to Ragged Mountain Reservoir Pipeline Right-of-Way	\$2,295,000		\$2,295,000	\$24,859			\$1,520,141	\$750,000	
2	South Fork Rivanna Reservoir Dredging	\$3,500,000		\$3,500,000	\$127,558			\$372,442	\$1,500,000	\$1,500,000
	TOTAL	\$5,795,000		\$5,795,000	\$152,417			\$1,892,583	\$2,250,000	\$1,500,000

#### Project Descriptions:

1. South Fork Reservoir to Ragged Mountain Reservoir Pipeline Right-of-Way: The future construction of a new pipeline from the South Fork Rivanna River to the Ragged Mountain Reservoir is a part of the approved 50-year Community Water Supply Plan to increase future transfer capacity through replacement of the Sugar Hollow Pipeline along an alternative alignment. Prior expenditures covered a review of the 2009 conceptual design that was requested by the Board through the “four boards”<sup>1</sup>. The previous anticipated preliminary route for this project was along the proposed Western Bypass. Since the Bypass has been eliminated from consideration, the pipeline project will involve a more detailed routing study, and acquisition of real estate rights along the approved route.
2. South Fork Rivanna Reservoir Dredging: The South Fork Rivanna Reservoir stores raw water for treatment at the South Rivanna Water Treatment Plant and in the future is proposed to provide water for transfer to the enlarged Ragged Mountain Reservoir. River flow into the reservoir is from a drainage area, almost entirely within Albemarle County, of approximately 258 square miles, or approximately thirty six percent of County lands. Soil erosion from natural events, from land use in the agricultural area, from land disturbances in the developed areas, and from re-suspension of flood plain deposits created during the 19th century (stream bank erosion), are likely the causes of significant amounts of sediment becoming trapped

<sup>1</sup> The “four boards” include the Albemarle County Board of Supervisors, the Albemarle County Service Authority Board of Directors, the Charlottesville City Council, and the Rivanna Water & Sewer Authority (RWSA) Board of Directors. Although the RWSA Board of Directors is fully empowered to make decisions regarding water supply, it has met jointly with the other three boards to seek advice on major decisions.

within the reservoir. The initial design of the reservoir anticipated the accumulation of these sediments, and a significant portion of the total volume of storage was designated for this purpose.

RWSA has reviewed proposals via a Public-Private Education Facilities and Infrastructure Act (PPEA) process. The proposals were designed to address, at a minimum, the sediment in segments 1-3 of the main stem (approximately 300,000 CY). This proposed CIP project does not involve dredging beyond the original reservoir contours, shoreline configuration, or within wetland or shoreline buffer areas. In response to strong statements from citizen advocates that they believed a “turn-key” approach would be less costly than approaches recommended by RWSA consultants, the PPEA process allowed the private entity that entered into an agreement with RWSA to adopt that “turn-key” approach, including determining an approach to dredging the Reservoir, obtaining all necessary federal, state, and local permits and approvals, negotiations and agreements with private landowners or other entities, and conducting the project in compliance with all applicable federal, State and local laws and regulations.

In July 2013, the one qualified PPEA proposer, Orion Marine, withdrew its proposal, citing difficulties in obtaining necessary land agreements. Future Board decisions on the project contracting approach will dictate the next steps. This project remains in the CIP as the fulfillment of a contractual obligation from the January 2012 Ragged Mountain Dam Cost Allocation Agreement, and RWSA counsel has offered an opinion that consent to amend the Agreement from the City and ACSA is required before the RWSA Board amend or cancel the project. Further action on this project is anticipated after the completion of the Board-authorized Reservoir Management Study that has an anticipated March 2016 completion date.



**Major System:** Observatory WTP and Ragged Mountain/Sugar Hollow Reservoir System

The Observatory Water Treatment Plant (WTP) and Ragged Mountain/Sugar Hollow Reservoir System is comprised of the water treatment facility on Observatory Mountain and the associated raw water infrastructure that stores and conveys source water to the plant. The raw water storage system includes the new Ragged Mountain Dam (recently constructed with a useable raw water storage capacity of 1.5 billion gallons when reservoir is full) and the Sugar Hollow Dam (originally constructed in 1947, upgraded in 1999 and downstream discharge improvements completed in September 2014, with a useable raw water storage capacity of 339 million gallons as updated by a 2015 bathymetric survey). The system also includes 17.6 miles of 18-inch raw water cast-iron mains, originally installed in 1908, 1922, and 1946. The Sugar Hollow Raw Water Main historically conveyed water from the Sugar Hollow Dam to the Observatory Water Treatment Plant, however, as a result of the New Ragged Mountain Dam project, the main now discharges directly into Ragged Mountain Reservoir. The remaining downstream section of the Sugar Hollow main now conveys raw water from the Ragged Mountain Reservoir to the treatment plant. The line crosses the Mechums River (where an abandoned pumping station is sited) on its way to Ragged Mountain Reservoir, and eventually passes through the Royal Pumping Station and terminates at the Observatory WTP. The Ragged Mountain Raw Water Main conveys water from the Ragged Mountain Reservoir through the Stadium Road Pumping Station and terminates at the Observatory Water Treatment Plant.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
3	Observatory Water Treatment Plant Improvements	\$9,250,000	\$250,000	\$9,500,000	\$33,725	\$678,000	\$890,000	\$1,495,000	\$5,089,000	\$1,314,275
4	Ragged Mountain Reservoir to Observatory Water Treatment Plant Pipeline Condition Assessment		\$285,000	\$285,000						\$285,000
	TOTAL	\$9,250,000	\$535,000	\$9,785,000	\$33,725	\$678,000	\$890,000	\$1,495,000	\$5,089,000	\$1,599,275

**Project Descriptions:**

3. Observatory Water Treatment Plant Improvements: The Observatory Water Treatment Plant is the oldest of the three urban plants. Early planning for the Community Water Supply envisioned that the plant would undergo a wholesale upgrade during this Capital Improvement planning period. However, funding limitations have redirected the scope to concentrate on specific upgrades to critical elements, identified by a Needs Assessment Study as improvements to the flocculators, filters, sedimentation basins, and chemical feed facilities to enhance future reliability. In previous CIP documents, the funding for this system focused on an evaluation and future planning for the raw water transmission system. Due to a higher need at the Observatory Water Treatment Plant, the project was altered to focus on current treatment needs.

The Observatory Water Treatment Plant was originally constructed in the mid-1950s. Since that time very little has been replaced or upgraded at the facility. The sixty year old facility has much of the original equipment that is inefficient, prone to unexpected failure, and does not have readily accessible replacement parts. Design is currently in progress for replacement of the existing flocculators, with construction scheduled to begin in April 2016, running concurrently with the Granular Activated Carbon (GAC) construction work at Observatory Water Treatment Plant. An additional raw water system improvement will consist of installing a new variable frequency motor drive on one of the Stadium Road Raw Water Pump Station pumps, thereby allowing plant operation using variable raw water intake flows. This will result in more efficient and consistent operation of the plant.

The remaining proposed treatment upgrades will follow after the GAC project completion. It should be noted that the Observatory Water Treatment Plant currently is sited on land leased to RWSA by the University of Virginia. The terms of the existing lease expire on April 17, 2021. Prior to construction of the remaining

improvements, the terms of a new lease may be needed with RWSA, the City of Charlottesville and the University as participants.

4. Ragged Mountain Reservoir to Observatory Water Treatment Plant Pipeline Condition Assessment: The 18-inch Ragged Mountain and Sugar Hollow Raw Water Pipelines run in parallel to each other from the Ragged Mountain Reservoir to the Observatory Water Treatment Plant. For the most part, these pipelines are constructed of cast iron and are approaching 100 years old. A condition assessment of these two pipelines will allow RWSA to better understand the pipeline condition and to plan for future conveyance of raw water to the urban area. This project includes using non-destructive acoustic technologies to identify existing leaks and remaining pipe wall thickness to determine the remaining service life of these pipelines. These data can be used to prioritize repair or replacement work on these pipelines.

**Major System:** Finished Water Storage/Transmission – Urban System

The urban finished water storage and transmission system serves to provide transmission of treated water from the three RWSA water plants (Observatory, South Fork Rivanna, and North Fork Rivanna) to the distribution networks of the Albemarle County Service Authority, the City of Charlottesville, and the University of Virginia. The system includes approximately 40 miles of pipeline, six water storage tanks: Avon Street (2 MG), Pantops (5 MG), Piney Mountain. (0.7 MG), Stillhouse (0.7 MG), Observatory (3 MG), and Lewis Mountain (0.5 MG), and the Alderman Road and Stillhouse pumping stations.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
5	Route 29 Pump Station Site Acquisition	\$1,900,000		\$1,900,000	\$450,747	\$1,449,253				
6	Valve Repair - Replacement (Phase 2)	\$500,000		\$500,000				\$500,000		
7	Urban Water GAC and Water Treatment Plant Improvements	\$24,000,494	\$925,000	\$24,925,494	\$2,705,797	\$12,193,712	\$8,659,010	\$1,366,975		
8	Stillhouse Tank Repairs	\$580,000	\$20,000	\$600,000	\$8,094	\$170,406	\$421,500			
9	Wholesale Water Master Metering	\$6,400,000	(\$2,800,000)	\$3,600,000	\$482,437	\$1,542,563	\$1,575,000			
10	Piney Mountain Tank Rehabilitation		\$500,000	\$500,000			\$28,000	\$412,000	\$60,000	
11	Rt. 29 Pipeline - VDOT Betterment		\$3,075,000	\$3,075,000		\$945,000	\$2,130,000			
12	Avon to Pantops Water Main		\$250,000	\$250,000				\$250,000		
	<b>TOTAL</b>	<b>\$33,380,494</b>	<b>\$1,970,000</b>	<b>\$35,350,494</b>	<b>\$3,647,075</b>	<b>\$16,300,934</b>	<b>\$12,813,510</b>	<b>\$2,528,975</b>	<b>\$60,000</b>	

**Project Descriptions:**

5. Route 29 Pump Station Site Acquisition: This project provides site acquisition for a new Route 29 Pump Station and Storage Tank to be built at a later time in the general area south of Airport Road and north of Hollymead Towncenter on TMP 32-41. The future pump station and tank, along with a new transmission pipeline between the proposed pump station and the South Fork Water Treatment Plant, will provide an interconnection between the areas presently served by the South Fork Water Treatment Plant and the North Fork Water Treatment Plant. The interconnection is needed for redundancy of service in the event of an emergency, during drought conditions, and to adequately serve the growing needs of the Places29 area generally north of the Forest Lakes subdivision.

The project requires continued discussion with the Albemarle County Planning Department to coordinate the pump station project with the future extension of Meeting Street from Hollymead Towncenter to Airport Road. Current funding for this project provides for the acquisition of approximately 2 acres of real estate for the future pump station and tank site. Some conceptual site planning and Meeting Street extension road layout has been completed and discussed with Albemarle County staff. The recently adopted County Comprehensive Plan included discussion of the project and site. Additional work includes discussions and negotiations with the prospective property owner, property appraisals, and continued discussion with the County Planning Department.

6. Valve Repair - Replacement (Phase 2): Isolation valves are critical for normal operation of the water distribution system and timely emergency response to water main breaks. Staff are reviewing results from an ongoing valve exercising and condition assessment program. This project will replace the highest-priority valves that are identified during the condition assessment as not operable and not repairable.

7. Urban Water Granular Activated Carbon and Water Treatment Improvements: The U.S. Environmental Protection Agency regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990's Stage 1 of the rule was implemented and RWSA, ACSA and the City of Charlottesville are in compliance with Stage 1. Stage 2 of the D/DBPR was to be effective for the Urban distribution system in October 2012, but the three agencies obtained a two-year extension that shifted the implementation to October 2014. The Stage 2 D/DBPR requires a major change in how THM and HAA levels are calculated and will be more stringent than the Stage 1 requirements. An extensive study concluded that complete compliance with the Stage 2 D/DBPR cannot be met consistently with minor modification of existing processes but will instead require significant capital improvements.

In July 2012, the Board decided to pursue the installation of Granular Activated Carbon (GAC) contactors to achieve Stage 2 D/DBPR compliance in the Urban System. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs. As decided by the Board in December 2013, the GAC systems have been sized at a lower capacity than the current rated plant capacities (the "Hybrid GAC" approach). The GAC contactors are expected to be on-line and operational by the end of 2017, after the EPA mandated compliance date. For the interim, a Risk Reduction Plan was developed, outlining interim methods to reduce trace natural organic matter from the source water thereby reducing DBPs. This project budget includes \$631,000 to fund the capital needs of the Risk Reduction Plan. The plan includes installation of Powder Activated Carbon (PAC) feed systems at various treatment plants. The PAC treatment will be adequate treatment for the new regulations in the interim time period before GAC completion. The PAC systems were completed in the winter and spring of 2015, and are currently in operation as needed.

The project includes GAC work and other improvements at all five water treatment plants was bid in February 2015, and the contract was awarded to Ulliman Schutte Construction, LLC. All work is scheduled to be completed and in service by the end of 2017. Also included in the Urban Water GAC project are various improvements at the South Rivanna WTP including construction of additional clearwell storage, replacement of the lime feed system, upgrades to the filter underdrains and backwash system, replacement of the filter media, sound attenuation and ventilation improvements for the high service pump station, installation of a variable frequency drive for the raw water pump station, installation of a new raw water flow meter and several improvements to the residuals management facilities. Included in the Urban Water GAC project are various improvements at the North Rivanna WTP including new filter control valves, new pump control valves, new filter sludge removal equipment, new electrical system upgrades throughout the plant, and the installation of a surge relief mechanism.

8. Stillhouse Tank Repairs: The Stillhouse water system pressure zone currently has one ground storage tank, with a capacity of 0.70 million gallons. As a result of the new Stillhouse Pump Station project being completed, operational parameters in the Stillhouse system have greatly improved, including further optimization of tank drawdown and refill levels. Since revised tank operations have been implemented, this project will now focus solely on structural improvements and interior painting. Recommended repair work is proposed in accordance with the Stillhouse Ground Tank Roof Structural Evaluation Report dated April 2014. The work consists of removal and replacement of rood rafters, painting, and other ancillary items. This repair work can be completed with the roof remaining intact; however, the tank will have to be drained for a temporary construction time period. While the tank is drained it is also recommended to paint the tank interior. Construction of the tank improvements will begin in the summer of 2016.
9. Wholesale Water Master Metering: In January 2012, a Water Cost Allocation Agreement designated how the City of Charlottesville (City) and ACSA would share in the financing of the New Ragged Mountain Dam project. Within the agreement is a general provision developed by the ACSA and City to enhance measurement of the water usage by each of the distribution agencies. In an effort to meet this obligation, the RWSA Board of Directors authorized staff in August of 2012 to complete an engineering study on metering plan alternatives. The study identified several alternatives for a metering plan based on combinations of metering and estimating methodologies. Based on feedback from ACSA and the City, a Jurisdictional Approach was recommended which included installation of water meters at approximately 37

locations at the City/County corporate boundary. At its September 2013 meeting, the Board directed that staff proceed with the Jurisdictional Coverage Approach. The final design based on field surveyed conditions and detailed site review includes 27 proposed meter locations plus one meter at each of the three urban water plants. This project includes preliminary and final project design, right-of-way acquisition and negotiations, bid-phase services, construction, and construction administration and inspection services. Construction of the 27 remote metering locations is expected to begin in early 2016. The three plant finished water flow meters were installed in 2015 as part of the Urban Water Granular Activated Carbon Project.

10. Piney Mountain Tank Rehabilitation: The 700,000 gallon Piney Mountain Ground Storage Tank serves the North Rivanna Pressure Band. A routine inspection of the Piney Mountain Tank in April of 2012 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed in May of 2013 and a list of recommended roof repairs provided. This project includes consultant services for design and bidding of necessary roof repairs and other ancillary items, as well as construction, construction administration, and inspection services. Long term plans for the Route 29 service area include the modification or elimination of this facility. The current recommended improvements are needed in order to maintain the existing tank in service for the next 10 years or more.
11. Route 29 Pipeline – VDOT Betterment: The VDOT Route 29 Solutions projects include widening of Route 29 (Seminole Trail) from a four-lane divided highway to a six-lane divided highway from Polo Grounds to Town Center Drive at Hollymead Town Center. Improvement of this 1.8 mile-long section will include significant grade changes, which VDOT has determined requires relocation of RWSA’s existing 12-inch cast iron water main for the entire length of the project. RWSA had previously identified through master planning that a 24-inch water main will be needed from the South Rivanna Water Treatment Plant to Hollymead Town Center in order to meet future water demands. RWSA has requested that VDOT and its Design-Build Contractor relocate the existing 12-inch water main as a 24-inch water main. In addition, RWSA is requesting that VDOT’s contractor construct a section of 24-inch waterline adjacent to the proposed new Berkmar Drive Extension for future use. This project includes construction funds for the betterment from a 12-inch to 24-inch pipeline along the Route 29 Widening Project as well as design and construction of the 24-inch water main in Berkmar Drive and construction inspection services for both projects. Construction is anticipated to begin in the summer of 2016.
12. Avon to Pantops Water Main: The southern half of the Urban Area water system is currently served by the Avon Street and Pantops storage tanks. The Avon Street tank is hydraulically well connected to the Observatory Water Treatment Plant while the Pantops tank is well connected to the South Rivanna Water Treatment Plant. The hydraulic connectivity between the two tanks, however is less than desired, creating operational challenges and reducing system flexibility. In 1987, the City and ASCA developed the Southern Loop Agreement, outlining project phasing and cost allocations, as envisioned at the time. The first two phases of the project were constructed shortly thereafter. The third phase, known as the “Eastern Branch” is the subject of the current project. The initial funding for this project is to prepare an updated routing study and Preliminary Engineering Report to identify the scope, phasing, route and cost of the project.

**Major System:** South Fork Rivanna Water System

The South Fork Rivanna Water System is comprised of the source water, storage, conveyance and treatment infrastructure currently serving the urban area from the South Fork Rivanna River. The system includes the South Fork Rivanna Reservoir and Dam (built in 1966). The Dam is co-located with the raw water intake and pump station, as well as a small hydroelectric generation facility. The source water from the South Fork Rivanna Reservoir is treated at the South Fork treatment plant (12-mgd rated capacity).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
13	South Fork Rivanna Hydropower Plant Rehabilitation	\$2,000,000		\$2,000,000	\$1,598	\$498,402	\$1,250,000	\$250,000		
14	South Fork Water Treatment Plant Leaf Screen		\$471,000	\$471,000			\$471,000			
15	South Fork Water Treatment Plant Press Rehabilitation		\$150,000	\$150,000			\$150,000			
	<b>TOTAL</b>	<b>\$2,000,000</b>	<b>\$621,000</b>	<b>\$2,621,000</b>	<b>\$1,598</b>	<b>\$498,402</b>	<b>\$1,871,000</b>	<b>\$250,000</b>		

**Project Descriptions:**

13. South Fork Rivanna Hydropower Plant Rehabilitation: South Fork Hydropower Plant is a small hydroelectric generating facility constructed in 1987. The plant has historically operated intermittently, as river flows allow. The generated power is used at the South Fork Water Treatment Plant, thereby reducing power purchased off of the electric grid. During an effort to troubleshoot and repair the turbine, a large rain and lightning event caused unexpected flooding into the facility. Insurance paid damages to recent improvements, but not the pre-existing needs to repair the turbine. Engineering investigations in 2013 associated with the failed mechanical equipment and flood event confirmed the need for further disassembly and inspection of the turbine shaft and blade linkages from a remote factory location. An economic analysis that was part of the engineering work suggested the potential, but not certainty, for a positive return on the investment of rehabilitation over a 20-year period of time.

Due to the complexity of possible rehabilitation, the associated FERC dam permitting, and the numerous variables in the economic analysis, proposals were solicited from national hydropower experts to initiate a feasibility study. The feasibility study began November 2015 and will be used to determine the cost effectiveness of rehabilitating the hydropower plant while making sure to account for FERC-related costs and issues. If the feasibility study determines the rehabilitation of the plant will likely result in a positive return on investment, a mechanical inspection of the turbine will take place to confirm defective components and required repairs. The cost estimates from the feasibility study will be updated along with an updated analysis of the potential for return on investment. If a positive return on investment is still likely, a preliminary engineering report would be recommended by staff followed by final design and construction.

14. South Fork Water Treatment Plant Leaf Screen: At the South Fork Water Treatment Plant, the raw water pump station and intake are integral to the dam and abutments. Water flows through a bar screen and then a mechanical band screen (leaf screen) into the raw water pump station wet well. The existing leaf screen is original to the 1964-1965 construction. Historically, the mechanical screen has been quite reliable, but recently has allowed significant debris to enter and damage the raw water pumps. An evaluation of the existing leaf screen has determined that it has reached the end of its service life and needs to be replaced. Likewise, a detailed alternative analysis has determined that the most cost effective approach is to fabricate and install a replacement mechanical band screen.

15. South Fork Water Treatment Plant Filter Belt Press Rehabilitation: The South Rivanna Water Treatment Plant belt press is used to dewater sludge removed from the water treatment train. The current belt press

has been in continuous operation since 1992. This project is to perform a complete factory overhaul to ensure reliable service and to preempt potential future mechanical failures.

## RURAL WATER

### Major System: Crozet Water System

The Crozet Water System includes the source water, raw water conveyance, finished water treatment, transmission and storage infrastructure for the Crozet community in western Albemarle County. The source water for this system is the Beaver Creek Reservoir and Garnett Dam which was built in 1964 with a current useable storage capacity of 521 million gallons. Raw water is treated at the Crozet Water Treatment Plant (1.0 mgd rated capacity) and provides finished water to the Albemarle County Service Authority. The system includes the Crozet Elevated Tank (0.05 MG) for water treatment plant backwash; the Crozet Ground Tank (0.5 MG) and pump station, and the Bucks Elbow Storage Tank (2.0 MG).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
16	Beaver Creek Dam Alteration	\$8,400,000	(\$2,329,000)	\$6,071,000	\$133,886		\$66,114	\$350,000	\$1,000,000	\$4,521,000
17	Buck's Elbow Tank - Interior Coating and Mixing System & Crozet Waterball Painting		\$1,055,000	\$1,055,000					\$60,000	\$995,000
18	Crozet Water GAC and Water Treatment Improvements	\$3,190,000	\$60,000	\$3,250,000	\$286,734	\$239,000	\$2,632,007	\$92,259		
19	Crozet Ground Storage Tank Repairs and Upgrades	\$450,000	\$70,000	\$520,000	\$3,609	\$466,391	\$50,000			
20	Crozet Water Treatment Plant - Miscellaneous Repairs		\$105,890	\$105,890		\$50,000	\$55,890			
21	Crozet Water Treatment Plant - Expansion		\$250,000	\$250,000		\$150,000	\$100,000			
22	Crozet Water Treatment Plant - New Finished Water Pump Station		\$2,600,000	\$2,600,000			\$521,000	\$2,079,000		
	<b>TOTAL</b>	<b>\$12,040,000</b>	<b>\$1,811,890</b>	<b>\$13,851,890</b>	<b>\$424,229</b>	<b>\$905,391</b>	<b>\$3,425,011</b>	<b>\$2,521,259</b>	<b>\$1,060,000</b>	<b>\$5,516,000</b>

#### Project Descriptions:

- 16. Beaver Creek Dam Alteration:** In 2008, 2010, and 2012 the Virginia Department of Conservation and Recreation (DCR) adopted a revised *Impounding Structures Regulation* which imposed new, more rigorous, evaluations of dams within the Commonwealth. As a result, the Beaver Creek Dam has been reclassified as a high hazard dam, thereby requiring a higher spillway design storm criteria. The higher design storm cannot be accommodated with the existing structure, and will require future modifications. This project includes investigation, preliminary design, public outreach, permitting, easement acquisition, final design, and construction of the anticipated modifications. In 2014, the general assembly of Virginia passed legislation funding a new state-wide evaluation of the Probable Maximum Precipitation (PMP), which has the potential to change the required dam upgrades. The legislation indicated that dam owners shall not be required to perform spillway upgrades until the study is completed and reviewed by the Virginia Soil and Water Conservation Board (SWCB). Per the DCR staff the SWCB adopted the study on December 9, 2015. Within the coming months, the study will be published publically and guidance will be made available as to how to apply the findings. DCR staff expects implementation information to be available no sooner than March 2016.
- 17. Buck's Elbow Tank – Interior Coating and Mixing System & Crozet Waterball Painting:** The two million gallon Buck's Elbow Ground Storage Tank provides water storage for the Crozet Area while the 50,000 gallon Crozet Waterball Tank serves as filter backwash storage at the Crozet Water Treatment Plant. Routine



inspections of these tanks in 2012 indicated that the tanks would require recoating by 2020. The project includes recoating of both the interior and exterior of both tanks as well as installation of an active mixing system at the Buck's Elbow Tank to decrease stratification and improve overall water quality in the Crozet area. Minor repairs and improvements to both tanks based on recommendations from the inspection report will also be included in this work. This project includes consultant services for design of project specifications, as well as construction, construction administration, and inspection services. Construction of the tank improvements are expected to begin in the spring of 2020.

18. Crozet Water Granular Activated Carbon and Water Treatment Improvements: The U.S. Environmental Protection Agency regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990's Stage 1 of the rule was implemented and RWSA and ACSA are in compliance with Stage 1. Stage 2 of the D/DBPR would normally be effective for the Crozet distribution system in November 2014; however, a two-year extension was granted by VDH and Stage 2 will become effective for Crozet in November 2016. The Stage 2 D/DBPR requires a major change in how THM and HAA levels are calculated and will be more stringent than the Stage 1 requirements. A study concluded that complete compliance with the Stage 2 D/DBPR cannot be continuously met with minor modification of existing processes (water production facilities combined with ASCA distribution system) but will instead require significant capital improvements.

For the Crozet water system, installation of granular activated carbon (GAC) contactor units was selected due to the start/stop operation of the water treatment plant and the relatively higher water age in the distribution system. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs. The overall GAC project including GAC work and other improvements at Crozet WTP was bid in February 2015, and the contract was awarded to Ulliman Schutte Construction, LLC. Ulliman began work at South Rivanna WTP in June 2015, and is anticipated to start work at the Crozet WTP in March 2016, and be completed before the end of 2017.

The project award was approved by the RWSA Board of Directors at the March 24, 2015 Board Meeting. In addition to approving the award, the Board amended the 2015-2019 Capital Improvement Plan to combine the Crozet GAC and Crozet Water Treatment Plant Improvements projects and increase the budget by \$550,800 for a total new total project budget of \$3,190,000. Included in the Crozet WTP GAC project are various improvements including upgrade of the chlorine feed system to a modern hypochlorite feed system and installation of a finished water flow meter with appurtenances, as well as replacing the existing fluoride and corrosion inhibitor chemical feed systems. The new chemical feed systems will be housed in additional rooms in the proposed GAC contactor building. This new location will allow for shorter chemical feed lines.

19. Crozet Ground Storage Tank Repairs and Upgrades: The 500,000 gallon Crozet Ground Storage Tank serves as the wet well for the finished water pumps at the Crozet Water Treatment Plant as well as one of two water storage tanks in the Crozet Service Area. A routine inspection of the Crozet Tank in April of 2012 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed in January 2013 and a list of recommended roof repairs provided. This project includes consultant services for design and bidding of necessary roof repairs and other ancillary items, as well as construction, construction administration, and inspection services. This project also includes the installation of an active mixing system to improve system-wide water quality by increasing circulation and minimizing tank stratification. Construction of the tank improvements will begin in the spring of 2016.
20. Crozet Water Treatment Plant – Miscellaneous Repairs: Staff identified several repairs needed within the Crozet water system within the next two years. These items have been consolidated into a single project and include new stem guides, valves and trash racks at the raw water pump station, a new backwash supply pump, a new overflow pipe for the backwash tank, and new walkways and handrails.
21. Crozet Water Treatment Plant - Expansion: The Crozet water treatment system is currently permitted and rated to supply up to 1.0 million gallons per day (mgd) of water to the ACSA distribution system. Over the past several years, average day usage of water has increased steadily to 0.48 mgd, in line with the AECOM 2011 Regional Water Demand Forecasts. Of particular note is that maximum day demands in Crozet have

consistently been 1.8 times the average day demand. As such, staff anticipates the need to provide more than 1.0 mgd of treatment plant capacity as soon as the summer of 2022. To achieve this goal, design and permitting would need to start no later than spring 2020, followed by construction in 2021. The current lease agreement with ACSA for land at this facility stipulates that a 5-year notice must be given prior to altering or terminating the lease. As such, it is imperative that RWSA begin evaluating how a future plant expansion would be accomplished and any impacts on the ACSA lease. The work currently included in this project includes alternative analysis, pilot studies and the development of a preliminary engineering report.

22. Crozet Water Treatment Plant – New Finished Water Pump Station: As described in the above project description, the Crozet water treatment facilities will require an expansion to secure future needs of the Crozet community. The Finished Water Pump Station is the final step in the treatment and conveyance process. The Crozet Pump Station is original to the plant and has numerous design and operational flaws that severely limit its operational reliability. A new pump station at the site is required for both current and future service needs. The project includes evaluation, permitting, design, construction and construction management.

**Major System:** Scottsville Water System

The Scottsville Water System is comprised of the raw water conveyance, finished water treatment, transmission and storage infrastructure for the Town of Scottsville in southern Albemarle County. The source water for this system is the Totier Creek Intake, and the backup supply is the Totier Creek Reservoir, which was built in 1971 with a current useable capacity of 182 million gallons. Raw water is treated at the Scottsville Water Treatment Plant (0.25 mgd rated capacity) and provides finished water to the Albemarle County Service Authority. The system includes the Scottsville Storage Tank (0.25 MG).

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
23	Scottsville Water Granular Activated Carbon	\$1,600,000	\$15,000	\$1,615,000	\$99,767		\$1,089,518	\$425,715		
24	Scottsville High Service Pump Station Upgrades	\$100,000		\$100,000					\$100,000	
	TOTAL	\$1,700,000	\$15,000	\$1,715,000	\$99,767		\$1,089,518	\$425,715	\$100,000	

**Project Descriptions:**

- 23. Scottsville Water Granular Activated Carbon:** The U.S. Environmental Protection Agency regulates maximum contaminant levels (MCL) for total trihalomethanes (THMs) and haloacetic acids (HAAs) in drinking water under the Disinfectant/Disinfection Byproducts Rule (D/DBPR). In the early 1990's Stage 1 of the rule was implemented and RWSA and ACSA are in compliance with Stage 1. Stage 2 of the D/DBPR was effective for the Scottsville distribution system in November 2014. The Stage 2 D/DBPR requires a major change in how THM and HAA levels are calculated and will be more stringent than the Stage 1 requirements. After a study, it was concluded that complete compliance with the Stage 2 D/DBPR cannot consistently be met with minor modification of existing processes (water production facilities combined with ASCA distribution system) but will instead require significant capital improvements.

For the Scottsville water system, installation of granular activated carbon (GAC) contactor units was selected due to the start/stop operation of the water treatment plant and the higher water age in the distribution system. The GAC will adsorb organic matter from the water, thereby reducing the precursors to THMs and HAAs. The overall GAC project including GAC work at Scottsville WTP was bid in February 2015, and the contract was awarded to Ulliman Schutte Construction, LLC. The project award was approved by the RWSA Board of Directors at the March 24, 2015 Board Meeting. In addition to approving the award, the Board amended the 2015-2019 Capital Improvement Plan to increase the budget for Scottsville GAC by \$382,100 for a new total project budget of \$1,600,000. Ulliman began work at South Rivanna WTP in June, and is anticipated to start work at the Scottsville WTP in July 2016, and be completed before the end of 2017.

- 24. Scottsville High Service Pump Station Upgrades:** Currently, the high service pumps at the Scottsville water treatment plant pump water to the RWSA standpipe tank and then an ACSA booster station pumps water to the ACSA tank, which serves the majority of the Scottsville service area. This project will evaluate and replace the high service pumps at the Scottsville WTP so that water can be pumped directly from the WTP to the ACSA tank, eliminating the need for the ACSA booster pump station and the RWSA standpipe tank. The revised setup will increase reliability, be more efficient, and reduce water age in the distribution system.

## URBAN WASTEWATER

### Major System: Wastewater Interceptors/Pumping Stations

The RWSA wastewater interceptors and pumping stations serve to convey wastewater from the collection systems of the City of Charlottesville and Albemarle County Service Authority to the Moores Creek Advanced Water Resource Recovery Facility (MCAWRRF). This grouping includes: the Crozet Interceptor and four associated pumping stations; the Moores Creek Interceptor and Relief Sewer; the Morey Creek, Maury Hills, Powell Creek, Meadow Creek, Schenks Branch, Woodbrook and Rivanna Interceptors; as well as the Albemarle-Berkley Interceptor and associated Albemarle Pumping Station. Also included in this system are the two primary pump stations into the MCAWRRF, the Rivanna and Moores Creek Pump Stations.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
25	Meadowcreek Interceptor Closeout	\$4,200,000		\$4,200,000	\$3,790,178	\$409,822				
26	Schenks Branch Interceptor	\$9,014,760		\$9,014,760	\$3,474,381	\$2,640,379	\$1,450,000	\$1,450,000		
27	Albemarle-Berkley Interceptor	\$954,000	(\$767,394)	\$186,606		\$186,606				
28	Rivanna Pump Station and Tunnel	\$33,300,000		\$33,300,000	\$10,684,001	\$14,927,101	\$6,253,086	\$1,435,812		
29	Interceptor Sewer and Manhole Repair	\$1,337,389		\$1,337,389		\$137,389	\$500,000	\$500,000	\$100,000	\$100,000
30	Crozet Interceptor	\$625,000		\$625,000	\$126,826	\$264,764	\$233,410			
31	Comprehensive Sanitary Sewer Model and Study Update	\$390,000		\$390,000	\$180,640	\$209,360				
32	Crozet Flow Equalization Basin	\$325,000	\$2,000,000	\$2,325,000		\$25,000	\$50,000	\$250,000	\$1,000,000	\$1,000,000
33	Crozet Interceptor Pump Station Automatic Bar Screens	\$139,950	(\$64,950)	\$75,000				\$75,000		
34	Crozet Interceptor Pump Station Isolation Valves		\$220,000	\$220,000			\$110,000		\$110,000	
	<b>TOTAL</b>	<b>\$50,286,099</b>	<b>\$1,387,656</b>	<b>\$51,673,755</b>	<b>\$18,256,026</b>	<b>\$18,800,421</b>	<b>\$8,596,496</b>	<b>\$3,710,812</b>	<b>\$1,210,000</b>	<b>\$1,100,000</b>

#### Project Descriptions:

- 25. Meadowcreek Interceptor Closeout:** The Meadowcreek Interceptor project included the replacement of approximately 22,000 linear feet of interceptor with larger diameter pipe to provide capacity for wet weather flow. The new pipeline is operational and providing improved service to both the City of Charlottesville and Albemarle County Service Authority. The construction activities at the end of the project were contentious and resulted in litigation with the Contractor. The lawsuit has since been settled, and the budget for this project included the settlement payments as well as liquidated damages owed to the Meadowcreek Golf Course; both of which have been taken care of and accounted for. The remaining funds in this project will be used to resolve numerous punch list items and correct defective work. Repairs associated with the defective work will be separated into two distinct phases. The first phase of the work will focus on defects associated with piping connections from the new interceptor to the City of Charlottesville's existing collection system. These repairs began in late Fall 2015. The second phase of the work will address poor flow characteristics within a junction manhole where a City of Charlottesville basin discharges. The sewer

alignment in this area will be adjusted to alleviate this condition and repairs are scheduled to begin in early 2016.

26. Schenks Branch Interceptor: The Schenks Branch Interceptor is located in the eastern part of the City of Charlottesville and ties into the Meadowcreek Interceptor. The interceptor was constructed in the mid-1950s of 21-inch clay and concrete pipe. The existing interceptor is undersized to serve present and future wet weather flows as determined by the City, and is to be upgraded to 30-inch pipe. The first portion of this sewer was constructed as part of the Meadowcreek Interceptor project. The second portion was constructed as part of the VDOT McIntire Road Extended project in 2012. The third portion was constructed as part of the McIntire/250 Interchange project and the Certificate to Operate was issued by DEQ in 2014. The rest of the upstream Interceptor in McIntire Road (Upper Schenks Branch Interceptor) has been designed and construction has begun on the first phase of this project which is located in the City's Schenks Branch Greenway. The contractor was issued a Notice to Proceed in July 2015. Sewer pipe and manhole installation work will continue over the next few months to be followed by reconstruction of the Greenway, including a new walking path and landscaped areas. The second phase of the Upper Schenks Branch Interceptor will be upgraded by RWSA in coordination with the City of Charlottesville's sewer upgrades once easement negotiations with Albemarle County are complete (or the City authorizes the second phase project be constructed under McIntire Road). Project costs include betterment cost for the portions that are being replaced by VDOT; design, permitting, easement acquisition, construction, construction observation/administration by the engineering consultant; and project contingencies for the rest of the interceptor.
27. Albemarle-Berkley Interceptor: The Albemarle-Berkley Interceptor is located in Albemarle County and ties into the Meadowcreek Interceptor. The existing interceptor was built in the mid-1970s mostly of clay pipe, and has the capacity to handle the existing and future dry weather flows through build-out. However, based on flow metering and manhole inspections, the interceptor has experienced substantial inflow and infiltration and the interceptor required rehabilitation. A condition assessment was performed on the interceptor, which resulted in the installation of a cured-in-place liner through the entire length of the pipeline (9,532 linear feet). As a result of the condition assessment, defects were also identified in a large number of the manholes. Rehabilitation work on all 44 manholes has been completed with only final close-out procedures remaining. This will complete all required rehabilitation efforts of this interceptor system.
28. Rivanna Pump Station and Tunnel: Pumping capacity between the Rivanna Interceptor in Riverview Park and the Moores Creek Advanced Water Resource Recovery Facility requires expansion for wet weather peak flow, from a current capacity of 24.5 mgd to a firm capacity of 53 mgd in accordance with RWSA's DEQ Consent Order. Following a lengthy public process and study of alternatives, the RWSA Board selected to move forward with a final design at the December 2011 Board of Directors meeting which included construction of approximately 1,620 linear feet of a tunnel with a tunnel-boring machine which would connect the existing Rivanna Interceptor in Riverview Park to a new pump station located on the RWSA MCAWRRF property. The final design included pumps capable of delivering a peak pumping rate equivalent to 53 mgd, electrical gear, influent grinders, self-cleaning wet well, air collection for odor control, back-up power generation, SCADA control and integration, tie-ins to the existing systems, site and permitting work, storage building demolition and electrical relocation work, as well as architectural, structural and mechanical systems. The existing pump station at the entrance to Riverview Park will be demolished once the new pump station and tunnel are complete and in service. Bidding was held in November 2013 and the project was awarded by the Board of Directors in December 2013 to Adams Robinson Enterprises. Construction began in March 2014 and construction of the new pump station and tunnel is on-going.
29. Interceptor Sewer and Manhole Repair: This project is used to conduct assessment of various interceptors as well as rehabilitation of interceptors that do not have a separate CIP project. Planned projects include condition assessments and assumed rehabilitation of the Moores Creek Interceptor, Moores Creek Relief Interceptor, Maury Hill Branch Sewer, Morey Creek Interceptor, and Powell Creek Interceptor. This project will also provide an allowance in budgeted funds to carry out future repairs. The intent of this project is to complete a condition assessment of all RWSA interceptors (except those replaced during the period with new pipe) and perform as-needed rehabilitation work by 2020. Such period assessments of all sewer pipe reflects

industry best practices and the maintenance expectations of federal and state regulators as a part of avoiding sanitary sewer overflows.

30. Crozet Interceptor: The Crozet Interceptor is located in western Albemarle County and serves the Crozet area. Flow metering indicates that the interceptor experiences substantial inflow and infiltration and requires rehabilitation. In order to minimize future infrastructure improvements, ACSA and RWSA have agreed to aggressively rehabilitate this interceptor and the sewers that flow to the interceptor. The initial phase of rehabilitation to repair defects in manholes and pipelines contributing to the inflow and infiltration in the interceptor upstream of Crozet Pump Station No. 4 has been completed. The current budget accounts for condition assessment work and assumed rehabilitation needs for the lower portions of the interceptor. While wet weather flows have moderately improved based on the initial phase of work, the ACSA and RWSA continue to investigate and remediate deficiencies along the entire interceptor.
31. Comprehensive Sanitary Sewer Model and Study Update: Due to wet weather inflow and infiltration (I/I); projected growth, and infill, the RWSA interceptor system required evaluation of current and future flows. A consultant conducted flow metering and developed a system-wide computer modeling evaluation in 2006 which allowed RWSA, the City and ACSA to collectively identify system deficiencies, develop inflow and infiltration reduction goals, and project and prioritize future capital needs. The study was finalized in 2010. Subsequently, RWSA installed 12 permanent sanitary sewer flow meters to better understand the system operations.

In April 2014 the City, ACSA, and RWSA entered into a Wastewater Projects Cost Allocation Agreement (Agreement) with the purpose of allocating costs for capacity-related projects. As part of that agreement, RWSA must routinely update future flow projections, and measured dry and wet weather flows, for each the City and ACSA. These projections are and made through a calibrated wastewater model from flows measured in sewer pipes. Temporary flow meters were installed from November 2014 until May 2015 to collect discrete flow data from the City and ACSA entering the RWSA system in order to update the model and evaluate I/I reduction goals and future capital project needs in accordance with the requirements of the Agreement. Data from both the temporary flow meters and the permanent flow meters will be used to determine the impacts of wet weather on the collection system as necessary for modeling and flow projection analyses. Population projections for the region are being finalized with sewer model calibration, capacity evaluations, and the completion of flow tables for the Wastewater Projects Cost Allocation Agreement to follow.
32. Crozet Flow Equalization Basin: Rehabilitation work in the RWSA and ACSA sewer systems is on-going to meet the I&I reduction goals in the Crozet Interceptor sewer basin based on the flow metering and modeling results of the Comprehensive Sanitary Sewer Model & Study conducted in 2006 and as part of the Crozet Interceptor CIP project. As described in the Comprehensive Sanitary Sewer Model and Study Update CIP project description above, the results of the 2006 study are being updated to evaluate I/I reduction goals and future capital project needs. The need to proceed with construction of a flow equalization basin in the Crozet area will be confirmed as a result of this study update, which will take into account recent flow monitoring data that has been collected following previous I/I reduction efforts. If it is determined that rehabilitation efforts to reduce I&I have not been sufficient to meet the 2020 two-year storm flow targets, a preliminary engineering evaluation of a flow equalization basin upstream of Crozet Pump Station No. 4 will begin immediately following that determination. Immediately progressing into the preliminary engineering phase of the flow equalization basin is necessary to ensure that the facility can be sited, designed, permitted, constructed and ready for operation by 2020 in order to meet the two-year storm flow targets. The budget for this project includes an estimate for the preliminary engineering, as well as estimates for final design and a budgetary place holder to account for construction costs.
33. Crozet Interceptor Pump Station Automatic Bar Screens: There are currently two automatic bar screens at Crozet Pump Station No. 4. These units are original to the pump station which was constructed in the mid 1980's. Only one of the units is operational, with the second unit no longer serviceable. The first screen was replaced as part of the CIP in 2014. This project involves replacement of the second unit.

34. Crozet Interceptor Pump Station Isolation Valves: There are four pump stations located in the Crozet Interceptor system that help convey the flow from the Crozet area into the Morey Creek Interceptor and the rest of the urban collection system. These pump stations were constructed in the 1980s and provided no means of isolating each pump station from its downstream force main. This condition complicates maintenance-related activities as each time a pump station component needs to be serviced or replaced, the volume of wastewater with the force main must be addressed at the pump station as it drains back to the wet well. In addition, the Crozet Interceptor Pump Stations also have limited storage within their wet wells, and any reduction of down time as a result of dealing with the impacts of no isolation valves, decreases the amount of time available to work on the equipment. In order to alleviate this condition, temporary valves called “line stops” will be temporarily installed on the force mains downstream of the pump stations to allow enough time for a new isolation valve to be installed. This isolation valve location will provide the maximum amount of down time available based on current system conditions for future pump station maintenance activities. Crozet Pump Station No. 4 is the most critical and would be performed first, with valves being installed at the other pump stations every other year.

**Major System:** Moores Creek Advanced Water Resource Recovery Facility

The Moores Creek Advanced Water Resource Recovery Facility (MCAWRRF) is the largest wastewater treatment facility within the RWSA system. The plant was originally constructed in 1958 and upgraded and expanded in 1981 and 1982, and currently has a rated capacity of 15 mgd. From 2009 thru 2012 the facility was upgraded to provide enhanced nutrient removal, and increased wet weather pumping and treatment capacity. This site includes the infrastructure for the wastewater treatment process as well as the RWSA administration facilities.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
35	Bridge Repairs	\$275,000		\$275,000	\$10,490	\$9,761	\$200,000	\$54,749		
36	MCAWRRF Administration Building Repairs	\$450,000		\$450,000	\$183,998	\$100,000	\$166,002			
37	MCAWRRF Odor Control - Phase 2	\$9,330,000		\$9,330,000	\$352,476	\$1,280,000	\$5,737,524	\$1,960,000		
38	MCAWRRF Roof Replacements		\$903,000	\$903,000			\$83,000	\$410,000	\$410,000	
39	MCAWRRF Second Centrifuge		\$1,025,000	\$1,025,000		\$45,568	\$705,432	\$274,000		
	<b>TOTAL</b>	<b>\$10,055,000</b>	<b>\$1,928,000</b>	<b>\$11,983,000</b>	<b>\$546,964</b>	<b>\$1,435,329</b>	<b>\$6,891,958</b>	<b>\$2,698,749</b>	<b>\$410,000</b>	

**Project Descriptions:**

35. Bridge Repairs: The bridge crossing Moores Creek located at the Advanced Water Resource Recovery Facility was constructed in the early 1980s. In late 2011, staff commissioned a detailed inspection of the bridge. The inspection results indicated that the bridge was in good condition, but required maintenance repairs to assure continued safe operation. This work includes sealing the expansion joints, scupper installation to drain the bridge deck, new concrete overlay topping, repairs to the steel plate girders and their bearings, catwalk and steel corrosion repair and repainting, and minor concrete repair. This work will be completed in conjunction with the Moores Creek Odor Control Improvements project.
  
36. Moores Creek AWRRF Administration Building Repairs: The RWSA Administration Building was constructed in 1978 as part of the Moores Creek wastewater treatment facility, with the addition of an elevator and office space in 1995. Over the past several years there have been several significant building maintenance issues. As a result, in October 2012, staff commissioned an architectural, mechanical, electrical, and plumbing evaluation of the building, which identified several near, mid, and long-term repair needs. The first round of improvements in this project included the replacement of the entire roof with a standing seam aluminum material, gutter and downspout replacement, and electrical circuit mapping and rewiring. Other miscellaneous repairs, such as window replacement, will be included as the bidding environment allows. The roof replacement was completed in late 2014.
  
37. Moores Creek AWRRF Odor Control – Phase 2: As part of the implementation of the next phase of the 2007 Odor Control Master Plan at the MCAWRRF, operations audits were performed, liquid and vapor phase sampling was conducted, and a computerized dispersion model was developed from 2013 to 2014. Recommendations for odor control improvements that would significantly control odors from traveling beyond the MCAWRRF fence line were presented to the RWSA Board of Directors in December 2014 and the CIP project for \$9.33M was approved at the January 2015 Meeting. The final design for odor control improvements includes covering the head works and screening channels, installing grit facilities, constructing a bypass line through one equalization basin, covering the primary clarifiers, building additional odor scrubbing facilities to treat the foul air from the covered sources and the new Rivanna Pump Station, removing the post-digestion clarifiers from service, modifying the handling, hauling and storage of biosolids on-site, cleaning the equalization basins and holding ponds, and coating the interior of the digesters. A Value Engineering Study was conducted in June 2015 to evaluate odor control design alternatives based on the preliminary design. The design for the Odor Control Improvements Project was completed in November 2015. An award of construction contract and associated engineering construction administration and



inspection is anticipated early in 2016. An 18 month construction period is anticipated to begin in spring 2016 with final project completion in fall 2017. The digester coating and basin cleaning projects will be managed by RWSA staff through separate contracts.

38. Moore's Creek AWRRF Roof Replacements: The majority of the buildings at the Moore's Creek Advanced Water Resource Recovery Facility were constructed in 1981 and 1983 during a major expansion of the existing treatment plant. All buildings constructed at that time were built with a metal roof system. In 2014, deficiencies were identified in the roof at the Administration Building and the roof was replaced. The materials of the original roof at the Administration Building are the same as the roof material on the other buildings. Likewise, many of the buildings have started to experience leaks and structural deficiencies. As a result, the purpose of this project is to replace the roof systems at the following buildings at the Moore's Creek AWRRF: Blower Building, Moore's Creek Pump Station, Sludge Pump Station No. 2, Maintenance Building 1, and Maintenance Building 2.
39. Moore's Creek AWRRF Second Centrifuge: The Moore's Creek AWRRF currently operates a high-speed centrifuge to process and dewater digested biosolids from the treatment process. The centrifuge was constructed during the 2009-2012 Nutrient Upgrade project and served to replace an older plate and frame filter press operation (which was removed during installation of the centrifuge), with a second plate and frame press serving as backup. Within the past year, an evaluation of the remaining filter press concluded that extensive repairs would be required to maintain this as a backup dewatering system and the repairs would not be as cost-effective as purchasing a second centrifuge. Without the utility of the second press the facility does not have a redundant process, and thus during planned or emergency outages a portable back-up unit must be rented or leased. A second centrifuge will allow for continued biosolids dewatering during planned or emergency repairs to one of the two centrifuges, for higher rate processing by operating both units simultaneously during other periods, and for better maintenance of proper solids flow through the plant. The higher rate processing will reduce staff time and costs to operate biosolids dewatering, and such labor cost savings will offset the debt service costs associated with the purchase and installation of the centrifuge.

**RURAL WASTEWATER**

**Major System:** Scottsville Wastewater System

The Scottsville Wastewater System includes the influent pumping station, the water resource recovery facility constructed in 1983, and the historical treatment lagoon (now incorporated into the plant operation). The water resource recovery facility has a rated capacity of 0.2 mgd.

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
	No projects anticipated in current 5 year plan									
	TOTAL									

**Project Descriptions:**

No capital improvement projects are envisioned for this system during the next 5 years.

**Major System:** Glenmore Wastewater System

The 0.381-mgd water resource recovery facility, located within the Glenmore subdivision, is operated by RWSA. The facility includes an influent pumping station located immediately adjacent to the treatment facility.

No.	Project Description	Five-Year Capital Program				Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended	Previous Expenditures (7/1/15)	FY16	FY17	FY18	FY19	FY20
	No projects anticipated in current 5 year plan									
	TOTAL									

Project Descriptions:

No capital improvement projects are envisioned for this system during the next 5 years.

**ALL SYSTEMS**

**Major System:** All Systems

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
40	Radio Upgrades		\$500,000	\$500,000			\$500,000			
	TOTAL		\$500,000	\$500,000			\$500,000			

**Project Descriptions:**

- Radio Upgrades:** The regional 800 MHz Public Safety Communication System, in which the Rivanna Water and Sewer Authority participates to provide internal and emergency radio communication, is expected to reach the end of its service life in 2018. Because of technology changes (software and hardware) the Charlottesville-UVA-Albemarle County Emergency Communications Center (ECC) will need to upgrade or replace the system to keep it useable. This project plans for the upgrade or replacement of major technology components and equipment of the existing system include: electronic components at all tower sites and the prime site at the ECC facility; new console equipment at the regional ECC; equipment such as tower site generators and UPS systems; an additional tower site (to improve service in southern Albemarle County); microwave backbone; and replacement of the system recording facilities. The project will take 24 months to complete and will be completed in Fiscal Year 2018. RWSA is being apportioned a part of the \$18.8M project cost proportionately based on the number of radios (2.4% of the total project cost). In addition to this assessment from the ECC, the Authority will also be required to undertake programing upgrades to its fleet of stationary, mobile, and portable radios.

**APPENDICES**

**CIP Financial Summary**

**Water System Summary**

**Wastewater System Summary**

## CIP FINANCIAL SUMMARY

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
1	South Fork Reservoir to RM Reservoir Pipeline Right-of-Way	\$2,295,000		\$2,295,000	\$24,859			\$1,520,141	\$750,000	
2	South Fork Rivanna Reservoir Dredging	\$3,500,000		\$3,500,000	\$127,558			\$372,442	\$1,500,000	\$1,500,000
3	Observatory Water Treatment Plant Improvements	\$9,250,000	\$250,000	\$9,500,000	\$33,725	\$678,000	\$890,000	\$1,495,000	\$5,089,000	\$1,314,275
4	RM Reservoir to OWTP Pipeline Condition Assessment		\$285,000	\$285,000						\$285,000
5	Route 29 Pump Station Site Acquisition	\$1,900,000		\$1,900,000	\$450,747	\$1,449,253				
6	Valve Repair - Replacement (Phase 2)	\$500,000		\$500,000				\$500,000		
7	Urban Water GAC and Water Treatment Plant Improvements	\$24,000,494	\$925,000	\$24,925,494	\$2,705,797	\$12,193,712	\$8,659,010	\$1,366,975		
8	Stillhouse Tank Repairs	\$580,000	\$20,000	\$600,000	\$8,094	\$170,406	\$421,500			
9	Wholesale Water Master Metering	\$6,400,000	(\$2,800,000)	\$3,600,000	\$482,437	\$1,542,563	\$1,575,000			
10	Piney Mountain Tank Rehabilitation		\$500,000	\$500,000			\$28,000	\$412,000	\$60,000	
11	Rt. 29 Pipeline - VDOT Betterment		\$3,075,000	\$3,075,000		\$945,000	\$2,130,000			
12	Avon to Pantops Water Main		\$250,000	\$250,000				\$250,000		
13	South Fork Rivanna Hydropower Plant Rehabilitation	\$2,000,000		\$2,000,000	\$1,598	\$498,402	\$1,250,000	\$250,000		
14	South Fork Water Treatment Plant Leaf Screen		\$471,000	\$471,000			\$471,000			
15	South Fork Water Treatment Plant Filter Press Rehabilitation		\$150,000	\$150,000			\$150,000			
16	Beaver Creek Dam Alteration	\$8,400,000	(\$2,329,000)	\$6,071,000	\$133,886		\$66,114	\$350,000	\$1,000,000	\$4,521,000
17	BET - Interior Coating and Mixing System and CWB Painting		\$1,055,000	\$1,055,000					\$60,000	\$995,000
18	Crozet Water GAC and Water Treatment Improvements	\$3,190,000	\$60,000	\$3,250,000	\$286,734	\$239,000	\$2,632,007	\$92,259		
19	Crozet Ground Storage Tank Repairs and Upgrades	\$450,000	\$70,000	\$520,000	\$3,609	\$466,391	\$50,000			
20	Crozet Water Treatment Plant - Miscellaneous Repairs		\$105,890	\$105,890		\$50,000	\$55,890			

## CIP FINANCIAL SUMMARY

No.	Project Description	Five-Year Capital Program			Previous Expenditures (7/1/15)	Projected Future Expenses by Year				
		As Adopted (1/27/2015)	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
21	Crozet Water Treatment Plant - Expansion		\$250,000	\$250,000		\$150,000	\$100,000			
22	Crozet Water Treatment Plant - New Finished Water Pump Station		\$2,600,000	\$2,600,000			\$521,000	\$2,079,000		
23	Scottsville Water Granular Activated Carbon	\$1,600,000	\$15,000	\$1,615,000	\$99,767		\$1,089,518	\$425,715		
24	Scottsville High Service Pump Station Upgrades	\$100,000		\$100,000					\$100,000	
25	Meadowcreek Interceptor Closeout	\$4,200,000		\$4,200,000	\$3,790,178	\$409,822				
26	Schenks Branch Interceptor	\$9,014,760		\$9,014,760	\$3,474,381	\$2,640,379	\$1,450,000	\$1,450,000		
27	Albemarle-Berkley Interceptor	\$954,000	(\$767,394)	\$186,606		\$186,606				
28	Rivanna Pump Station and Tunnel	\$33,300,000		\$33,300,000	\$10,684,001	\$14,927,101	\$6,253,086	\$1,435,812		
29	Interceptor Sewer and Manhole Repair	\$1,337,389		\$1,337,389		\$137,389	\$500,000	\$500,000	\$100,000	\$100,000
30	Crozet Interceptor	\$625,000		\$625,000	\$126,826	\$264,764	\$233,410			
31	Comprehensive Sanitary Sewer Model and Study Update	\$390,000		\$390,000	\$180,640	\$209,360				
32	Crozet Flow Equalization Basin	\$325,000	\$2,000,000	\$2,325,000		\$25,000	\$50,000	\$250,000	\$1,000,000	\$1,000,000
33	Crozet Interceptor Pump Station Automatic Bar Screens	\$139,950	(\$64,950)	\$75,000				\$75,000		
34	Crozet Interceptor Pump Station Isolation Valves		\$220,000	\$220,000			\$110,000		\$110,000	
35	Bridge Repairs	\$275,000		\$275,000	\$10,490	\$9,761	\$200,000	\$54,749		
36	MCAWRRF Administration Building Repairs	\$450,000		\$450,000	\$183,995	\$100,000	\$166,002			
37	MCAWRRF Odor Control - Phase 2	\$9,330,000		\$9,330,000	\$352,476	\$1,280,000	\$5,737,524	\$1,960,000		
38	MCAWRRF Roof Replacements		\$903,000	\$903,000			\$83,000	\$410,000	\$410,000	
39	MCAWRRF Second Centrifuge		\$1,025,000	\$1,025,000		\$45,568	\$705,432	\$274,000		
40	Radio Upgrades		\$500,000	\$500,000			\$500,000			
	<b>Total</b>	<b>\$124,506,593</b>	<b>\$8,768,546</b>	<b>\$133,275,139</b>	<b>\$23,161,798</b>	<b>\$38,618,477</b>	<b>\$36,077,493</b>	<b>\$15,523,093</b>	<b>\$10,179,000</b>	<b>\$9,715,275</b>

## WATER SYSTEM SUMMARY

Urban Water System	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted 1/2015	Proposed Changes	Recommended	Previous Expensed	FY16	FY17	FY18	FY19	FY20
<b>PROJECT COSTS</b>									
Community Water Supply Plan	\$ 5,795,000	\$ -	\$ 5,795,000	\$ 152,417	\$ -	\$ -	\$ 1,892,583	\$ 2,250,000	\$ 1,500,000
Observatory WTP and Ragged Mtn/Sugar Hollow Reservoir System	9,250,000	535,000	9,785,000	33,725	678,000	890,000	1,495,000	5,089,000	1,599,275
Finished Water Storage/Distribution - Urban System	33,380,494	1,970,000	35,350,494	3,647,075	16,300,934	12,813,510	2,528,975	60,000	-
South & North Fork Rivanna WTP and Reservoir System	2,000,000	621,000	2,621,000	1,598	498,402	1,871,000	250,000	-	-
<b>Total Urban Water Systems</b>	<b>50,425,494</b>	<b>3,126,000</b>	<b>53,551,494</b>	<b>3,834,815</b>	<b>17,477,336</b>	<b>15,574,510</b>	<b>6,166,558</b>	<b>7,399,000</b>	<b>3,099,275</b>
<b>FUNDING SOURCES URBAN SYSTEM - TO DATE</b>									
Debt Proceeds used & available			\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Capital Cash used			3,834,815	3,834,815	-	-	-	-	-
<b>SUBTOTAL</b>			<b>3,834,815</b>	<b>3,834,815</b>	<b>-</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>FUNDING SOURCES URBAN SYSTEM - NEEDS</b>									
Capital Cash on hand/available			\$ 2,050,000		\$ 2,050,000	\$ -			
Future Cash reserve transfer to Capital Fund			4,670,000		742,706	1,257,294	1,000,000	1,000,000	670,000
2015B Bond Issue November 2015	\$27,340,869		27,340,869		14,684,630	9,619,010	3,037,229		
New Debt Needed			15,655,810		-	4,698,206	2,129,329	6,399,000	2,429,275
<b>SUBTOTAL</b>			<b>49,716,679</b>		<b>17,477,336</b>	<b>15,574,510</b>	<b>6,166,558</b>	<b>7,399,000</b>	<b>3,099,275</b>
<b>TOTAL URBAN WATER FUNDING</b>			<b>\$ 53,551,494</b>	<b>\$ 3,834,815</b>	<b>\$ 17,477,336</b>	<b>\$ 15,574,510</b>	<b>\$ 6,166,558</b>	<b>\$ 7,399,000</b>	<b>\$ 3,099,275</b>
<b>Estimated Bond Issues</b>			<b>\$ 15,655,810</b>			<b>\$ 6,827,535</b>		<b>\$ 8,828,275</b>	

Rural Water System	Five-Year Capital Program				Projected Future Expenses by Year				
	As Adopted 1/2015	Proposed Changes	Recommended	Previous Expensed	FY16	FY17	FY18	FY19	FY20
<b>PROJECT COSTS</b>									
Crozet Water System	\$ 12,040,000	\$ 1,811,890	\$ 13,851,890	\$ 424,229	\$ 905,391	\$ 3,425,011	\$ 2,521,259	\$ 1,060,000	\$ 5,516,000
Scottsville Water System	1,700,000	15,000	1,715,000	99,767	-	1,089,518	425,715	100,000	-
<b>Total Rural Water Systems</b>	<b>\$ 13,740,000</b>	<b>\$ 1,826,890</b>	<b>\$ 15,566,890</b>	<b>\$ 523,996</b>	<b>\$ 905,391</b>	<b>\$ 4,514,529</b>	<b>\$ 2,946,974</b>	<b>\$ 1,160,000</b>	<b>\$ 5,516,000</b>
<b>FUNDING SOURCES RURAL SYSTEM - NEEDS</b>									
Cash used & available			\$ 308,438	\$ 8,438	\$ 200,000	\$ -		\$ 100,000	
Debt Proceeds Used			515,558	515,558					
2012 A Bond			2,241,240		\$ 705,391	1,535,849			
2015B Bond			2,390,015			2,390,015			
New Debt Needed			10,111,639			588,665	2,946,974	1,060,000	5,516,000
<b>TOTAL RURAL WATER FUNDING</b>			<b>\$ 15,566,890</b>	<b>\$ 523,996</b>	<b>\$ 905,391</b>	<b>\$ 4,514,529</b>	<b>\$ 2,946,974</b>	<b>\$ 1,160,000</b>	<b>\$ 5,516,000</b>
<b>Estimated Bond Issues</b>			<b>\$ 10,111,639</b>			<b>\$ 588,665</b>	<b>\$ 4,006,974</b>		<b>\$ 5,516,000</b>



## WASTEWATER SYSTEM SUMMARY

Wastewater System	Five-Year Capital Program			Previous Expended	Projected Future Expenses by Year				
	As Adopted 1/2015	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
<b>PROJECT COSTS</b>									
Wastewater Interceptor/Pumping Stations	\$ 50,286,099	\$ 1,387,656	\$ 51,673,755	\$ 18,256,026	\$ 18,800,421	\$ 8,596,496	\$ 3,710,812	\$ 1,210,000	\$ 1,100,000
Moore's Creek AWWRF	10,055,000	2,428,000	12,483,000	546,964	1,435,329	7,391,958	2,698,749	410,000	-
<b>Total Urban Wastewater Systems</b>	<b>\$ 60,341,099</b>	<b>\$ 3,815,656</b>	<b>\$ 64,156,755</b>	<b>\$ 18,802,990</b>	<b>\$ 20,235,750</b>	<b>\$ 15,988,454</b>	<b>\$ 6,409,561</b>	<b>\$ 1,620,000</b>	<b>\$ 1,100,000</b>
<b>FUNDING SOURCES URBAN SYSTEM - TO DATE</b>									
Debt Proceeds Used			\$ 16,365,774	\$ 16,365,774	\$ -	\$ -	\$ -	\$ -	\$ -
Debt Proceeds Remaining - 2012A			1,930,000	-	1,930,000				
Debt Proceeds Remaining - 2014A			21,134,061	-	12,134,061	\$8,000,000	1,000,000		
Debt Proceeds Remaining - 2015A			1,067,871	-	1,067,871				
Capital Cash used			2,437,216	2,437,216	-	-	-	-	-
<b>SUBTOTAL</b>			<b>42,934,922</b>	<b>18,802,990</b>	<b>15,131,932</b>	<b>8,000,000</b>	<b>1,000,000</b>	<b>-</b>	<b>-</b>
<b>FUNDING SOURCES URBAN SYSTEM - NEEDS</b>									
Capital Cash on hand/available			\$ 4,900,000		\$ 4,900,000				
Future Cash reserve transfer to Capital Fund			503,818		203,818		\$100,000	\$ 100,000	\$100,000
New Debt Needed			15,818,015		-	7,988,454	5,309,561	1,520,000	1,000,000
<b>SUBTOTAL</b>			<b>21,221,833</b>		<b>5,103,818</b>	<b>7,988,454</b>	<b>5,409,561</b>	<b>1,620,000</b>	<b>1,100,000</b>
<b>TOTAL URBAN WASTEWATER FUNDING</b>			<b>\$ 64,156,755</b>	<b>\$ 18,802,990</b>	<b>\$ 20,235,750</b>	<b>\$ 15,988,454</b>	<b>\$ 6,409,561</b>	<b>\$ 1,620,000</b>	<b>\$ 1,100,000</b>
<b>Estimated Bond Issues</b>			<b>\$ 15,818,015</b>		<b>\$ 7,988,454</b>		<b>\$ 7,829,561</b>		<b>\$ -</b>

Rural Wastewater System	Five-Year Capital Program			Previous Expended	Projected Future Expenses by Year				
	As Adopted 1/2015	Proposed Changes	Recommended		FY16	FY17	FY18	FY19	FY20
<b>PROJECT COSTS</b>									
Scottsville WRRF	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Glenmore WRRF	-	-	-	-	-	-	-	-	-
<b>Total Rural Wastewater Systems</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>FUNDING SOURCES RURAL SYSTEM - NEEDS</b>									
Capital Cash used			\$ -	\$ -	\$ -				
<b>TOTAL RURAL WASTEWATER FUNDING</b>			<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>
<b>Estimated Bond Issues</b>			<b>\$ -</b>		<b>\$ -</b>	<b>\$ -</b>	<b>\$ -</b>		

2016 Proposed CIP vs. 2015 Adopted CIP

	<b>2016-2020 Proposed CIP</b>	<b>2015-2019 Adopted CIP</b>	<b>Change \$</b>	<b>Change %</b>
<b>Project Cost</b>				
Urban Water Projects	\$ 53,551,494	\$ 53,838,029	\$ (286,535)	-1%
Urban Wastewater Projects	64,156,755	66,404,099	(2,247,344)	-3%
Rural Projects	15,566,890	15,382,100	184,790	1%
<b>Total Project Cost Estimates</b>	<b>\$ 133,275,139</b>	<b>\$ 135,624,228</b>	<b>\$ (2,349,089)</b>	<b>-2%</b>
<b>Funding in place</b>				
Debt Proceeds available	\$ 56,104,056	\$ 6,891,974	49,212,082	714%
Debt Proceeds Used	16,881,332	14,545,125	2,336,207	16%
Cash-Capital Used	6,280,469	7,962,448	(1,681,979)	-21%
Cash-Capital Available	7,250,000	7,845,000	(595,000)	-8%
	\$ 86,515,857	\$ 37,244,547	\$ 49,271,310	132%
<b>Financing Needs</b>				
Possible Future Reserves	\$ 5,173,818	6,900,000	(1,726,182)	-25%
New Debt	41,585,464	91,479,681	(49,894,217)	-55%
	\$ 46,759,282	\$ 98,379,681	\$ (51,620,399)	-52%
<b>Total Funding</b>	<b>\$ 133,275,139</b>	<b>\$ 135,624,228</b>	<b>\$ (2,349,089)</b>	<b>-2%</b>
Percentage of funding in place	64.9%	27.5%		
Ratio of debt to expense	86.0%	83.3%		
Ratio of cash to expense	14.0%	16.7%		

Rivanna Water and Sewer Authority  
 CIP 2016-2020  
 Summary Information

2/8/2016

Detail by Major Systems	<u>Total Proposed CIP</u>	<u>Urban Water Projects</u>	<u>Urban Wastewater Projects</u>	<u>Water Rural Projects</u>	<u>Wastewater Rural Projects</u>
<b><u>Project Cost</u></b>					
Urban Water Projects	\$ 53,551,494	\$ 53,551,494	\$ -		
Urban Wastewater Projects	64,156,755	-	64,156,755		
Rural Projects	15,566,890	-	-	15,566,890	-
<b>Total Project Cost Estimates</b>	<b>\$ 133,275,139</b>	<b>\$ 53,551,494</b>	<b>\$ 64,156,755</b>	<b>\$ 15,566,890</b>	<b>\$ -</b>
<b><u>Funding in place</u></b>					
Debt Proceeds available	\$ 56,104,056	\$ 27,340,869	\$ 24,131,932	\$ 4,631,255	\$ -
Debt Proceeds Used	16,881,332	-	16,365,774	515,558	-
Cash-Capital Used	6,280,469	3,834,815	2,437,216	8,438	-
Cash-Capital Available	7,250,000	2,050,000	4,900,000	300,000	-
	\$ 86,515,857	\$ 33,225,684	\$ 47,834,922	\$ 5,455,251	\$ -
<b><u>Financing Needs</u></b>					
Possible Future Reserves	\$ 5,173,818	4,670,000	503,818	-	-
New Debt	41,585,464	15,655,810	15,818,015	10,111,639	-
	\$ 46,759,282	\$ 20,325,810	\$ 16,321,833	\$ 10,111,639	\$ -
<b>Total Funding</b>	<b>\$ 133,275,139</b>	<b>\$ 53,551,494</b>	<b>\$ 64,156,755</b>	<b>\$ 15,566,890</b>	<b>\$ -</b>
Percentage of funding in place	64.9%	62.0%	74.6%	35.0%	0.0%
Ratio of debt to expense	86.0%	80.3%	87.8%	98.0%	0.0%
Ratio of cash to expense	14.0%	19.7%	12.2%	2.0%	0.0%

Rivanna Water and Sewer Authority  
 CIP 2016-2020  
 Summary Information

2/8/2016

<b>PROPOSED 5-YEAR CIP          CHARGE ANALYSIS ESTIMATES</b>
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**Note - this fixed rate (charge) analysis is intended to show the effect of the draft CIP on the current adopted debt service charges. It is meant to provide a comparison of the next five years. It is not setting fixed rates for the next 5 years.**

TOTAL RATE IMPACT	Annual Debt Service <u>FY 2016</u>	Current Charge Debt Service <u>FY 2016</u> Per Month	<u>FY 2016</u> Per Month	<u>FY 2017</u> Per Month	<u>FY 2018</u> Per Month	<u>FY 2019</u> Per Month	<u>FY 2020</u> Per Month	<u>Total</u> Per Month
<b>URBAN WATER</b>								
<b>CITY</b>								
Urban Water - Current Adopted	1,897,186	\$ 158,099						
Annual CIP - Growth Charge			\$ 5,280	\$ 5,280	\$ 5,280	\$ 5,280	\$ 5,280	\$ 26,400
New Charge estimate			\$ 163,379	\$ 168,659	\$ 173,939	\$ 179,219	\$ 184,499	\$ 184,499
Annual percentage change			3.3%	3.2%	3.1%	3.0%	2.9%	
Total percentage change								16.7%
<b>ACSA</b>								
Urban Water - Current Adopted	3,358,366	\$ 279,864						
Annual CIP - rate needed			\$ 4,359	\$ 4,359	\$ 4,359	\$ 4,359	\$ 4,359	\$ 21,795
New Rate estimate			\$ 284,223	\$ 288,582	\$ 292,941	\$ 297,300	\$ 301,659	\$ 301,659
Annual percentage change			1.6%	1.5%	1.5%	1.5%	1.5%	
Total percentage change								7.8%
<b>URBAN WASTEWATER</b>								
<b>CITY</b>								
Urban WWater - Current Adopted	4,003,745	\$ 333,645						
Annual CIP - rate needed			\$ 17,130	\$ 17,130	\$ 17,130	\$ 17,130	\$ 17,130	\$ 85,650
New Rate estimate			\$ 350,775	\$ 367,905	\$ 385,035	\$ 402,165	\$ 419,295	\$ 419,295
Annual percentage change			5.1%	4.9%	4.7%	4.4%	4.3%	
Total percentage change								25.7%
<b>ACSA</b>								
Urban WWater - Current Adopted	2,789,917	\$ 232,493						
Annual CIP - rate needed			\$ 12,465	\$ 12,465	\$ 12,465	\$ 12,465	\$ 12,465	\$ 62,325
New Rate estimate			\$ 244,958	\$ 257,423	\$ 269,888	\$ 282,353	\$ 294,818	\$ 294,818
Annual percentage change			5.4%	5.1%	4.8%	4.6%	4.4%	
Total percentage change								26.8%

Rivanna Water and Sewer Authority  
 CIP 2016-2020  
 Summary Information

2/8/2016

**Rural Rate Impacts**

(all rates are monthly)

		<u>Current Charges</u>	<u>Debt Service Increase</u>					<u>Total</u>	<u>5-Year Avg. Annual Increase</u>
			<u>FY 2017</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u>		
Crozet Water	Operations	\$ 80,391							
	Debt Service	<u>30,939</u>							
		\$ 111,330	\$ 17,065 15.3%	\$ 12,197 11.0%	\$ 12,197 11.0%	\$ 12,197 11.0%	\$ 12,197 11.0%	\$ 65,853 59.2%	\$ 13,171
Scottsville Water	Operations	41,360							
	Debt Service	<u>7,652</u>							
		\$ 49,012	3,220 6.6%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ 3,220 6.6%	\$ 644
Glenmore Wastewater	Operations	25,024							
	Debt Service	<u>187</u>							
		\$ 25,211	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ -
Scottsville Wastewater	Operations	20,593							
	Debt Service	<u>832</u>							
		\$ 21,425	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ - 0.0%	\$ -
<b>All Rural Rate Centers Monthly</b>		\$ <b>167,368</b>							
		\$ <b>39,610</b>							
		\$ <b>206,978</b>	\$ <b>20,285</b> 9.8%	\$ <b>12,197</b> 5.9%	\$ <b>12,197</b> 5.9%	\$ <b>12,197</b> 5.9%	\$ <b>12,197</b> 5.9%	\$ <b>69,073</b> 33.4%	\$ <b>13,815</b> 6.7%

Summary of Debt Service Charges - Annually							
		FY2017	FY2018	FY2019	FY2020	FY2021	Total
Current FY2016	\$ <b>475,320</b>						
Annual Additional Revenue Needs		\$ <b>243,420</b>	\$ <b>146,364</b>	\$ <b>146,364</b>	\$ <b>146,364</b>	\$ <b>146,364</b>	\$ <b>828,876</b>
Total Annual Charge for Debt Service		\$ 718,740	\$ 865,104	\$ 1,011,468	\$ 1,157,832	\$ 1,304,196	\$ 1,304,196
		51.2%	20.4%	16.9%	14.5%	12.6%	174.4%