

Capital Improvement Plan

Fiscal Years
2020 - 2024

ADOPTED
May 2019



South Rivanna Water Treatment Plant



Birdwood Golf Course Waterline



Crozet Water Treatment Plant



Observatory Water Treatment Plant



Beaver Creek Dam



Rivanna Water & Sewer Authority

695 Moores Creek Lane, Charlottesville, Virginia 22902

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Introduction

The Capital Improvement Plan (CIP) for Fiscal Years 2020-2024 has been prepared as a strategic and financially responsible plan for the Rivanna Water and Sewer Authority (RWSA) to complete major infrastructure construction projects. The projects included in the CIP are necessary to achieve the RWSA's core mission of providing safe, high-quality drinking water and environmentally responsible wastewater treatment services for the City of Charlottesville and the Albemarle County Service Authority (ACSA). The CIP is a 5-year planning document which provides an estimated budget and schedule for projects as they advance through the design and construction process.

The infrastructure requirements of the Capital Improvement Plan are developed through our Asset Management and Master Planning programs to address water and wastewater capacity demands, regulatory mandates and rehabilitation needs. Each year, these projects are reviewed and prioritized by the RWSA management team and brought forth for review by the Board of Directors.

During the past year, several capital projects were very near completion or are no longer needed, and as such are being removed from the 2020-2024 CIP. These projects account for approximately \$51.1 million or 33.2% of FY 19-23 CIP. These projects include:

- Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains
- Flow Meter and Auto Valve on Sugar Hollow to Ragged Mountain Transfer
- Route 29 Pump Station Site Acquisition
- Urban Water GAC and Water Treatment Plant Improvement
- Wholesale Water Master Metering – Urban
- Crozet Water GAC and Water Treatment Improvement
- Crozet Water Treatment Plant – Finished Water Pump Station
- Crozet Water System – Master Plan
- Scottsville Water GAC
- Crozet Interceptor Pump Stations – Bypass Fittings and Isolation Valves
- Moores Creek AWRRF Bridge Repairs
- Moores Creek AWRRF Odor Control – Phase 2
- Moores Creek AWRRF Roof Replacements
- Moores Creek AWRRF Second Centrifuge

The total 5-year 2020-2024 CIP is approximately \$97.2 million, with the previous expenditures on active projects totaling approximately \$2.8 million, leaving a net proposed 5-year projected expenditure of \$94.4 million.

There are several new projects added to the CIP this year, with a total estimated expenditures of \$4.18 million from 2020-2024, including:

- South Rivanna Dam – Gate Repair (\$0.9 million)
- North Rivanna Water Treatment Plant – Upgrades (\$2.325 million)

- Scottsville Water Treatment Plant LT2 Improvements (\$0.1 million)
- Albemarle Berkley Basin Demolition (\$0.2 million)
- IT Master Plan – Software (\$0.45 million)

There are a few projects where the proposed budgets have been modified based on the anticipated project requirements and necessitate funding adjustments. The projects with changes include:

- Ragged Mountain Reservoir to Observatory WTP Raw Waterline (\$4.12 million existing / \$3.217 million proposed)
- Ragged Mountain Reservoir to Observatory WTP Pump Station (\$2.41 million existing / \$0.66 million proposed)
- Observatory WTP Improvements (\$18.6 million existing / \$19.7 million proposed)
- Sugar Hollow Dam Rubber Crest Gate Replacement (\$0.94 million existing / \$1.14 million proposed)
- Avon to Pantops Water Main (\$13.2 million existing / \$2.10 million proposed)
- South Rivanna Hydropower Decommissioning (\$0.4 million existing / \$0.725 million proposed)
- Beaver Creek Dam Alteration (\$8.83 million existing / \$4.90 million proposed)
- New Raw Water Pump Station and Intake (\$6.1 million existing / \$4.14 million proposed)
- Upper Schenks Branch Interceptor (\$4.49 million existing / \$3.99 million proposed)
- Interceptor Sewer & Manhole Repair (\$1.941 million existing / \$1.088 million proposed)
- Crozet Flow Equalization Tank (\$3.3 million existing / \$4.86 million proposed)
- Maury Hill Branch Sewer Replacement (\$0.29 million existing / \$0 million proposed)
- Engineering and Administration Building (\$3.0 million existing / \$0 million proposed)
- Moores Creek AWRRF Master Plan (\$0.1 million existing / \$0.25 million proposed)
- Moores Creek AWRRF Mechanical Thickener (\$1.2 million existing / \$0 million proposed)
- Grinder and Air Control Improvements (\$0.10 million existing / \$0.21 million proposed)
- Radio Upgrades (\$0.52 million existing / \$0.65 million proposed)
- Security Enhancements (\$2.4 million existing / \$1.0 million proposed)

FINANCIAL SUMMARY
MAJOR SYSTEM CATEGORIES

FINANCIAL SUMMARY

Major System Categories – Water

System Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress
	Current CIP	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Urban Water (UW)										
Community Water Supply Plan	\$8,831,000	\$1,351,000	\$3,240,249	\$2,470,000	\$594,751	\$575,000	\$1,307,000	\$1,995,000	\$10,182,000	\$123,782
Observatory WTP & Ragged Mountain/Sugar Hollow Reservoir System	\$19,570,000	\$1,270,000	\$2,703,198	\$415,000	\$6,371,802	\$7,850,000	\$3,500,000	\$0	\$20,840,000	\$1,154,558
Finished Water Storage/Distribution	\$22,090,000	(\$10,560,086)	\$2,782,000	\$583,914	\$2,667,000	\$4,205,000	\$567,000	\$725,000	\$11,529,914	\$178,046
South & North Fork Rivanna Water System	\$7,900,000	\$11,050,000	\$581,891	\$9,474,524	\$7,893,585	\$1,000,000	\$0	\$0	\$18,950,000	\$145,516
Subtotal (UW)	\$58,391,000	\$3,110,914	\$9,307,338	\$12,943,438	\$17,527,138	\$13,630,000	\$5,374,000	\$2,720,000	\$61,501,914	\$1,601,902
Non-Urban Water (NUW)										
Crozet Water System	\$23,030,000	(\$5,307,000)	\$4,221,690	\$5,016,310	\$1,317,000	\$943,000	\$835,000	\$5,390,000	\$17,723,000	\$702,248
Scottsville Water System	\$0	\$245,000	\$145,000	\$100,000	\$0	\$0	\$0	\$0	\$245,000	\$0
Subtotal (NUW)	\$23,030,000	(\$5,062,000)	\$4,366,690	\$5,116,310	\$1,317,000	\$943,000	\$835,000	\$5,390,000	\$17,968,000	\$702,248
WATER TOTAL	\$81,421,000	(\$1,951,086)	\$13,674,028	\$18,059,748	\$18,844,138	\$14,573,000	\$6,209,000	\$8,110,000	\$79,469,914	\$2,304,150

FINANCIAL SUMMARY

Major System Categories – Wastewater

System Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress
	Current CIP	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Urban Wastewater (UWW)										
Wastewater Interceptors and Pumping Stations	\$11,161,000	\$142,330	\$3,077,945	\$3,680,000	\$3,710,385	\$585,000	\$250,000	\$0	\$11,303,330	\$449,438
Moores Creek AWWRF	\$7,251,632	(\$3,802,000)	\$2,951,632	\$50,000	\$448,000	\$0	\$0	\$0	\$3,449,632	\$65,743
Subtotal (UWW)	\$18,412,632	(\$3,659,670)	\$6,029,577	\$3,730,000	\$4,158,385	\$585,000	\$250,000	\$0	\$14,752,962	\$515,181
Non-Urban Wastewater (NUWW)										
Scottsville WRRF	\$100,000	\$110,000	\$0	\$65,000	\$145,000	\$0	\$0	\$0	\$210,000	\$0
Glenmore WRRF	\$111,000	\$64,000	\$25,000	\$85,000	\$65,000	\$0	\$0	\$0	\$175,000	\$0
Subtotal (NUWW)	\$211,000	\$174,000	\$25,000	\$150,000	\$210,000	\$0	\$0	\$0	\$385,000	\$0
WASTEWATER TOTAL	\$18,623,632	(\$3,485,670)	\$6,054,577	\$3,880,000	\$4,368,385	\$585,000	\$250,000	\$0	\$15,137,962	\$515,181
All Systems Security & Technology	\$3,421,000	(\$825,000)	\$991,000	\$980,000	\$475,000	\$150,000	\$0	\$0	\$2,596,000	\$28,337
TOTAL	\$103,465,632	(\$6,261,756)	\$20,719,605	\$22,919,748	\$23,687,523	\$15,308,000	\$6,459,000	\$8,110,000	\$97,203,876	\$2,847,668

PROJECT DETAILS

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Completed Projects

During fiscal year 2019, several capital improvement projects were completed, were advanced to the final phases of close-out, or were determined to be no longer necessary. As such they will be removed from consideration in future planning documents. Presented in the table below are the fourteen (14) 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 \$2.1 million.

6. Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains: The two 18-inch water mains that supply water from Ragged Mountain Reservoir to Observatory Water Treatment Plant are 72 and 110 years old, respectively. The mains are interconnected at the top of the Ragged Mountain Dam, with one serving the 1920's Royal Pump Station and the other serving the more modern Stadium Road Pump Station. Both pump stations provide water to the Observatory Water Treatment Plant. This project was to interconnect the two raw water lines near the Rt. 29/Fontaine Avenue interchange. As design work proceeded, the cost of the project exceeded the potential benefit. With a new replacement water main anticipated by FY 2026, the interconnect project is being eliminated from the CIP.
7. Sugar Hollow to Ragged Mountain Reservoir Transfer Flow Meter: The Sugar Hollow Raw Waterline is an 18-inch diameter cast iron pipeline which conveys water from Sugar Hollow Reservoir to Ragged Mountain Reservoir. The waterline discharges directly into the Ragged Mountain Reservoir and is used to supplement inflow. Prior to this project, the control valve used to modulate flow between the two reservoirs was a manually-operated gate valve at the Sugar Hollow Gatekeeper's House near the Sugar Hollow Dam. This required RWSA staff to travel to the Sugar Hollow Gatekeeper's House to operate the valve, which given the limited cellular communication in that area, posed a potential safety hazard. In addition, prior to the project, there were limited means to monitor and record flow between the two reservoirs. In this project, one of RWSA's On-Call Maintenance Construction Contractors installed a new 18-inch flow meter, a modulating control valve, and new power and SCADA control wiring, to provide the means to effectively regulate the flow between the two reservoirs remotely from the Observatory Water Treatment Plant. Also, an existing, original 18-inch diameter gate valve upstream of the new 18-inch flow meter was replaced to provide redundancy in the system.

In addition to the improvements on the raw waterline, this project included the complete demolition of several previously abandoned structures including the Sugar Hollow Gatekeeper's House and four smaller utility buildings and sheds. As a result of the demolition process, the majority of RWSA-owned utilities and structures on the site are at or below grade, which enables the property to have more beneficial use in the future.

9. Rt. 29 Pump Station Site Acquisition: This project provided site acquisition for a new Rt. 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 No. 32-41 as identified in the Albemarle County Comprehensive Plan. The future pump station and tank, along with a new transmission pipeline between the proposed pump station and the South Rivanna Water Treatment Plant, will provide an interconnection between the areas presently served by the South Rivanna Water Treatment Plant and the North Rivanna 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 29 area generally north of the Forest Lakes subdivision. Multiple meetings and negotiations took place with the property's land owner in an effort to acquire the needed property. The negotiations were not successful, and the property was acquired through condemnation proceedings authorized at the May 2017 RWSA Board Meeting. Final legal proceedings have been completed.

11. Urban Water Granular Activated Carbon and Water Treatment Improvements: In July 2012, the Board decided to pursue the installation of Granular Activated Carbon (GAC) contactors to achieve Stage 2 D/DBPR compliance with the EPA in the Urban System. The GAC adsorbs 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 were not expected to be on-line in time for the EPA-mandated compliance date. In the interim, a Risk Reduction Plan was developed, outlining the use of Powder Activated Carbon (PAC) to reduce trace natural organic matter from the source water thereby reducing DBPs. The PAC feed systems were included in this project and were adequate treatment for the new regulations in the interim time period before GAC completion. The PAC systems were completed in 2015.

In addition to installation of PAC feed systems and GAC contactors, this project also included 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; 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; and at the Observatory WTP including various improvements such as a new chlorine contact tank, improved potable water service piping to the filter building and upgraded finished water discharge piping. Construction of the projects were completed in May 2018.

12. Wholesale Water Master Metering: The January 2012 Water Cost Allocation Agreement designated how the City of Charlottesville (City) and ACSA share in the financing of the New Ragged Mountain Dam project. Within the agreement is a general provision developed by the ACSA and the 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. A Jurisdictional Approach was recommended which included installation of water meters at locations at the City/county corporate boundary plus one meter at each of the three urban water treatment plants. At its September 2013 meeting the Board directed that staff proceed with the Jurisdictional Coverage Approach. The final design includes 25 remote meter locations plus the three finished water flow meters at the water treatment plants. Construction of the 25 remote meter locations began in early 2016 and was completed

in early 2019. The three finished water flow meters were installed in 2015 as part of the Urban Water Granular Activated Carbon Project.

23. Crozet Water Granular Activated Carbon and Water Treatment Improvements: For the Crozet water system, installation of granular activated carbon (GAC) contactor units was selected to achieve Stage 2 D/DBPR compliance with EPA due to the start/stop operation of the water treatment plant and the relatively higher water age in the distribution system. The GAC adsorbs organic matter from the water, thereby reducing the precursors to THMs and HAAs. Included in the Crozet WTP GAC project were various other improvements including upgrade of the chlorine feed system to a modern hypochlorite feed system, as well as replacing the existing fluoride and corrosion inhibitor chemical feed systems. The new chemical feed systems are housed in additional rooms in the GAC contactor building. This new location also allows for shorter chemical feed lines. Construction of the project was completed in September 2017.
25. Crozet Water Treatment Plant Finished Water Pump Station: The Crozet water treatment facilities required 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 and was original to the plant. As a result it had numerous design and operational impediments or challenges that severely limited its operational reliability. A new pump station at the site was required for both current and future service needs. The project included evaluation, permitting, design, construction and construction management of a new Finished Water Pump Station and construction was completed in Spring 2019.
26. Drinking Water Infrastructure Plan: The Crozet drinking water service area continues to see expanded growth, and recent discussions with Albemarle County and Albemarle County Service Authority (ACSA) personnel have confirmed that recent growth trends indicate that water use demands in Crozet are on the rise. While some projects are currently underway to address the immediate needs in Crozet, RWSA staff concluded that it was pertinent to develop a comprehensive mid and long-range plan for the entire water system, including analysis of water supply, treatment, distribution, storage and raw water conveyance. The project evaluated and analyzed all of these parameters, and developed a Drinking Water Infrastructure Plan for the Crozet Service Area's water supply and distribution needs and recommended improvements for the next 50-year design period (Year 2070). The final plan will be complete in early 2019.
27. Scottsville Water Granular Activated Carbon: For the Scottsville water system, installation of granular activated carbon (GAC) contactor units was selected to achieve Stage 2 D/DBPR compliance with EPA due to the start/stop operation of the water treatment plant and the higher water age in the distribution system. The GAC adsorbs organic matter from the water, thereby reducing the precursors to THMs and HAAs. Construction of the project was completed in November 2017.
32. Crozet Interceptor Pump Station Bypass 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 complicated maintenance-related activities as each

time a pump station component needed to be serviced or replaced, the volume of wastewater within the force main had to be addressed at the pump station as it drained 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, decreased the amount of time available to work on the equipment. In order to alleviate this condition, temporary valves called “line stops” were 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 provides the maximum amount of down time available based on current system conditions for future pump station maintenance activities. While line stops were in place, bypass connections were also provided at each pump station. These will allow staff the option of bringing in bypass pumps for more significant pump station shutdowns required for maintenance activities or repairs that the isolation valves alone cannot account for. Construction of this project was completed in the Winter of 2018/2019.

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, 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 by the spring of 2018 in conjunction with the Moores Creek Odor Control Improvements project.
36. 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 were 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 was approved at the January 2015 Meeting, with subsequent increases due to project challenges. 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, removing the post-digestion clarifiers from service, modifying the handling, and hauling and storage of bio solids, all of which has been recently completed in Odor Control Improvements Project. The constructed facilities are shown as costs associated with these complete and will be capitalized in this CIP. The remaining odor control work included in the current CIP budget includes cleaning the equalization basins and holding ponds which is anticipated to be bid out this spring and coating the interior of the digesters which is ongoing.
37. Roof Replacements: The majority of the buildings at the Moores Creek Advanced Water Resource Recovery Facility were constructed in 1981 and 1982 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 Moores Creek AWRRF: Blower Building, Moores Creek Pump Station, Sludge Pump Station No. 2, Maintenance Building 1, and Maintenance Building 2, Sludge Pumping Building, Primary Pump Building, and the Effluent Pump Building. Design of these improvements began in March 2017 with completion of construction in late 2018.

38. Second Centrifuge: The Moores Creek AWRRF currently operates a high-speed centrifuge to process and dewater digested bio solids 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. 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 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 bio solids dewatering during planned or emergency repairs to one of the two centrifuges, for higher-rate processing by operating both units simultaneously during other periods (thus saving on staff time), and for better maintenance of proper solids flow through the plant.

Completed Projects

No.	Project Description	Five-Year Capital Program			
		Adopted Budget 6/2018	Previous Expenditures (6/30/2018)	Final Projected Costs/Close Out	Savings
6	Interconnect Lower SH and RM Raw Water Mains	\$331,000	\$8,076	\$8,076	\$322,924
7	Flow Meter and Auto Valve on SH to RM Transfer	\$383,241	\$15,311	\$383,241	
9	Route 29 Pump Station Site Acquisition	\$1,720,000	\$1,042,168	\$1,720,000	
11	Urban Water GAC and Water Treatment Plant Improvement	\$24,925,494	\$24,089,122	\$24,307,304	\$618,190
12	Wholesale Water Master Metering - Urban	\$3,200,000	\$2,679,816	\$3,221,659	(\$21,659)
23	Crozet Water GAC and Water Treatment Improvement	\$3,418,390	\$3,250,630	\$3,267,341	\$151,049
25	Crozet WTP - WTP Expansion Finished Water Pump Station	\$2,600,000	\$2,067,760	\$2,233,510	\$366,490
26	Crozet Water System - Master Plan	\$300,000	\$245,223	\$297,577	\$2,423
27	Scottsville Water Granular Activated Carbon	\$1,615,000	\$1,569,384	\$1,577,733	\$37,267
32	Crozet Interceptor Pump Stations - Bypass Fittings and Isolation Valves	\$720,000	\$18,334	\$462,000	\$258,000
35	Bridge Repairs	\$330,000	\$261,198	\$279,468	\$50,532
36	MCAWRRF Odor Control Phase 2	\$8,907,519	\$8,841,776	\$8,907,519	
37	MCAWRRF Roof Replacements	\$1,264,000	\$809,424	\$965,253	\$298,747
38	MCAWRRF Second Centrifuge	\$1,337,000	\$1,154,719	\$1,291,133	\$45,867
TOTAL		\$51,051,644	\$46,052,941	\$48,921,814	\$2,129,830

CIP 19-23 Total	CIP 20-24 Completed	CIP 20-24 Remaining	CIP 20-24 New Funding	CIP 20-24 New Total
\$153,902,035	\$51,051,644	\$103,465,632	(\$6,261,756)	\$97,203,876

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 Rivanna 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 Rivanna Reservoir, with the second phase of reservoir expansion in the future as necessary.

Project Descriptions:

1. South Rivanna Reservoir to Ragged Mountain Reservoir Water Line Right-of-Way: The approved 50-year Community Water Supply Plan includes the future construction of a new raw water pipeline from the South Rivanna River to the Ragged Mountain Reservoir. This new pipeline will replace the Upper Sugar Hollow Pipeline along an alternative alignment to increase raw water transfer capacity in the Urban Water System. The project includes a detailed routing study to account for recent and proposed development and road projects in Albemarle County and the University of Virginia. Preliminary design, preparation of easement documents, and acquisition of water line easements along the approved route will also be completed as part of this project. Prior expenditures also covered a previous review of the 2009 conceptual design that was requested by the Board.
2. South Rivanna Reservoir Dredging: The South 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 259 square miles. 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 sediment becoming trapped within the reservoir. The initial design of the reservoir anticipated the accumulation of these sediments, and a significant portion of the total storage volume was designated for this

purpose. Currently the sediment stored does not exceed the available sediment storage capacity.

The January 2012 Ragged Mountain Dam Project Agreement outlines that “the City and ACSA agree to direct, and RWSA agrees, to perform such dredging projects at the South Fork Rivanna Reservoir as may be specified jointly by the City and ACSA pursuant to the Water Cost Allocation Agreement.” The Cost Allocation Agreement stipulates that target maintenance dredging shall be performed, and that the dredging be market driven, cost effective, and opportunistic and shall not exceed \$3.5M. In 2012 and 2013, RWSA, via the Public-Private Education Facilities and Infrastructure Act (PPEA) process, solicited proposals to provide maintenance dredging. In July 2013, the one qualified PPEA proposer 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 can amend or cancel the project.

3. Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Line: Raw water is transferred from the Ragged Mountain Reservoir (RMR) to the Observatory Water Treatment Plant by way of two 18-inch cast iron pipelines, which have been in service for more than 110 and 70 years respectively. The increased frequency of emergency repairs and expanded maintenance requirements are one impetus for replacing these pipelines. The proposed water line will be able to reliably transfer water to the expanded Observatory plant, which will have the capacity to treat 10-12 million gallons per day (mgd). The new pipeline is expected to be constructed of 36-inch ductile iron and will be on the order of 14,000 feet in length.
4. Ragged Mountain Reservoir to Observatory Raw Water Pump Station: The Ragged Mountain Reservoir (RMR) to Observatory WTP raw water pump station is planned to replace the existing Stadium Road and Royal pump stations, which in part have exceeded their design lives or will require significant upgrades with the Observatory WTP expansion. The pump station will pump up to 10 mgd to the Observatory WTP. Integration of the new pump station with the planned South Rivanna Reservoir (SRR) to RMR pipeline is being considered in the interest of improved operational and cost efficiencies. An integrated pump station would also include the capacity to transfer up to 16 million gallons per day (mgd) of raw water from RMR back to the SRR WTP. The location of this pump station will be recommended as part of the SRR to RMR raw water main preliminary engineering study, which is currently under way.
5. Birdwood Golf Course Waterline: RWSA and the UVA Foundation chose to expedite construction of the portion of the future South Rivanna to Ragged Mountain 36-inch raw water main through the Birdwood property. This enables pipeline work to proceed just ahead of the planned golf course reconstruction project to prevent subsequent disruption to the property and adjacent neighbors, as well as mitigate future increased water line construction costs. The golf course reconstruction project began in November 2018. This work includes installation of

approximately 6,100 linear feet of 36-inch raw water main along the eastern property boundary of the golf course.

Community Water Supply Plan

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year							
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)	
1	South Rivanna Reservoir to Ragged Mountain Reservoir Water Line Right-of-Way	\$2,295,000		\$840,249	\$870,000	\$584,751					\$2,295,000	\$123,782
2	South Rivanna Reservoir Dredging	\$10,000				\$10,000					\$10,000	
3	Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Line	\$4,116,000	(\$899,000)				\$325,000	\$1,186,000	\$1,706,000		\$3,217,000	
4	Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Pump Station	\$2,410,000	(\$1,750,000)				\$250,000	\$121,000	\$289,000		\$660,000	
5	Birdwood Golf Course Waterline		\$4,000,000	\$2,400,000	\$1,600,000						\$4,000,000	
	TOTAL	\$8,831,000	\$1,351,000	\$3,240,249	\$2,470,000	\$594,751	\$575,000	\$1,307,000	\$1,995,000		\$10,182,000	\$123,782

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 (constructed in 2014, with a useable raw water storage capacity of 1.5 billion gallons) 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.

Project Descriptions:

6. 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. This upgrade will concentrate on specific improvements 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 addition, the existing reinforced concrete flume, which conveys treated water from the sedimentation basins to the filters, is in need of replacement, old piping control valves will be replaced and modernized, and electrical and SCADA control systems will be upgraded.

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. A portion of the project was completed in the 2016-2017 fiscal year. The flocculator systems were completely upgraded with new mechanical and electrical equipment, including variable speed motor drives for optimum efficiency. The upgraded flocculators have been in service since May 2017.

In addition to providing needed equipment upgrades, the improvements will also increase the plant's capacity from 7.7 million gallons per day to 10 million gallons per day based on a feasibility analysis performed during the Preliminary Engineering phase of the project. It was determined that the capacity upgrades could be performed economically and would provide needed reliability and redundancy in the Urban System.

It should be noted that the Observatory Water Treatment Plant 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 and the University as participants. The new lease is currently under negotiation.

7. Sugar Hollow Dam – Rubber Crest Gate Replacement & Intake Tower Repairs: In 1998 the Sugar Hollow Dam underwent a significant upgrade to improve structural stability and spillway capacity. The original metal spillway gates were replaced with a manufactured five-foot-high inflatable rubber dam that is bolted to the existing concrete structure. This rubber dam allows for the normal storage of water in the reservoir with the ability to be lowered during extreme storm events. The rubber dam has an approximate service life of twenty years and is therefore now due for replacement. The aging intake tower structure will be evaluated as part of the project for necessary repairs and improvements. Recommended repairs may include issues relating to the intake gate valves and tower walls, including repair or replacement of intake trash racks, and sealing/grouting of minor concrete wall cracks.

Observatory Water Treatment Plant and Ragged Mountain/Sugar Hollow Reservoir System

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year						
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
6	Observatory Water Treatment Plant Improvements	\$18,630,000	\$1,070,000	\$2,648,198		\$5,701,802	\$7,850,000	\$3,500,000		\$19,700,000	\$1,154,558
7	Sugar Hollow Dam - Rubber Crest Gate Replacement & Intake	\$940,000	\$200,000	\$55,000	\$415,000	\$670,000				\$1,140,000	
	TOTAL	\$19,570,000	\$1,270,000	\$2,703,198	\$415,000	\$6,371,802	\$7,850,000	\$3,500,000	\$0	\$20,840,000	\$1,154,558

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 Rivanna, and North Rivanna 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.

Project Descriptions:

8. 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 continuously reviews results from an ongoing valve exercising and condition assessment program performed by the RWSA Maintenance Department. This project will repair any valves identified during the condition assessment as having a repairable deficiency and replace the highest priority valves that are inoperable and unrepairable. This phase of the Valve Repair-Replacement Project will include a repair of an existing valve on the Southern Loop Waterline and replacement of valves on the North Rivanna, South Rivanna, Pantops, and Crozet Waterlines.
9. Piney Mountain Tank Rehabilitation: The 700,000-gallon Piney Mountain Tank serves the North Rivanna pressure band. A routine inspection of the Piney Mountain Tank revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed 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 Rt. 29 service area include the modification or elimination of this facility. The current recommended improvements are needed to maintain the existing tank in service for at least the next 10 years.
10. 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 was used for route alignment determination, hydraulic modeling, and preliminary design. Due to the complicated nature of our finished water systems, it was decided at the August 2018 Board meeting that a more comprehensive approach is warranted and we should complete the Finished Water Master Plan prior to moving forward with final design and construction of the Avon to Pantops Water Main. Additionally, due to alternate funding priorities the construction of this main has been delayed 3-years.

11. Water Demand Projection and Safe Yield Study: In January 2012, the City of Charlottesville, Albemarle County Service Authority, and RWSA entered into the Ragged Mountain Dam Project Agreement. Within the agreement are provisions to monitor the bathymetric capacity of the Urban water reservoirs as well as a requirement to conduct reoccurring demand analysis, demand forecasting and safe yield evaluations. The bathymetric survey of the South Rivanna Reservoir and the Ragged Mountain Reservoir were funded in the FY2019 O&M Budget. Subsequent to collecting the reservoir survey data, this study will evaluate and calculate current and future demands and present safe yield. Per the project agreement, these analyses shall be completed by calendar year 2020.
12. South Rivanna River Crossing and North Rivanna Transmission Main: RWSA has previously identified through master planning that a 24-inch water main will be needed from the South Rivanna Water Treatment Plant (SRWTP) to Hollymead Town Center to meet future water demands. Two segments of this water main were constructed as part of the VDOT Rt. 29 Solutions projects, including approximately 10,000 LF of 24-inch water main along Rt. 29 and 600 LF of 24-inch water main along the new Berkmar Drive Extension, behind the Kohl's department store. To complete the connection between the SRWTP and the Airport Road Pump Station Site, there is a need to construct a new river crossing at the South Fork Rivanna River and two "gap" sections of 24-inch water main between the already completed sections. Much of the new water main route is within VDOT right-of-way; however, acquisition of right-of-way will be required at the river crossing and on the Kohl's Property at Hollymead Town Center. This project includes funding for construction as well as engineering design, easement acquisition, bid-phase services, and construction administration and inspection services.
13. Rt. 29 Pump Station: The Rt. 29 Pipeline and Pump Station master plan was developed in 2007 and originally envisioned a multi-faceted project that reliably connected the North and South Rivanna pressure bands, reduced excessive operating pressures, and developed a new Airport pressure zone to serve the highest elevations near the Airport and Hollymead Town Center. The master plan was updated in 2018 to reflect the changes in the system and demands since 2007. This project, along with project number 12 above will provide a reliable and redundant finished water supply to the North Rivanna area. The proposed pump station will be able to serve system demands at both the current high pressure and a future low pressure condition. These facilities will also lead to future phase implementation which will include a storage tank and the creation of the Airport pressure zone.
14. Finished Water System Master Plan: As identified in the 2017 Strategic Plan, the Authority has a goal to plan, deliver and maintain dependable infrastructure in a financially responsible manner. Staff has identified asset master planning as a priority strategy to improve overall system development. There are asset classes where comprehensive and ongoing plans exist or are in development (e.g. wastewater collection, raw water supply, Crozet water, etc.). In the case of the urban finished water system, many of the previously identified capital projects are in design or construction. As such, staff have identified a need to develop a current and ongoing finished water master plan. This work will utilize the demand forecasting from the Water Demand Project and Safe Yield Study.

Finished Water Storage/Transmission – Urban System

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
8	Valve Repair - Replacement (Phase 2)	\$500,000	\$382,914	\$500,000	\$382,914					\$882,914	
9	Piney Mountain Tank Rehabilitation	\$500,000		\$500,000						\$500,000	\$51,185
10	Avon to Pantops Water Main	\$13,200,000	(\$11,100,000)	\$1,375,000					\$725,000	\$2,100,000	\$126,861
11	Water Demand Projection and Safe Yield Study	\$100,000	\$54,000	\$154,000						\$154,000	
12	South Fork Rivanna River Crossing and North Rivanna Transmission	\$5,340,000				\$843,000	\$3,930,000	\$567,000		\$5,340,000	
13	Rt. 29 Pump Station	\$2,300,000			\$201,000	\$1,824,000	\$275,000			\$2,300,000	
14	Finished Water System Master Plan	\$150,000	\$103,000	\$253,000						\$253,000	
	TOTAL	\$22,090,000	(\$10,560,086)	\$2,782,000	\$583,914	\$2,667,000	\$4,205,000	\$567,000	\$725,000	\$11,529,914	\$178,046

South and North Rivanna Water Systems

The South 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 Rivanna Reservoir is treated at the South Rivanna treatment plant (12-mgd rated capacity).

The North Rivanna Water System is comprised of a river intake and raw water pumping station on the North Fork of the Rivanna River, as well as the North Fork Water Treatment Plant (2-mgd rated capacity). The North Rivanna System provides water to the ACSA service area located along US Route 29, between Forest Lakes subdivision and Piney Mountain Road.

Project Descriptions:

15. South Rivanna Hydropower Plant Decommissioning: The 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 Rivanna Water Treatment Plant, thereby reducing power purchased off 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 more 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.

Due to the complexity of possible rehabilitation, the associated Federal Energy Regulatory Commission (FERC) dam permitting, and the numerous variables in the economic analysis, proposals were solicited from national hydropower experts to initiate a feasibility study to determine the cost effectiveness of rehabilitating the hydropower plant while making sure to account for FERC-related costs and issues. The feasibility study was completed in May 2016 and determined that rehabilitation of the facility had a small likelihood for a positive return on investment. This conclusion was brought to the Board of Directors along with a recommendation to initiate the surrender of the exemption to licensure and decommission the facility. The Board approved this recommendation and staff has begun the exemption surrender process. The budget includes regulatory support as well as physical improvements such as removing defunct electrical components, abandoning components of the turbine and evaluating the re-establishment of the penstock as a reservoir drain.

16. South Rivanna Water Treatment Plant Improvements: The South Rivanna Water Treatment Plant recently completed significant upgrades as part of the Urban Granular Activated Carbon project. Over the course of that project, several other significant needs were identified and assembled into a single project within this Capital Plan. The project components include, but are not limited to, the following: a new coagulant storage facility; installation of two additional filters to meet firm capacity needs and new filter control panels; an enclosure around the lime storage facilities; the addition of a second variable frequency drive at the Raw Water Pump Station as well as other general pump station improvements; the relocation for the electrical

gear from a sub terrain location at the Sludge Pumping Station to a new aboveground enclosure; a new administration building on site for additional office, meeting, and storage space; an additional high service pump and the addition of variable frequency drives to three of the pumps; sedimentation basin improvements; replacement of filter inlet valves and actuators; remodeling of the existing filter building for better lab and control space and painting throughout; new clarifier drives; a new closed transition transfer switch for the facility; and a realignment of the plant entrance near the front gate. Currently this facility operates at 80-90% of capacity and the identified upgrades will improve reliability and resiliency, particularly at higher flow rates.

17. South Rivanna Dam – Gate Repair: The South Rivanna Dam, originally constructed in 1965, is equipped with two 36” diameter slide gates and conduits, one each on the north and south abutments of the dam, which can be utilized to dewater the facility or to meet minimum instream flow (MIF) requirements when the dam is not spilling. These gates are original to the dam and while they are operable and are exercised regularly, they can no longer provide a complete seal, therefore allowing some leakage through the dam. RWSA has protocols in place to temporarily stop leakage through the gates when necessary to conserve water; however, there is a desire to repair or replace the gates and components as needed to restore full functionality. The project includes other repairs to the facility, including improvements to the concrete wall adjacent to the Raw Water Pump Station as well as improvements to the north dam tower to provide safer access by staff while still discouraging access by the general public.
18. North Rivanna Water Treatment Plant – Upgrade: The North Rivanna Water Treatment Plant was recently retro-fitted with GAC treatment. While the electrical system was upgraded as part of the GAC project, the remaining equipment and process control are original to the plant. Additionally, recent flooding has identified an issue with the siting and viability of the current backwash lagoons. This project includes an evaluation as well as replacement of the backwash and sludge handling for the plant.

South and North Rivanna Water Systems

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
15	South Rivanna Hydropower Plant Decommissioning	\$400,000	\$325,000	\$400,000	\$325,000					\$725,000	\$98,625
16	South Rivanna Water Treatment Plant Improvements	\$7,500,000	\$7,500,000	\$181,891	\$7,864,524	\$6,953,585				\$15,000,000	\$46,891
17	South Rivanna Dam - Gate Repair		\$900,000		\$900,000					\$900,000	
18	North Rivanna Water Treatment Plant - Upgrade		\$2,325,000		\$385,000	\$940,000	\$1,000,000			\$2,325,000	
	TOTAL	\$7,900,000	\$11,050,000	\$581,891	\$9,474,524	\$7,893,585	\$1,000,000	\$0	\$0	\$18,950,000	\$145,516

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 (Waterball) Tank (0.05 MG) for water treatment plant backwash; the Crozet Ground Storage Tank (0.5 MG) and pump station, and the Buck's Elbow Storage Tank (2.0 MG).

Project Descriptions:

19. Beaver Creek Dam Alteration: From 2008-2014 the Virginia Department of Conservation and Recreation (DCR) adopted 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 the spillway to pass a larger design storm. The spillway capacity was not designed to pass the larger design storm, and thus will require modifications to adhere to current regulations. This project includes investigation, preliminary design, public outreach, permitting, easement and property acquisition, final design, and construction of the anticipated modifications. Also included in this project are a new relocated raw water pump station, intake and oxygenation system.

RWSA operates the Beaver Creek Dam and reservoir as the sole raw water supply for the Crozet Area. In 2011, an analysis of the Dam Breach inundation areas and changes to Virginia Department of Conservation and Recreation (DCR) *Impounding Structures Regulations* prompted a change in hazard classification of the dam from Significant to High Hazard. This change in hazard classification requires that the capacity of the spillway be increased. Following the completion of an updated alternatives analysis by Schnabel Engineering in 2018, staff decided to proceed with design of a labyrinth spillway and chute through the existing dam with a bridge to allow Browns Gap Turnpike to cross over the new spillway. This CIP project includes investigation, preliminary design, public outreach, permitting, easement acquisition, final design, and construction of the anticipated modifications. Work for this project will be coordinated with the new relocated raw water pump station and intake. Additionally, due to alternate funding priorities the construction of this project has been delayed 3-years.

20. Beaver Creek Raw Water Pump Station and Intake: The Drinking Water Infrastructure Plan for the Crozet water service area recommends installation of a new Raw Water Pump Station and Intake at the Beaver Creek Dam in order to meet new minimum instream flow requirements and provide adequate raw water pumping capacity to serve the growing Crozet community for the next 50 years. The pump station will be moved out of its existing location at the toe of the dam to a new location, to be determined during design. The new intake structure will include enhanced controls to allow for access to the best quality water at any given time.

Following a Reservoir Water Quality and Management Study by DiNatale Water Consultants, several recommendations were made to improve water quality in the Beaver Creek Reservoir,

including installation of a new outlet structure and installation of a hypolimnetic oxygenation system. The oxygenation system would reduce reliance on algaecide treatments by increasing dissolved oxygen in the reservoir. Due to alternate funding priorities, the entire pump station and intake project have been delayed 3-years. Additionally, hypolimnetic oxygenation system has been eliminated from the project. The site, however, will be designed to accommodate it's possible future inclusion.

21. Buck's Elbow & Crozet Waterball Tank Painting: The 2,000,000-gallon Buck's Elbow Ground Storage Tank provides finished 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 (CZWTP). Routine inspections of these tanks in 2012 indicated that the tanks would require recoating by 2020. The project includes recoating the interior and top-coating the exterior of both tanks to prevent corrosion. Also included is the installation of an active mixing system and construction of a chlorine feed station at the Buck's Elbow Tank to decrease stratification, maintain consistent chlorine residuals, and improve overall water quality in the Crozet area. Minor repairs and improvements to both tanks will also be included in this work, such as foundation repairs and safety enhancements. This project includes consultant services for design of project specifications, as well as construction, construction administration, and inspection services. Installation of the active mixing system and construction of the chlorine feed station at Buck's Elbow Tank is expected to begin in Spring 2019, while the painting of both tanks has been postponed until 2025.
22. 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, with maximum day demand approaching plant capacity. In addition, much of the existing plant systems are the same as when the plant was constructed in the 1960's.

Expanding the plant capacity at Crozet WTP would require a new Virginia Department of Environmental Quality Water Withdrawal Permit and could include possible stream release requirements. In order to fully analyze all aspects of the design required for this project a Preliminary Engineering Report (PER), plant field testing, preliminary permitting work and coordination with pertinent regulators were completed. The results of the PER stated that the current treatment plant can be upgraded, and the capacity increased, through installation of newer, and more technologically advanced equipment into the existing footprint of the filter plant. Work associated with this project includes general building rehabilitation, filter improvements, sedimentation expansion and improvements, chemical feed improvements, flocculator expansion, alum storage/containment improvements and waste sludge handling and removal improvements.

Crozet Water System

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
19	Beaver Creek Dam Alteration	\$8,830,000	(\$3,932,000)	\$192,871	\$516,129	\$561,000	\$668,000	\$660,000	\$2,300,000	\$4,898,000	\$191,871
20	New Raw Water PS & Intake	\$6,100,000	(\$1,962,000)	\$160,000	\$138,000	\$300,000	\$275,000	\$175,000	\$3,090,000	\$4,138,000	
21	Buck's Elbow & Crozet Waterball Tank Painting	\$1,200,000	(\$1,013,000)	\$60,000	\$127,000					\$187,000	
22	Crozet Water Treatment Plant Expansion	\$6,900,000	\$1,600,000	\$3,808,819	\$4,235,181	\$456,000				\$8,500,000	\$510,377
	TOTAL	\$23,030,000	(\$5,307,000)	\$4,221,690	\$5,016,310	\$1,317,000	\$943,000	\$835,000	\$5,390,000	\$17,723,000	\$702,248

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).

Project Description:

23. Scottsville WTP Finished Water Flow Meter: The Scottsville Water Treatment Plant provides potable drinking water to Albemarle County Service Authority customers in the Scottsville service area. After water has been treated at the plant, it is collected in an existing clearwell which was constructed with the original facility. From the clearwell, the water is pumped into the distribution system by one of two high service pumps. The flow from these pumps is not metered. In order to keep a record of the total flow entering the Scottsville distribution system, plant operators must periodically conduct draw-down tests to verify the pumping rate of each of the two pumps. The total flow is then calculated based on the run time of each pump. Based on these procedures, this method of measuring flow may not be representative of the flow entering the system as the pumping rate will vary based on the clearwell level and the hydraulic grade line of the distribution system. In addition, the Virginia Department of Health has indicated that the flow should be metered during recent conversations related to the disinfection profile calculation throughout the plant. To resolve this issue, this project will modify the high service pump discharge piping to allow for the installation of a finished water meter.
24. Scottsville Water LT2 Improvements: RWSA conducts routine regulatory sampling of the raw water from Totier Creek and Totier Creek Reservoir for compliance with the EPA Long Term 2 Enhanced Surface Water Treatment Rule (LT2). The rule provides risk based guidance on the needed level of treatment for the deactivation of microbial pathogens. This project anticipates the addition of ultraviolet disinfection to the treatment process in Scottsville.

Scottsville Water System

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
23	Scottsville Water Finished Water Flow Meter		\$145,000	\$145,000						\$145,000	
24	Scottsville Water LT2 Improvements		\$100,000		\$100,000					\$100,000	
	TOTAL	\$0	\$245,000	\$145,000	\$100,000	\$0	\$0	\$0	\$0	\$245,000	\$0

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.

Project Descriptions:

25. Upper 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 Upper Schenks Branch Interceptor consists of two sections along McIntire Road. Both of these sections have been designed with the first phase of this project located in the City's Schenks Branch Greenway, completed in early 2016. The second phase of the Upper Schenks Interceptor will be replaced 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 design, permitting, easement acquisition, construction, construction observation/administration by the engineering consultant; and project contingencies
26. 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 Morey Creek Interceptor, Powell Creek Interceptor and Upper Rivanna Interceptor as well as rehabilitation efforts identified for the Moores Creek Interceptor and the Moores Creek Relief Interceptor that have been identified from previous condition assessment efforts. A sewer rehabilitation contract has been developed under this project as well which procured a dedicated contractor for all rehabilitation work. 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 the end of 2020. Such periodic 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
27. Crozet Interceptor: The Crozet Interceptor is located in western Albemarle County and serves the Crozet area. Flow metering indicated that the interceptor experienced substantial inflow and infiltration and requires rehabilitation. In order to minimize future infrastructure improvements, ACSA and RWSA have agreed to 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.

28. Crozet Flow Equalization Tank: Rehabilitation work in the RWSA and ACSA sewer systems is on-going to meet the I&I reduction goals in the Crozet Interceptor. This is 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. The results of the 2006 study were updated in 2016 to evaluate I/I reduction goals and future capital project needs. The need to proceed with construction of a flow equalization tank in the Crozet area was confirmed as a result of this study update, which took into account recent flow monitoring data that had been collected following previous I/I reduction efforts. Based on those results, a preliminary engineering evaluation and siting analysis of a flow equalization tank upstream of Crozet Pump Station No. 4 was completed to ensure that the facility could be 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 estimates for the preliminary engineering, final design, property acquisition, legal assistance, construction costs and construction management services.
29. Crozet Pump Station 1, 2, 3 Rehabilitation: The Crozet Interceptor Pump Stations were constructed in the 1980's and many of the components are still original. This project includes the replacement of pumps and valves at Pump Station 2 in order to improve pumping capabilities at this location and provide spare parts for the pumps at Pump Station 1. It also includes roof replacements at all four pump stations, siding replacement for the wet well enclosure at Pump Station 3, and installation of new water wells at Pump Stations 3 and 4.
30. Maury Hill Branch Sewer Upgrade: Based on the sewer study performed in 2016, the Maury Hill Branch Sewer was targeted for capacity upgrades around 2020. This project would include an upgrade from 8-inch diameter to 12-inch diameter sewer along with all new manholes. The work was anticipated to be coincident with rehabilitation needs and capacity increases to accommodate the growth at the UVA Fontaine Research Park. Due to alternate funding priorities, this project has been delayed 2-years outside of the current 5-year CIP.
31. Albemarle Berkley PS – Basin Demolition: Historically the Albemarle Berkley Pump Station was co-located within an open air basing that occasionally collected sewage during power outages. With the addition of a back-up power generator, the basin no longer serves a technical purpose. Given the proximity of the deteriorating structure to school property, this project serves to demolish and fill the area of the existing basin.

Urban Wastewater Interceptors/Pumping Stations

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
25	Upper Schenks Branch Interceptor	\$4,485,000	(\$500,000)	\$20,000	\$100,000	\$3,315,000	\$550,000			\$3,985,000	\$11,187
26	Interceptor Sewer and Manhole Repair	\$1,941,000	(\$852,670)	\$1,088,330						\$1,088,330	\$176,434
27	Crozet Interceptor	\$625,000		\$394,615		\$230,385				\$625,000	\$181,725
28	Crozet Flow Equalization Tank	\$3,300,000	\$1,560,000	\$1,300,000	\$3,560,000					\$4,860,000	\$80,092
29	Crozet Pump Station 1, 2, 3 Rehabilitation	\$525,000	\$20,000	\$275,000	\$20,000			\$250,000		\$545,000	
30	Maury Hill Branch Sewer Replacement	\$285,000	(\$285,000)							\$0	
31	Alb. Berkley PS - Basin Demolition		\$200,000			\$165,000	\$35,000			\$200,000	
	TOTAL	\$11,161,000	\$142,330	\$3,077,945	\$3,680,000	\$3,710,385	\$585,000	\$250,000	\$0	\$11,303,330	\$449,438

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.

Project Descriptions:

32. 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 was approved at the January 2015 Meeting, with subsequent increases due to project challenges. 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, removing the post-digestion clarifiers from service, modifying the handling, and hauling and storage of bio solids, all of which has been recently completed in Odor Control Improvements Project. The remaining odor control work included in the current CIP budget includes cleaning the equalization basins and holding ponds which is anticipated to be bid out this spring and coating the interior of the digesters which is ongoing.
33. Engineering and Administration Building: RWSA currently has its administrative headquarters in two buildings on the grounds of the Moores Creek Advanced Water Resource Recovery Facility. The two-story Administration Building was constructed in the early 1980's and houses offices, IT server space, meeting space and a full service laboratory. The second building is a series of four trailers installed in between 2003-2010 that house the engineering department. The Administration building is located at the head of the wastewater treatment plant and is surrounded by underground piping and process functions that may conflict with existing parking and/or the building in a future plant expansion. There is currently a need to house additional staff; increase office and meeting space; plan for the replacement of the trailers; bring the IT server workrooms to modern standards; provide classroom space for education outreach. Due to the alternate funding priorities and the desire to complete the MCAWRRF master plan, this project has been delayed 4-years beyond the current 5-year CIP.
34. Digester Sludge Storage Improvements: The sole sludge storage tank at the MCAWRRF was constructed in 1959 of reinforced concrete and is in need of repairs. The scope of work would include piping modifications, hydraulic improvements, tank safety improvements such as handrail and lights, and structural improvements to the existing sludge storage tank roof.

35. Aluminum Slide Gate Replacement: Several large aluminum slide gates are located at the influent side of the Moores Creek Pump Station. These gates allow staff to stop or divert flow to perform maintenance activities. After repeated attempts to access and repair the gates, it is now necessary to replace and modify the gate arrangement. The replacement includes new gates for greater flexibility and resiliency as well as significant flow bypass pumping. Likewise there are several gates at the Ultraviolet disinfection facility that leak water, causing a reduced capacity of the facility. Replacement of these gates will restore the process to full capacity. In addition, motor operated valves at the headworks will improve wet weather operations related to the new grit facility.
36. Moores Creek AWWRF Master Plan: The majority of the Moores Creek Water Resource Recovery Facility was constructed in the early 1980's. At the time, the plant layout was developed with space held open for future process expansion. With the Enhanced Nutrient Removal (ENR) project in 2009, the operation and layout of the plant was fundamentally altered, as needed to meet the new regulation. The project did anticipate the need for future expansion and some of the processes have readily available space. However, a full expansion plan was not developed at the time. As identified in the 2107 Strategic Plan, the Authority has a goal to plan, deliver and maintain dependable infrastructure in a financially responsible manner. Staff has identified asset master planning as a priority strategy to improve overall system development. As such, this project will serve to evaluate and plan for future space and process needs to accommodate capacity expansion and/or anticipated regulatory changes.
37. Mechanical Thickener: During the design of the Moores Creek AWWRF Phase 2 Odor Control project, the consultants conducted a detailed evaluation of all facility odor sources. One of the key sources identified, was the post-digestion clarifiers. These clarifiers are two round open-topped tanks of digested wastewater sludge, located on the north side of the plant. During the ENR upgrade, the characteristics of the post-aeration sludge changed. This change has led to less predictable sludge handling through the existing gravity thickeners. This change in the post-aeration sludge characteristics has made obtaining a clear thickener overflow more difficult without chemical addition. Removing the post-digestion clarifiers from service combined with solids carryover from the existing gravity thickeners create a number of downstream consequences in primary clarification, sludge digestion and solids dewatering. Removing these facilities from service reduces the sludge thickness and therefore the plant's ability to adequately process it. This project includes the design and installation of a mechanical thickener prior to digestion that will increase plant solids processing reliability and capacity. Due to the alternate funding priorities and the desire to complete the MCAWWRF Master Plan, this project has been delayed 4-years beyond the current 5-year CIP.
38. Compost Shed Roof Rehabilitation: In the early 1980's a large metal-framed shed roof was constructed to house the biosolids composting operations. Subsequent to stopping composting at Moores Creek AWWRF, the shed roof serves as an equipment maintenance yard, solids handling facility and material storage lock-up. The shed roof is exhibiting signs of rafter deterioration and ongoing drainage issues. This project will serve to evaluate and perform remediation needs at this facility.

Moores Creek Advanced Water Resource Recovery Facility

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
32	Odor Control Phase 2	\$2,216,632		\$2,216,632						\$2,216,632	\$65,743
33	Engineering and Administration Building	\$3,000,000	(\$3,000,000)							\$0	
34	Digester Sludge Storage Improvements	\$265,000	\$48,000	\$265,000		\$48,000				\$313,000	
35	Aluminum Slide Gate Replacements	\$470,000		\$470,000						\$470,000	
36	Moores Creek AWRRF Master Plan	\$100,000	\$150,000		\$50,000	\$200,000				\$250,000	
37	Mechanical Thickener	\$1,200,000	(\$1,200,000)							\$0	
38	Compost Shed Roof Rehabilitation		\$200,000			\$200,000				\$200,000	
	TOTAL	\$7,251,632	(\$3,802,000)	\$2,951,632	\$50,000	\$448,000	\$0	\$0	\$0	\$3,449,632	\$65,743

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.

Project Descriptions:

39. Grinder and Air Control Improvements: Currently the influent raw water pump station does not have a means to prevent large material from impacting the pumps, resulting in frequent clogging and maintenance. The space within the pump station is very limited and therefore does not allow for screening. This project will design and install an inline grinder within the influent pump channel. In addition, this project will evaluate methods to automate air control for the biological treatment process. The current method of air control produces inconsistent results, adversely impacting treatment and operations.

Scottsville Water Resource Recovery Facility

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
39	Grinder and Air Control Improvements	\$100,000	\$110,000		\$65,000	\$145,000				\$210,000	
	TOTAL	\$100,000	\$110,000	\$0	\$65,000	\$145,000	\$0	\$0	\$0	\$210,000	\$0

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.

Project Descriptions:

40. Influent Pump & VFD Addition: The Glenmore WRRF is predicted to see additional dry and wet weather flows as construction within the service area continues. Future wet weather flows will require higher influent pumping capacity and an additional pump and electrical variable frequency drive will be required to maintain firm capacity.
41. Secondary Clarifier Coating: The secondary clarifiers at the Glenmore facility were painted over 10-years ago. The clarifier environment is a particularly harsh environment subject to corrosive gasses, grit abrasion and mechanical wear. Based on observations by operations staff, the coating system is in need of replacement to prevent deterioration and failure of the underlying metal superstructure. This project includes the cleaning and full coating of the metal portions of the clarifier.

Glenmore Water Resource Recovery Facility

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
40	Influent Pump & VFD Addition	\$61,000	\$4,000			\$65,000				\$65,000	
41	Secondary Clarifier Coating	\$50,000	\$60,000	\$25,000	\$85,000					\$110,000	
	TOTAL	\$111,000	\$64,000	\$25,000	\$85,000	\$65,000	\$0	\$0	\$0	\$175,000	\$0

All Systems

Project Descriptions:

42. 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 upgrades to its fleet of stationary, mobile, and portable radios.
43. Asset Management: Asset management is the practice of managing our infrastructure to minimize the total cost of owning and operating these assets while providing desired service levels. In doing so, it is used to make sure planned maintenance activities take place and that capital assets are replaced, repaired or upgraded at the right time, while ensuring that the money necessary to perform those activities is available. The Rivanna Water and Sewer Authority (RWSA) has some components of an asset management program in place (i.e. GIS, work order system), but has identified the need to further develop the program as part of our Strategic Planning process. In order to continue to build the program, a consultant was procured to assist with a three-phase process that will include facilitation and development of an asset management strategic plan, development and management of a pilot study where the results of the strategic plan will be applied to a specific class of assets, and assistance through a full implementation process. As part of this three-phase process, the consultant will also assist RWSA with the procurement of a software package to facilitate the overall program.
44. Security Enhancements: As required by the federal Bioterrorism Act of 2002, water utilities must conduct vulnerability assessments (VA) and have emergency response plans. RWSA recently completed a VA of its water system in collaboration with other regional partners and identified a number of security improvements that could be applied to both its water and wastewater systems. The purpose of this project will be to install security improvements at RWSA facilities including an enhanced access control program, industrial strength door and window components, security gate and fencing modifications, an improved lock and key program, facility signage, closed circuit television (CCTV) enhancements, intrusion detection systems (IDS), additional security lighting, and ladder guards.
45. IT Master Plan – Software: Staff is currently conducting an IT Master Plan to assess and benchmark current software and business practices. As the planning effort nears completion

there will be a need for several wholesale software upgrades. This project will address those Authority wide needs.

All Systems

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
42	Radio Upgrades	\$521,000	\$125,000	\$521,000		\$125,000				\$646,000	\$28,337
43	Asset Management	\$500,000		\$300,000		\$200,000				\$500,000	
44	Security Enhancements	\$2,400,000	(\$1,400,000)	\$170,000	\$830,000					\$1,000,000	
45	IT Master Plan - Software		\$450,000		\$150,000	\$150,000	\$150,000			\$450,000	
	TOTAL	\$3,421,000	(\$825,000)	\$991,000	\$980,000	\$475,000	\$150,000	\$0	\$0	\$2,596,000	\$28,337

APPENDICES

CIP Financial Summary

Water System Summary

Wastewater System Summary

All Systems Summary

CIP Financial Summary

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
1	South Rivanna Reservoir to Ragged Mountain Reservoir Water Line Right-of-Way	\$2,295,000		\$840,249	\$870,000	\$584,751				\$2,295,000	\$123,782
2	South Rivanna Reservoir Dredging	\$10,000				\$10,000				\$10,000	
3	Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Line	\$4,116,000	(\$899,000)	\$0			\$325,000	\$1,186,000	\$1,706,000	\$3,217,000	
4	Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Pump Station	\$2,410,000	(\$1,750,000)	\$0			\$250,000	\$121,000	\$289,000	\$660,000	
5	Birdwood Golf Course Waterline		\$4,000,000	\$2,400,000	\$1,600,000					\$4,000,000	
6	Observatory Water Treatment Plant Improvements	\$18,630,000	\$1,070,000	\$2,648,198		\$5,701,802	\$7,850,000	\$3,500,000		\$19,700,000	\$1,154,558
7	Sugar Hollow Dam - Rubber Crest Gate Replacement & Intake	\$940,000	\$200,000	\$55,000	\$415,000	\$670,000				\$1,140,000	
8	Valve Repair - Replacement (Phase 2)	\$500,000	\$382,914	\$500,000	\$382,914					\$882,914	
9	Piney Mountain Tank Rehabilitation	\$500,000		\$500,000						\$500,000	\$51,185
10	Avon to Pantops Water Main	\$13,200,000	(\$11,100,000)	\$1,375,000					\$725,000	\$2,100,000	\$126,861
11	Water Demand Projection and Safe Yield Study	\$100,000	\$54,000	\$154,000						\$154,000	
12	South Fork Rivanna River Crossing and North Rivanna Transmission Main	\$5,340,000				\$843,000	\$3,930,000	\$567,000		\$5,340,000	
13	Rt. 29 Pump Station	\$2,300,000			\$201,000	\$1,824,000	\$275,000			\$2,300,000	

CIP Financial Summary (Continued)

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
14	Finished Water System Master Plan	\$150,000	\$103,000	\$253,000						\$253,000	
15	South Rivanna Hydropower Plant Decommissioning	\$400,000	\$325,000	\$400,000	\$325,000					\$725,000	\$98,625
16	South Rivanna Water Treatment Plant Improvements	\$7,500,000	\$7,500,000	\$181,891	\$7,864,524	\$6,953,585				\$15,000,000	\$46,891
17	South Rivanna Dam - Gate Repair		\$900,000		\$900,000					\$900,000	
18	North Rivanna Water Treatment Plant - Upgrade		\$2,325,000		\$385,000	\$940,000	\$1,000,000			\$2,325,000	
19	Beaver Creek Dam Alteration	\$8,830,000	(\$3,932,000)	\$192,871	\$516,129	\$561,000	\$668,000	\$660,000	\$2,300,000	\$4,898,000	\$191,871
20	New Raw Water PS & Intake, Oxygenation (BCR)	\$6,100,000	(\$1,962,000)	\$160,000	\$138,000	\$300,000	\$275,000	\$175,000	\$3,090,000	\$4,138,000	
21	Buck's Elbow & Crozet Waterball Tank Painting	\$1,200,000	(\$1,013,000)	\$60,000	\$127,000					\$187,000	
22	Crozet Water Treatment Plant Expansion	\$6,900,000	\$1,600,000	\$3,808,819	\$4,235,181	\$456,000				\$8,500,000	\$510,377
23	Scottsville Water Finished Water Flow Meter		\$145,000	\$145,000						\$145,000	
24	Scottsville Water LT2 Improvements		\$100,000		\$100,000					\$100,000	
25	Upper Schenks Branch Interceptor	\$4,485,000	(\$500,000)	\$20,000	\$100,000	\$3,315,000	\$550,000			\$3,985,000	\$11,187
26	Interceptor Sewer and Manhole Repair	\$1,941,000	(\$852,670)	\$1,088,330						\$1,088,330	\$176,434

CIP Financial Summary (Continued)

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
27	Crozet Interceptor	\$625,000		\$394,615		\$230,385				\$625,000	\$181,725
28	Crozet Flow Equalization Tank	\$3,300,000	\$1,560,000	\$1,300,000	\$3,560,000					\$4,860,000	\$80,092
29	Crozet Pump Station 1, 2, 3 Rehabilitation	\$525,000	\$20,000	\$275,000	\$20,000			\$250,000		\$545,000	
30	Maury Hill Branch Sewer Replacement	\$285,000	(\$285,000)								
31	Alb. Berley PS - Basin Demolition		\$200,000			\$165,000	\$35,000			\$200,000	
32	Odor Control Phase 2	\$2,216,632		\$2,216,632						\$2,216,632	\$65,743
33	Engineering and Administration Building	\$3,000,000	(\$3,000,000)								
34	Digester Sludge Storage Improvements	\$265,000	\$48,000	\$265,000		\$48,000				\$313,000	
35	Aluminum Slide Gate Replacements	\$470,000		\$470,000						\$470,000	
36	Moores Creek AWWRF Master Plan	\$100,000	\$150,000		\$50,000	\$200,000				\$250,000	
37	Mechanical Thickener	\$1,200,000	(\$1,200,000)								
38	Compost Shed Roof Rehabilitation		\$200,000			\$200,000				\$200,000	
39	Grinder and Air Control Improvements	\$100,000	\$110,000		\$65,000	\$145,000				\$210,000	

CIP Financial Summary (Continued)

Proj. No.	Project Description	Five-Year Capital Program			Projected Future Expenses by Year					Recommended CIP	Work-in-Progress (Prev. Expenses 6/30/2018)
		Current CIP Adopted 6/2018	Proposed Changes	Current Capital Budget	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
40	Influent Pump & VFD Addition	\$61,000	\$4,000			\$65,000				\$65,000	
41	Secondary Clarifier Coating	\$50,000	\$60,000	\$25,000	\$85,000					\$110,000	
42	Radio Upgrades	\$521,000	\$125,000	\$521,000		\$125,000				\$646,000	\$28,337
43	Asset Management	\$500,000		\$300,000		\$200,000				\$500,000	
44	Security Enhancements	\$2,400,000	(\$1,400,000)	\$170,000	\$830,000					\$1,000,000	
45	IT Master Plan - Software		\$450,000		\$150,000	\$150,000	\$150,000			\$450,000	
Total		\$103,465,632	(\$6,261,756)	\$20,719,605	\$22,919,748	\$23,687,523	\$15,308,000	\$6,459,000	\$8,110,000	\$97,203,876	\$2,847,668

Water System Summary

Urban Water System	Summary		Current Capital Budget	Projected Future Expenses by Year					Recommended CIP	Work-in -Progress
	Current CIP	Proposed Changes		FY20	FY21	FY22	FY23	FY24		
PROJECT COSTS										
Community Water Supply Plan	\$ 8,831,000	\$ 1,351,000	\$ 3,240,249	\$ 2,470,000	\$ 594,751	\$ 575,000	\$ 1,307,000	\$ 1,995,000	\$ 10,182,000	\$ 123,782
Observatory WTP/Ragged Mtn/Sugar Hollow Systems	19,570,000	1,270,000	2,703,198	415,000	6,371,802	7,850,000	3,500,000	-	20,840,000	1,154,558
Finished Water Storage/Distribution - Urban System	22,090,000	(10,560,086)	2,782,001	583,914	2,667,000	4,205,000	567,000	725,000	11,529,915	178,047
South & North Fork Rivanna WTP and Reservoir System	7,900,000	11,050,000	581,891	9,474,524	7,893,585	1,000,000	-	-	18,950,000	145,516
Total Projects Urban Water Systems	\$ 58,391,000	\$ 3,110,914	\$ 9,307,337	\$ 12,943,438	\$ 17,527,138	\$ 13,630,000	\$ 5,374,000	\$ 2,720,000	\$ 61,501,913	\$ 1,601,901
FUNDING SOURCES URBAN SYSTEM - TO DATE										
Work-in-Progress			\$ 1,601,900	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,601,900	
Debt Proceeds Available 2015B			5,294,967	8,000,000	5,225,033	-	-	-	18,520,000	
Capital Funds Available			2,410,470	-	-	-	-	-	2,410,470	
SUBTOTAL			9,307,337	8,000,000	5,225,033	-	-	-	22,532,370	
FUNDING SOURCES URBAN SYSTEM - NEEDS										
Future Cash reserve transfer to Capital Fund				\$ 1,000,000	\$ 1,500,000	\$ 1,500,000	\$ 1,500,000	\$ 500,000	\$ 6,000,000	
New Debt Needed			-	3,943,438	10,802,105	12,130,000	3,874,000	2,220,000	32,969,543	
SUBTOTAL			-	4,943,438	12,302,105	13,630,000	5,374,000	2,720,000	38,969,543	
TOTAL URBAN WATER FUNDING			\$ 9,307,337	\$ 12,943,438	\$ 17,527,138	\$ 13,630,000	\$ 5,374,000	\$ 2,720,000	\$ 61,501,913	
Estimated Bond Issues					\$14,745,500		\$18,224,000		\$61,501,913	

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Non-Urban Water System	Summary		Current Capital Budget	Projected Future Expenses by Year					Recommended CIP	Work-in -Progress
	Current CIP	Proposed Changes		FY20	FY21	FY22	FY23	FY24		
PROJECT COSTS										
Crozet Water System	\$ 23,030,000	\$ (5,307,000)	\$ 4,221,690	\$ 5,016,310	\$ 1,317,000	\$ 943,000	\$ 835,000	\$ 5,390,000	\$ 17,723,000	\$ 702,248
Scottsville Water System	-	245,000	145,000	100,000	-	-	-	-	245,000	-
Total Rural Water Systems	\$ 23,030,000	\$ (5,062,000)	\$ 4,366,690	\$ 5,116,310	\$ 1,317,000	\$ 943,000	\$ 835,000	\$ 5,390,000	\$ 17,968,000	\$ 702,248
Non-URBAN FUNDING SOURCES										
Work in Progress			\$ 702,248	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 702,248	
Capital Funds Available			\$ 145,000	\$ 100,000					245,000	
Debt Proceeds 2018 Bond			3,519,442	5,016,310	1,317,000	943,000	734,248	-	11,530,000	
Future Cash reserve transfer to Capital Fund									-	
New Debt Needed			-	-	-	-	100,752	5,390,000	5,490,752	
TOTAL NON-URBAN WATER FUNDING			\$ 4,366,690	\$ 5,116,310	\$ 1,317,000	\$ 943,000	\$ 835,000	\$ 5,390,000	\$ 17,968,000	
Estimated Bond Issues				\$ -			5,490,800			

Wastewater System Summary

Urban Wastewater System	Summary		Current Capital Budget	Projected Future Expenses by Year					Recommended CIP	Work-in-Progress
	Current CIP	Proposed Changes		FY20	FY21	FY22	FY23	FY24		
PROJECT COSTS										
Wastewater Interceptor/Pumping Stations	\$ 11,161,000	\$ 142,330	\$ 3,077,945	\$ 3,680,000	\$ 3,710,385	\$ 585,000	\$ 250,000	\$ -	\$ 11,303,330	\$ 449,438
Moore's Creek WWTP	7,251,632	(3,802,000)	2,951,632	50,000	448,000	-	-	-	3,449,632	65,743
Security & Asset Management										
Total Urban Wastewater Systems	\$ 18,412,632	\$ (3,659,670)	\$ 6,029,577	\$ 3,730,000	\$ 4,158,385	\$ 585,000	\$ 250,000	\$ 0	\$ 14,752,962	\$ 515,181
FUNDING SOURCES URBAN SYSTEM - IN PLACE										
Work-in-Progress			\$ 515,181	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 515,181	
Debt Proceeds - 2018			1,472,396	2,980,000	851,604	-	-	-	5,304,000	
Capital Funds Available			4,042,000	-	-	-	-	-	4,042,000	
SUBTOTAL			6,029,577	2,980,000	851,604	-	-	-	9,861,181	
FUNDING SOURCES URBAN SYSTEM - NEEDS										
Future Cash Reserves			\$ -	\$ 750,000	\$ 500,000	\$ -	\$ -	\$ -	\$ 1,250,000	
New Debt Needed			(0)	\$ 0	2,806,781	585,000	250,000	-	3,641,781	
SUBTOTAL			(0)	\$ 750,000	3,306,781	585,000	250,000	-	4,891,781	
TOTAL URBAN WASTEWATER FUNDING			\$ 6,029,577	\$ 3,730,000	\$ 4,158,385	\$ 585,000	\$ 250,000	\$ -	\$ 14,752,962	
Estimated Bond Issues					\$ 2,806,800		\$ 835,000		\$ 3,641,800	

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Non-Urban Wastewater System	Summary		Current Capital Budget	Projected Future Expenses by Year					Recommended CIP	Work-in-Progress
	Current CIP	Proposed Changes		FY20	FY21	FY22	FY23	FY24		
PROJECT COSTS										
Glenmore WWTP	\$ 111,000	\$ 64,000	\$ 25,000	\$ 85,000	\$ 65,000	\$ -	\$ -	\$ -	\$ 175,000	\$ -
Scottsville WWTP	100,000	110,000	-	65,000	145,000	-	-	-	210,000	-
Total Rural Wastewater Systems	\$ 211,000	\$ 174,000	\$ 25,000	\$ 150,000	\$ 210,000	\$ -	\$ -	\$ -	\$ 385,000	\$ -
FUNDING SOURCES RURAL SYSTEM - NEEDS										
Capital Funds Available			\$ 25,000	\$ 45,000	-	-	-	-	70,000	
Future Cash Reserve			-	80,000	-	-	-	-	80,000	
New Debt Needed			-	25,000	210,000	-	-	-	235,000	
TOTAL RURAL WASTEWATER FUNDING			\$ 25,000	\$ 150,000	\$ 210,000	\$ -	\$ -	\$ -	\$ 385,000	
Estimated Bond Issues			\$ 235,000		\$ 235,000					

All Systems Summary

Shared Projects - All Rate Centers	Summary		Current Capital Budget	Projected Future Expenses by Year					Recommended CIP	Work-in - Progress
	Current CIP	Proposed Changes		FY20	FY21	FY22	FY23	FY24		
PROJECT COSTS										
Asset management/Security/IT Master Plan	\$ 3,421,000	\$ (825,000)	\$ 991,000	\$ 980,000	\$ 475,000	\$ 150,000	\$ -	\$ -	\$ 2,596,000	\$ 123,782
Total Projects Urban Water Systems	\$ 3,421,000	\$ (825,000)	\$ 991,000	\$ 980,000	\$ 475,000	\$ 150,000	\$ -	\$ -	\$ 2,596,000	\$ 123,782
Completed or Closed Projects	-	-								
FUNDING SOURCES										
Work in Progress			\$123,782						\$ 123,782	
Possible Future Reserves			\$100,000	\$100,000					\$200,000	
New Debt Needed			\$ 767,219	\$ 880,000	\$ 475,000	\$ 150,000	\$ -	\$ -	\$ 2,272,219	
									-	
TOTAL URBAN WATER FUNDING			\$ 991,000	\$ 980,000	\$ 475,000	\$ 150,000	\$ -	\$ -	\$ 2,596,000	
Estimated Bond Issues					\$2,272,219					

	2020 - 2024 Adopted CIP	2019-2023 Adopted CIP	Change \$
<u>Project Cost</u>			
Urban Water Projects	\$ 61,501,900	\$ 89,832,485	\$ (28,330,585)
Urban Wastewater Projects	14,753,000	32,895,150	(18,142,150)
Non-Urban Projects & Shared	20,949,000	31,174,400	(10,225,400)
Total Project Cost Estimates	<u>\$ 97,203,900</u>	<u>\$ 153,902,035</u>	<u>\$ (56,698,135)</u>
<u>Funding in place</u>			
Work-in-Progress (paid for)	\$ 2,943,110	\$ 33,967,484	(31,024,374)
Debt Proceeds Used	35,354,000	11,230,305	24,123,695
Cash-Capital Available	6,767,470	7,702,584	(935,114)
	<u>\$ 45,064,580</u>	<u>\$ 52,900,373</u>	<u>\$ (7,835,793)</u>
<u>Financing Needs</u>			
Possible Future Reserves	\$ 7,530,000	4,111,000	3,419,000
New Debt	44,609,320	96,890,662	(52,281,342)
	<u>\$ 52,139,320</u>	<u>\$ 101,001,662</u>	<u>\$ (48,862,342)</u>
Total Funding	<u>\$ 97,203,900</u>	<u>\$ 153,902,035</u>	<u>\$ (56,698,135)</u>
Percentage of funding in place	46.4%	34.4%	
Ratio of debt to expense	85.3%	92.3%	
Ratio of cash to expense	14.7%	7.7%	

Rivanna Water and Sewer Authority
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Detail by Major Systems	Total Adopted CIP	Urban Water Projects	Urban Wastewater Projects	Shared Projects	Water Non-Urban Projects	Wastewater Non-Urban Projects
Project Cost						
Urban Water Projects	\$ 61,501,900	\$ 61,501,900	\$ -		\$ -	\$ -
Urban Wastewater Projects	14,753,000	-	14,753,000		-	-
Non-Urban Projects & Shared	20,949,000	-	-	2,596,000	17,968,000	385,000
Total Project Cost Estimates	\$ 97,203,900	\$ 61,501,900	\$ 14,753,000	\$ 2,596,000	\$ 17,968,000	\$ 385,000
Funding in place						
Work-in-Progress (paid for)	\$ 2,943,110	\$ 1,601,900	\$ 515,180	\$ 123,780	\$ 702,250	\$ -
Debt Proceeds available	35,354,000	18,520,000	5,304,000	-	11,530,000	-
Cash-Capital Available	6,767,470	2,410,470	4,042,000	-	245,000	70,000
Subtotal	\$ 45,064,580	\$ 22,532,370	\$ 9,861,180	\$ 123,780	\$ 12,477,250	\$ 70,000
Financing Needs						
Possible Future Reserves	\$ 7,530,000	6,000,000	1,250,000	200,000	-	80,000
New Debt	44,609,320	32,969,530	3,641,820	2,272,220	5,490,750	235,000
Subtotal	\$ 52,139,320	\$ 38,969,530	\$ 4,891,820	\$ 2,472,220	\$ 5,490,750	\$ 315,000
Total Funding	\$ 97,203,900	\$ 61,501,900	\$ 14,753,000	\$ 2,596,000	\$ 17,968,000	\$ 385,000
Percentage of funding in place	46.4%	36.6%	66.8%	4.8%	69.4%	18.2%
Ratio of debt to expense	85.3%	83.7%	60.6%	87.5%	94.7%	61.0%
Ratio of cash to expense	14.7%	13.7%	35.9%	7.7%	1.4%	39.0%

	<u>Urban Water</u>	<u>Urban Wastewater</u>	<u>Non-Urban</u>	<u>Shared</u>	<u>Total</u>
Current Adopted CIP 2019 - 2023	\$ 88,382,485	\$ 30,924,151	\$ 31,174,390	\$ 3,421,000	\$ 153,902,026
Changes:					
Completed or Closed Projects	(30,559,735)	(12,558,519)	(7,933,390)	-	(51,051,644)
Adjustments on existing Projects	(3,545,845)	(4,012,670)	(4,988,000)	(1,275,000)	(13,821,515)
New Projects	<u>7,225,000</u>	<u>400,000</u>	<u>100,000</u>	<u>450,000</u>	<u>8,175,000</u>
Total Changes	(26,880,580)	(16,171,189)	(12,821,390)	(825,000)	(56,698,159)
Total Adopted CIP 2020 - 2024	\$ 61,501,905	\$ 14,752,962	\$ 18,353,000	\$ 2,596,000	\$ 97,203,867

Rivanna Water and Sewer Authority
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		FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
City of Charlottesville								
Urban Water								
Operating Rate	Per 1000 gal.	1.969	2.070	2.095	2.284	2.466	2.614	2.771
	% Change		5.1%	1.2%	9.0%	8.0%	6.0%	6.0%
Debt Service Charge	Per month	\$ 160,039	\$ 181,008	193,580	210,345	226,150	242,069	257,946
			13.1%	6.9%	8.7%	7.5%	7.0%	6.6%
Revenue Requirements:								
Operating Rate Revenue	Annual	\$ 3,514,200	\$ 3,587,700	\$ 3,630,500	\$ 3,957,245	\$ 4,273,825	\$ 4,530,254	\$ 4,802,069
Debt Service Revenues	Annual	1,920,500	2,172,100	2,323,000	2,524,139	2,713,796	2,904,834	3,095,354
Total		\$ 5,434,700	\$ 5,759,800	\$ 5,953,500	\$ 6,481,384	\$ 6,987,620	\$ 7,435,088	\$ 7,897,423
	\$ Change		\$ 325,100	\$ 193,700	\$ 527,884	\$ 506,237	\$ 447,467	\$ 462,335
	% Change		6.0%	3.4%	8.9%	7.8%	6.4%	6.2%
Urban Wastewater								
Operating Rate	Per 1000 gal.	1.951	2.146	2.369	2.511	2.662	2.822	2.991
	% Change		10.0%	10.4%	6.0%	6.0%	6.0%	6.0%
Debt Service Charge	Per month	\$ 392,841	\$ 408,260	407,588	411,140	411,960	411,060	410,190
			3.9%	-0.2%	0.9%	0.2%	-0.2%	-0.2%
Revenue Requirements:								
Operating Rate Revenue	Annual	\$ 3,540,600	\$ 3,711,300	\$ 4,016,800	\$ 4,257,808	\$ 4,513,276	\$ 4,784,073	\$ 5,071,117
Debt Service Revenues	Annual	4,714,100	4,899,100	4,891,100	4,933,680	4,943,520	4,932,720	4,922,280
Total		\$ 8,254,700	\$ 8,610,400	\$ 8,907,900	\$ 9,191,488	\$ 9,456,796	\$ 9,716,793	\$ 9,993,397
	\$ Change		\$ 355,700	\$ 297,500	\$ 283,588	\$ 265,308	\$ 259,997	\$ 276,604
	% Change		4.3%	3.5%	3.2%	2.9%	2.7%	2.8%
Total all Rate Centers								
Operating Rate Revenue		\$ 7,054,800	\$ 7,299,000	\$ 7,647,300	\$ 8,215,053	\$ 8,787,101	\$ 9,314,327	\$ 9,873,187
Debt Service Revenues		6,634,600	7,071,200	7,214,100	7,457,819	7,657,316	7,837,554	8,017,634
Total City All Revenues		\$ 13,689,400	\$ 14,370,200	\$ 14,861,400	\$ 15,672,872	\$ 16,444,417	\$ 17,151,881	\$ 17,890,820
	\$ Change		\$ 680,800	\$ 491,200	\$ 811,472	\$ 771,545	\$ 707,464	\$ 738,940
	% Change		5.0%	3.4%	5.5%	4.9%	4.3%	4.3%
Additional for 10-Year CIP								
					79,300	292,300	623,200	981,600
		\$ 13,689,400	\$ 14,370,200	\$ 14,861,400	\$ 15,752,172	\$ 16,736,717	\$ 17,775,081	\$ 18,872,420
			5.0%	3.4%	6.0%	6.3%	6.2%	6.2%

Rivanna Water and Sewer Authority
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		FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
ACSA Charges From RWSA								
Urban Water								
Operating Rate	Per 1000 gal.	1.969	2.07	2.095	2.284	2.466	2.614	2.771
	% Change		5.1%	1.2%	9.0%	8.0%	6.0%	6.0%
Debt Service Charge	Per month	\$ 285,439	\$ 307,598	321,303	342,838	362,235	382,693	404,655
			7.8%	4.5%	6.7%	5.7%	5.6%	5.7%
Revenue Requirements:								
Operating Rate Revenue	Annual	\$ 3,243,900	\$ 3,447,000	\$ 3,488,100	\$ 3,802,029	\$ 4,106,191	\$ 4,352,563	\$ 4,613,717
Debt Service Revenues	Annual	3,425,300	3,691,200	3,855,600	4,114,052	4,346,818	4,592,315	4,855,858
Total		\$ 6,669,200	\$ 7,138,200	\$ 7,343,700	\$ 7,916,081	\$ 8,453,010	\$ 8,944,878	\$ 9,469,575
	\$ Change		\$ 469,000	\$ 205,500	\$ 572,381	\$ 536,928	\$ 491,868	\$ 524,697
	% Change		7.0%	2.9%	7.8%	6.8%	5.8%	5.9%
Urban Wastewater								
Operating Rate	Per 1000 gal.	1.951	2.146	2.369	2.511	2.662	2.822	2.991
	% Change		10.0%	10.4%	6.0%	6.0%	6.0%	6.0%
Debt Service Charge	Per month	\$ 222,550	\$ 246,308	278,174	286,107	289,337	294,757	300,207
			10.7%	12.9%	2.9%	1.1%	1.9%	1.8%
Revenue Requirements:								
Operating Rate Revenue	Annual	\$ 3,139,800	\$ 3,565,800	\$ 4,016,800	\$ 4,257,808	\$ 4,513,276	\$ 4,784,073	\$ 5,071,117
Debt Service Revenues	Annual	2,670,600	2,955,700	3,338,100	3,433,289	3,472,049	3,537,089	3,602,489
Total		\$ 5,810,400	\$ 6,521,500	\$ 7,354,900	\$ 7,691,097	\$ 7,985,325	\$ 8,321,162	\$ 8,673,606
	\$ Change		\$ 711,100	\$ 833,400	\$ 336,197	\$ 294,228	\$ 335,837	\$ 352,444
	% Change		12.2%	12.8%	4.6%	3.8%	4.2%	4.2%
Non-Urban Rate Centers								
Operating Rate Revenue	Annual	\$ 1,964,600	\$ 2,075,300	2,229,100	2,407,428	2,551,874	2,704,986	2,867,285
Debt Service Revenues	Annual	830,700	1,134,400	1,453,300	1,553,300	1,645,800	1,738,300	1,830,800
Total		\$ 2,795,300	\$ 3,209,700	\$ 3,682,400	\$ 3,960,728	\$ 4,197,674	\$ 4,443,286	\$ 4,698,085
				\$ 472,700	\$ 278,328	\$ 236,946	\$ 245,612	\$ 254,799
				14.7%	7.6%	6.0%	5.9%	5.7%
Total all Rate Centers								
Operating Rate Revenue		\$ 8,348,300	\$ 9,088,100	\$ 9,734,000	\$ 10,467,265	\$ 11,171,341	\$ 11,841,622	\$ 12,552,119
Debt Service Revenues		6,926,600	7,781,300	8,647,000	9,100,641	9,464,667	9,867,704	10,289,147
Total ACSA All Revenues		\$ 15,274,900	\$ 16,869,400	\$ 18,381,000	\$ 19,567,906	\$ 20,636,009	\$ 21,709,326	\$ 22,841,267
	\$ Change		\$ 1,594,500	\$ 1,511,600	\$ 1,186,906	\$ 1,068,102	\$ 1,073,317	\$ 1,131,940
	% Change		10.4%	9.0%	6.5%	5.5%	5.2%	5.2%
Additional for 10-Year CIP								
					209,900	652,600	1,256,700	1,901,200
		\$ 15,274,900	\$ 16,869,400	\$ 18,381,000	\$ 19,777,806	\$ 21,288,609	\$ 22,966,026	\$ 24,742,467
			10.4%	9.0%	7.6%	7.6%	7.9%	7.7%

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	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
RWSA							
Operations Revenues							
Urban Water	\$ 6,758,100	\$ 7,034,700	\$ 7,118,600	\$ 7,759,274	\$ 8,380,016	\$ 8,882,817	\$ 9,415,786
Urban Wastewater	6,680,400	7,277,100	8,033,600	8,515,616	9,026,553	9,568,146	10,142,235
Other Rate Centers	1,964,600	2,075,300	2,229,100	2,407,428	2,551,874	2,704,986	2,867,285
Total	\$ 15,403,100	\$ 16,387,100	\$ 17,381,300	\$ 18,682,318	\$ 19,958,443	\$ 21,155,949	\$ 22,425,306
Change \$		984,000	994,200	1,301,018	1,276,125	1,197,507	1,269,357
Change %		6.4%	6.1%	7.5%	6.8%	6.0%	6.0%
Debt Service Charge Revenues							
Urban Water	5,345,800	5,863,300	6,178,600	6,638,191	7,060,614	7,497,149	7,951,212
Urban Wastewater	7,384,700	7,854,800	8,229,200	8,366,969	8,415,569	8,469,809	8,524,769
Other Rate Centers	830,700	1,134,400	1,453,300	1,553,300	1,645,800	1,738,300	1,830,800
Total	\$ 13,561,200	\$ 14,852,500	\$ 15,861,100	\$ 16,558,460	\$ 17,121,983	\$ 17,705,258	\$ 18,306,781
Change \$		1,291,300	1,008,600	697,360	563,523	583,275	601,523
Change %		9.5%	6.8%	4.4%	3.4%	3.4%	3.4%
Total RWSA Customer Revenues	\$ 28,964,300	\$ 31,239,600	\$ 33,242,400	\$ 35,240,778	\$ 37,080,426	\$ 38,861,207	\$ 40,732,087
Change \$		\$ 2,275,300	\$ 2,002,800	\$ 1,998,378	\$ 1,839,648	\$ 1,780,782	\$ 1,870,880
Change %		7.9%	6.4%	6.0%	5.2%	4.8%	4.8%
Additional for 10-Year CIP				289,200	944,900	1,879,900	2,882,800
	\$ 28,964,300	\$ 31,239,600	\$ 33,242,400	\$ 35,529,978	\$ 38,314,526	\$ 41,975,207	\$ 46,728,887
		0.0%	6.4%	6.9%	7.8%	9.6%	11.3%