



Rivanna Water and Sewer Authority

Board of Directors Meeting

August 28, 2018

2:15pm



695 MOORES CREEK LANE
CHARLOTTESVILLE, VA 22902-9016
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BOARD OF DIRECTORS

Regular Meeting of the Board of Directors of the Rivanna Water & Sewer Authority

DATE: August 28, 2018

LOCATION: Conference Room, Administration Building
695 Moores Creek Lane, Charlottesville, VA

TIME: 2:15 p.m.

AGENDA

1. **CALL TO ORDER**

- a. *Welcome to new Board member, Mike Murphy, Interim City Manager*
- b. *Nominations and Election of Board Vice-Chair*

2. **MINUTES OF PREVIOUS BOARD MEETINGS**

- a. *Minutes of Regular Board Meeting on July 24, 2018*

3. **RECOGNITION**

4. **EXECUTIVE DIRECTOR'S REPORT**

5. **ITEMS FROM THE PUBLIC**

6. **RESPONSES TO PUBLIC COMMENTS**

7. **CONSENT AGENDA**

- a. *Staff Report on Finance*
- b. *Staff Report on Ongoing Projects*
- c. *Staff Report on Operations*
- d. *Capital Improvement Plan Amendment – Rt. 29 N Water Pump Station Site Acquisition Project*
- e. *Capital Improvement Plan Amendment – Scottsville Water Treatment Plant Finished Water Metering Improvements*

8. **OTHER BUSINESS**

(JOINT SESSION WITH THE RSWA; RECONVENE THE RSWA MEETING; MOTION REQUIRED)

- a. *Presentation of Quarterly Strategic Plan Update; Katie McIlwee, Executive Coordinator and Communications Manager*
- b. *Presentation of FY 2020 – 2025 Six-Year Staffing Plan; Lonnie Wood, Director of Administration & Finance*

(RECESS TO COMPLETE THE RSWA MEETING; MOTION REQUIRED)

- c. *Presentation and Request for Capital Improvement Plan Amendment: Water Line Project on the Birdwood Property; Bill Mawyer, Executive Director, and Michelle Simpson, Senior Civil Engineer and Project Manager*
- d. *Presentation and Request for Capital Improvement Plan Amendment: Urban Water Supply Program Update; Bill Mawyer, Executive Director, and Jennifer Whitaker, Director of Engineering & Maintenance*
 - i. *Work Authorization: Urban Water Demand & Safe Yield Study; Hazen & Sawyer Engineers*
 - ii. *Work Authorization: Urban Water Infrastructure Master Plan; Baker Engineering*
- e. *Presentation and Request for Authorization: Series 2018 Bond Issuance; Lonnie Wood, Director of Administration & Finance*

9. OTHER ITEMS FROM BOARD/STAFF NOT ON AGENDA

10. CLOSED MEETING

11. ADJOURNMENT

GUIDELINES FOR PUBLIC COMMENT AT RIVANNA BOARD OF DIRECTORS MEETINGS

If you wish to address the Rivanna Board of Directors during the time allocated for public comment, please raise your hand or stand when the Chairman asks for public comments.

Members of the public requesting to speak will be recognized during the specific time designated on the meeting agenda for "Items From The Public." Each person will be allowed to speak for up to three minutes. When two or more individuals are present from the same group, it is recommended that the group designate a spokesperson to present its comments to the Board and the designated speaker can ask other members of the group to be recognized by raising their hand or standing. Each spokesperson for a group will be allowed to speak for up to five minutes.

During public hearings, the Board will attempt to hear all members of the public who wish to speak on a subject, but it must be recognized that on rare occasion presentations may have to be limited because of time constraints. If a previous speaker has articulated your position, it is recommended that you not fully repeat the comments and instead advise the Board of your agreement. The time allocated for speakers at public hearings are the same as for regular Board meetings, although the Board can allow exceptions at its discretion.

Speakers should keep in mind that Board of Directors meetings are formal proceedings and all comments are recorded on tape. For that reason, speakers are requested to speak from the podium and wait to be recognized by the Chairman. In order to give all speakers proper respect and courtesy, the Board requests that speakers follow the following guidelines:

- Wait at your seat until recognized by the Chairman.
- Come forward and state your full name and address and your organizational affiliation if speaking for a group;
- Address your comments to the Board as a whole;
- State your position clearly and succinctly and give facts and data to support your position;
- Summarize your key points and provide the Board with a written statement, or supporting rationale, when possible;
- If you represent a group, you may ask others at the meeting to be recognized by raising their hand or standing;
- Be respectful and civil in all interactions at Board meetings;
- The Board may ask speakers questions or seek clarification, but recognize that Board meetings are not a forum for public debate; Board Members will not recognize comments made from the audience and ask that members of the audience not interrupt the comments of speakers and remain silent while others are speaking so that other members in the audience can hear the speaker;
- The Board will have the opportunity to address public comments after the public comment session has been closed;
- At the request of the Chairman, the Executive Director may address public comments after the session has been closed as well; and
- As appropriate, staff will research questions by the public and respond through a report back to the Board at the next regular meeting of the full Board. It is suggested that citizens who have questions for the Board or staff submit those questions in advance of the meeting to permit the opportunity for some research before the meeting.

The agendas of Board meetings, and supporting materials, are available from the RWSA Administration Office upon request or can be viewed on the Rivanna website(s)



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RWSA BOARD OF DIRECTORS
Minutes of Regular Meeting
July 24, 2018

A regular meeting of the Rivanna Water & Sewer Authority (RWSA) Board of Directors was held on Tuesday, July 24, 2018 at 2:15 p.m. in the 2nd floor conference room, Administration Building, 695 Moores Creek Lane, Charlottesville, Virginia.

Board Members Present: Mr. Mike Gaffney, Chair; Ms. Kathy Galvin; Ms. Lauren Hildebrand; Mr. Gary O'Connell; Dr. Liz Palmer; and Mr. Jeff Richardson.

Board Members Absent: Mr. Maurice Jones.

Staff Present: Mr. Wayne Barnes, Mr. Tim Castillo, Ms. Victoria Fort, Mr. Tom Freeman, Mr. Austin Marrs, Mr. Bill Mawyer, Ms. Katie McIlwee, Mr. Bill Morris, Ms. Betsy Nemeth, Ms. Jamie Orrell, Ms. Angela Ott, Ms. Courtney Ott, Mr. Scott Schiller, Ms. Michelle Simpson, Ms. Andrea Terry, Mr. David Tungate, Ms. Jennifer Whitaker, Mr. Lonnie Wood, and Ms. Devon Yi.

1. CALL TO ORDER

Mr. Gaffney called the regular meeting of the Board of Directors of the Rivanna Water and Sewer Authority at 2:14 p.m.

2. MINUTES OF PREVIOUS BOARD MEETINGS

a. Minutes of Regular Board Meeting on June 26, 2018

Mr. Gaffney stated that he had left early from the June 26, 2018 meeting during the closed session, but he had read the closed meeting certification resolution and approved it with respect to the portion of the closed meeting he attended.

Mr. O'Connell noted that he had been absent from the last meeting and thus would abstain from approval of the minutes.

Mr. Mawyer reported that at the last meeting, there had been a presentation on the storm event of May 30, and Dr. Palmer had asked a question about what would constitute a dam safety issue. He

41 stated that staff had answered at that time that it would be 12 feet of water going over the dam,
42 but had since updated it to 18 feet (line 413).

43
44 Mr. O'Connell mentioned that the storm event caused those levels to rise to about 8 feet.

45
46 Mr. Mawyer confirmed that it was 7+ feet.

47
48 **Dr. Palmer moved to approve the minutes of June 26, 2018 as amended. Mr. Richardson**
49 **seconded the motion, which passed 5-0-1. Mr. O'Connell abstained from the vote as he had**
50 **been absent from that meeting. Mr. Jones was absent from the meeting and the vote.**

51
52 **3. RECOGNITION**

53 a. Joint Resolution of Appreciation for Maurice Jones

54
55 Mr. Gaffney read the following resolution into the record for Maurice Jones:

56
57 WHEREAS, Mr. Jones has served as a member of the Rivanna Water & Sewer
58 Authority and Rivanna Solid Waste Authority Boards of Directors since 2010; and

59
60 WHEREAS, over that same period Mr. Jones has demonstrated leadership in
61 water and sewer, solid waste and recycling services; and has been a valuable member of
62 the Boards of Directors and a resource to the Authorities; and

63
64 WHEREAS, Mr. Jones's understanding of the water, sewer, solid waste and
65 recycling operations of the City of Charlottesville, the Water & Sewer Authority and the
66 Solid Waste Authority has supported a strategic decision-making process that provided
67 benefits to the customers served by the City of Charlottesville as well as the community
68 as a whole. During Mr. Jones's tenure and through his efforts, major projects were
69 completed including:

- 70 - a Community Water Supply Plan, to ensure an adequate water supply for the
71 next 50 years
72 - the Expanded Ragged Mountain Reservoir Dam
73 - the Rivanna Sewer Pumping Station
74 - Odor Control Improvements at the Moores Creek Advanced Water Resource
75 Recovery Facility
76 - Granular Activated Carbon Filters for the water treatment plants
77 - a Strategic Plan for both Authorities; and

78
79 WHEREAS, the Water & Sewer Authority and Solid Waste Authority Boards of
80 Directors are most grateful for the professional and personal contributions Mr. Jones has
81 provided to both Authorities and to the community; and

82
83 NOW, THEREFORE, BE IT RESOLVED that the Rivanna Water & Sewer
84 Authority and the Rivanna Solid Waste Authority Boards of Directors recognizes, thanks,
85 and commends Mr. Jones for his distinguished service, efforts, and achievements as a
86 member of the Rivanna Water & Sewer Authority and the Rivanna Solid Waste

Authority, and presents this Resolution as a token of esteem, with its best wishes in his future endeavors.

BE IT FURTHER RESOLVED that this Resolution be entered upon both the permanent Minutes of the Rivanna Water & Sewer Authority and the Rivanna Solid Waste Authority.

Dr. Palmer moved to adopt the resolution of appreciation as presented. Ms. Hildebrand seconded the motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the vote.

Ms. Galvin thanked the Board for acknowledging Mr. Jones' efforts and for noting his many accomplishments.

Mr. Mawyer indicated that Rivanna would be sending a plaque to Mr. Jones along with a copy of the resolution. Mr. Mawyer mentioned that Mr. Jones had a legal meeting to attend and was therefore not present at the Board meeting.

4. EXECUTIVE DIRECTOR'S REPORT

Mr. Mawyer reported that Thomas Corrice had completed his wastewater operator class four license and had moved up from trainee. Mr. Mawyer stated that Wayne Barnes was promoted to assistant water manager, having served Rivanna for more than 39 years.

Mr. Mawyer stated that there had been three interns working with Rivanna over the summer, and they would be gone before the August meeting so he wanted to recognize Jamie Orrell, Courtney Ott, and Devon Yi at this point. He asked the interns to highlight what they had done to support Rivanna.

Ms. Jamie Orrell, a rising 4th year environmental science student at UVA, stated that she was interning with RWSA and had been doing sampling at the reservoirs and the water treatment plant, as well as in the community. Ms. Orrell stated that had been doing condition reports for the reservoirs and had also been working in the lab on different tests, now being certified to test for orthophosphate.

Ms. Courtney Ott, the administration intern, stated that she would be transferring to UVA in the fall to study psychology. Ms. Ott stated that she had worked at Rivanna with the accountant and had been involved with record retention and organization, and this had been a good learning experience for her.

Ms. Devon Yi, a rising 4th year student at UVA, stated that she was the IT intern and had been updating and configuring routers and working with the network, as well as researching various documents and writing up documentation for them.

Mr. Mawyer recognized Betsy Nemeth for organizing the intern program and having another successful year.

133
134 Mr. Mawyer reported that several Rivanna staff members had recently attended an emergency
135 operations center function at UVA, which included a hypothetical scenario in which a plane
136 carrying hazardous materials crashed into the South Rivanna Reservoir and contaminated the
137 water. He stated that the scenario involved a regional exercise with the City, County, FEMA, and
138 the emergency management agency. Mr. Mawyer stated that the water supply was big issue in
139 the exercise, and he had made the point that the proposed Rivanna to Ragged Mountain waterline
140 would have provided duplication and allowed for water to be piped from Ragged Mountain
141 Reservoir to the South Rivanna Water Treatment Plant – thus lessening the severity of the
142 incident and not having to put the South Rivanna Treatment Plant out of service because of the
143 water.

144
145 Mr. Mawyer reported that Rivanna staff had also attended their first annual facilities
146 coordination meeting with UVA Facilities Management, which hosted it, the UVA Foundation,
147 the Albemarle County Service Authority, the County’s Community Development department,
148 and City representatives from their utility and Neighborhood Development Services. He stated
149 they had all done presentations on upcoming projects for the coming years to help one another
150 coordinate and to foster their work as a connected network.

151
152 Mr. Mawyer stated that Andrea Terry had given a presentation on “Optimizing System
153 Performance in our Reservoirs” at the American Waterworks Association conference in
154 Richmond. He stated that Ms. Terry’s presentation had included information about Rivanna’s
155 utilization of DiNatale reservoir consultant and a water sampling program, with upcoming plans
156 for a hypolimnetic system in the Beaver Creek Reservoir.

157
158 Mr. Mawyer reported that our Director of Solid Waste, Phil McKalips, had given Lafayette
159 School students a tour of the recycling center, and our Wastewater Manager, Tim Castillo, gave
160 one of the Moores Creek Wastewater Plant – as well as a tour to the Environmental Biology
161 class from PVCC.

162
163 Mr. O’Connell thanked Mr. Castillo for a tour of Moores Creek for members of the ACSA Board
164 and staff, stating that the odor control project was quite impressive.

165
166 Mr. Mawyer reported that with the addition of FY19 projects, there were now 34 projects in our
167 report – with the construction list dwindling as odor, GAC, and other projects have been
168 completed. He stated that planning and studies for the urban finished water system, urban water
169 demand, safe yield analysis, etc. were underway and were setting the table for the next round of
170 construction projects.

171
172 Mr. Mawyer stated that they continue to appreciate the outstanding performance that the new
173 GAC system is providing in lowering disinfection byproducts in the system, and staff had
174 provided a graph to the Board in June that showed the reduction in each of the water treatment
175 plants. He stated that as a follow-up and continuation of our review of water restrictions the
176 previous fall, we are assessing issues with the Mechums River gauge that the USGS owns and
177 DEQ manages, which indicate how much water is coming into the South Fork Rivanna reservoir.
178 He stated that Rivanna met with DEQ in Richmond on July 23 and took Hydrologics, our

watershed modeler, adding that they started discussing the correlation between the gauge and how much water was coming into the reservoir, in an effort to make the data more accurate. Mr. Mawyer stated that the correlation calculated what was actually flowing into the reservoir versus what the gauge indicated was coming in. He stated they read the gauge one day and adjust the gate to ensure that the outflow is no less than 70% of the inflow – but DEQ will sometimes come back days or weeks later with a recalibration of the gauge that may indicate Rivanna’s readings and releases were not accurate.

Mr. Mawyer commented that this encouraged Rivanna to look at the watershed modeling and the last 100 years of rainfall, along with how it was being recorded over the drought of record – and they were having a discussion with DEQ of whether they would update the correlation formula, which Ms. Whitaker would discuss in her presentation.

Mr. Mawyer clarified an item from a *Cville Weekly* in July, as the article quoted him as saying the DEQ gauge was broken. He emphasized that the gauge was not broken, but when DEQ came back and wanted to recalibrate and adjust it, Rivanna had already let the water out of the reservoir – so the original information from the gauge may have caused them to release more than necessary. He added that he expressed his apologies to DEQ for stating that the gauge was “broken.”

Mr. Mawyer reported that in the Board’s discussion of Beaver Creek Dam and the labyrinth spillway, they had asked how tall the spillway would be from ground level to the bottom – and the answer is about 16 feet.

Mr. O’Connell stated that typically the labyrinth would be dry.

Mr. Mawyer confirmed this, stating that this was trying to address significant amounts of storm water – up to 31 inches a day, which was 3 to 4 times worse than the May 30, 2018 storm. He stated that this was when the water level would be high enough, when it would go through the spillway, but ordinarily it would not and was below the normal pool of the reservoir at the bottom of the spillway.

Mr. Richardson applauded staff for managing the intern program and making it successful.

Mr. Mawyer thanked him and stated that two interns had previously been hired onto Rivanna staff once they graduated from college, adding that the program is a good investment.

5. ITEMS FROM THE PUBLIC

Mr. Gaffney opened the floor to items from the public.

Mr. Richard Collins addressed the Board, stating that he had been a resident of Charlottesville since 1971 and was at the meeting to talk about the report in *Cville Weekly* entitled “Leaky gate: RWSA official resigns in protest.” Mr. Collins stated that this caught his attention, as he had some experience and knowledge with this issues, having once served as chair of RWSA and

having been a professor at UVA, where he taught resource planning. He noted that he had also been an active opponent to the current water supply plan.

Mr. Collins stated that he had never met Dr. Richard Gullick, the subject of the article, and explained that he called Dr. Gullick and asked him what the most important issue was that led him to resign. Mr. Collins stated that Dr. Gullick had relayed his version of what he felt was an unfair public disclosure, particularly related to the demand/supply function and what he believed were erroneous particulars of this event. He stated that Dr. Gullick indicated that if the public felt the planning for the water supply restrictions was due to decreased rainfall or limited capacity, they had an incomplete account of the issues – the most important being safe yield that came from the figures of the 1990s when there was a high increase in water consumption, versus the reduced consumption patterns since.

Mr. Collins commented that he was very impressed with Dr. Gullick and had read his documents, although he did not necessarily agree with everything he stated and wrote. Mr. Collins emphasized that this was a very important issue that could have great implications for the community, and he was skeptical that anything he could do would make it more likely to change the strategic planning process. He stated that he would come to this meeting and express his interest in the potential for the planning process Rivanna would be undergoing in the next year, and would encourage them to make the process more translatable, visible, – and something of this important would thus be widely distributed to the public.

Mr. Collins stated that he would inform Dr. Gullick of what happened at this meeting, as he had been unable to attend. Mr. Collins stated that Dr. Gullick was very cordial and was impressed with Rivanna's work in general, but he felt that the planning process was confused and he did not want to get into internal issues. Mr. Collins noted that it was evident to him that Dr. Gullick was interested in those things. He added that he and the public in general would be interested in how the next year and strategic planning would proceed.

Ms. Dede Smith addressed the Board and commended Rivanna on its minutes, particularly those from the June meeting. Ms. Smith stated that years ago, she had been at a public water meeting and a DEQ official – in response to a question she had about sediment in the South Fork – had stated that the real problem was during a storm because that reservoir became a huge mixing bowl that threw sediment over the dam. She stated that the minutes were the first time she had ever seen it quantified, and it was incredible to her to see the numbers put to the volume of sediment versus what normally went over the dam. Ms. Smith stated that this also illustrated an environmental issue that came with that reservoir, and Dr. Gullick's pipeline concerns were often framed in terms of environmentalism.

Ms. Smith stated that she has a question as to whether the pipeline was being put in for water supply or for environmental reasons. She also stated that she had recalled that it was illegal to plan beyond 50 years, and there were 40 years left in the community's 50 years, with the premise that you could only build up for 50 years and could not hoard water. Ms. Smith commented that this spoke very directly to the issues that were brought up, particularly to the pipeline as it related to demand and the upcoming demand study. She stated that she was also very concerned about who would pay for the pipeline, and if it was going to be put in for reasons other than being

required for the water supply and the 50-year timeframe, she had questions as to whether the urban ratepayer should get the bill. Ms. Smith stated that if it was being put in for other reasons, the question was, shouldn't everyone be paying.

6. RESPONSES TO PUBLIC COMMENTS

Mr. Mawyer stated that there had been a speaker in June (Dr. Richard Gullick) who made comments about misinformation, a coverup, a conspiracy, a deception equal to malfeasance, etc. He stated that he found those terms to be very concerning and disappointing to him, as he felt that staff and the Board had tried to be very open and up front with all the reasons the project was being contemplated, the purpose and what the benefits were. He stated that Rivanna had been to many meetings with City Council, the Board of Supervisors, and the ACSA Board – as well as holding a public meeting with people in the Hydraulic Road area, as they were along the path of the project. Mr. Mawyer noted that there was also information on Rivanna's website and he had done interviews with several reporters, adding that he found it disappointing that the information was either not getting out there or was getting out as misinformation.

Mr. Mawyer stated that over the past several weeks, Rivanna staff compiled five pages of information to supplement the one-page project overview, which was posted online in April. He stated that some of the key points to note were that the purpose of the waterline project was to ensure the community had an adequate drinking water supply for the next 50 years, and the process the community went through was extensive. He stated that in 2001 and 2002 there was a "harsh and extensive" 18-month drought that generated mandatory water restrictions on residents and businesses – even to the extent of restaurants serving food on paper plates and car washes needing to be shut down. Mr. Mawyer stated that there had even been anecdotal discussion of asking UVA to send its students home, and the drought was now considered the drought of record back to the 1960s or even the 1930s.

Mr. Mawyer stated that when the drought was over in 2002, the community demanded that the water providers fix the problem and come up with a plan so they didn't have to go through the severe restrictions again. He stated that elected and appointed officials all worked collectively with the community, with 10 years of public meetings and planning, to develop the community water supply plan that was to address the supply of water for the next 50 years. Mr. Mawyer stated that the minutes provide insight into the vast breadth of opinions and views of what the solutions were, adding that there were 33 alternatives discussed in the community – from dredging the South Rivanna Reservoir to bringing water from the James River to expanding the Ragged Mountain Reservoir. He noted that the Upper and Lower Ragged Mountain Dams were rated insufficient and unsafe by the dam safety agencies, and work had to be done on them, and the Ragged Mountain Reservoir was filled with a pipe from Sugar Hollow that was almost 100 years old.

Mr. Mawyer explained that ultimately, the community devised a community water supply plan and stated they would build a new Ragged Mountain Dam, with a pipeline from the Rivanna Reservoir over to Ragged Mountain so they could fill the new, larger reservoir; and even though they were going to build a dam at a certain height, they were not going to fill it fully. He stated that the City had been insistent that the natural area around Ragged Mountain be maintained and

316 not inundated with water until the community needed it. Mr. Mawyer stated that the Ragged
317 Mountain Dam agreement was written between the City, the County, the Service Authority, and
318 Rivanna – and it directed the RWSA to put the pipeline in and raise the water level in Ragged
319 Mountain Reservoir only when the demand equaled 85% of the supply.¹

320
321 Mr. Mawyer stated that regarding the question of why they just can't add the 12 feet of water
322 now, the answer is that contractually they cannot do that. Mr. Mawyer stated that they have an
323 agreement with the City and the ACSA that Rivanna would only do it when one of them asked
324 that it be done, when the demand equaled 85% of the safe yield. Mr. Mawyer stated that this
325 further required Rivanna to assess safe yield and demand with the first assessment being
326 completed by the year 2020 and every 10 years thereafter. He stated that Rivanna's staff was
327 currently in the process of doing a new demand study and safe yield study of South Rivanna
328 Reservoir and Ragged Mountain, with safe yield measuring how much siltation had come in,
329 what volume was left, and what safe yield they have. He noted that safe yield measured how
330 much water could be taken out of the reservoir every day during the drought of record without
331 depleting the water in the reservoir. Mr. Mawyer emphasized that Rivanna has an obligation to
332 follow that contract.

333
334 Mr. Mawyer stated that the community water supply plan was also very specific about safe yield
335 and about achieving other community values, including using existing infrastructure and
336 replacing aging infrastructure, and was specific about regaining the natural conditions in the
337 Moormans River and the South Rivanna watershed. He stated that while the plan was formally
338 approved in 2012, it and was practically completed in 2006, because Rivanna applied to the
339 Army Corps and the VDEQ in 2006 for the permit to build the new dam and the pipeline. Mr.
340 Mawyer stated that the community had already effectively already approved it, City Council had
341 endorsed it and had held two additional years of hearings about the issue but ultimately approved
342 the plan in 2008.

343
344 Mr. Mawyer reported that the permits had been issued from the Army Corps and DEQ in 2008,
345 with the Corps permit expiring in 2018 but being renewed for five more years and the DEQ
346 permit expiring in 2023. He stated that Rivanna had met with DEQ the previous day and asked
347 when they anticipated the pipeline to be built, and their response was in the 15-year timeline of
348 the permit, practically speaking. Mr. Mawyer stated there was some literature indicating the
349 pipeline was expected to be built by 2021 – but that was clearly not possible, and Rivanna had
350 asked the Board in the capital improvement program to consider four separate schedules of when
351 they might want to build the pipeline, so they could put it into the financial planning model and
352 help the Service Authority and the City with their financial models and funding devices to
353 strategically plan for project.

354
355 Mr. Mawyer emphasized that there had been a huge amount of discussion for 10 years in the
356 community, from 2002 to 2012, to come up with the plan that included building the dam and the
357 pipeline. He stated that when people say the drought of 2017 was being used as an excuse to
358 build the pipeline, he wanted it to be clear that the pipeline had been planned since 2006 and was

¹ Editor's Note: Section 3 of the Ragged Mountain Dam Project Agreement specifically provides this 85% trigger for increasing the water level of the Ragged Mountain Dam. Section 2(d) of the Agreement, providing for the SRR-RMR pipeline has no such trigger requirement.

not a result of the water restrictions in 2017. Mr. Mawyer stated that people had questions about why the water went out of the reservoir in 2017, and Rivanna has consistently been transparent with its response.

He stated that there were three primary reasons, including leaking gates that leaked about 3 million gallons a day for about two months, which accounted for approximately 180 million gallons of the almost 500 million gallons that went out of the reservoir. Mr. Mawyer stated they had always been up front about it and had never tried to conceal that information. He stated they had also had concerns about the USGS DEQ gauge, which indicated that 70% of the water was being released – and DEQ came back and stated those readings were too high. He noted that the third reason was that the community was in drought conditions, and the Virginia Drought Monitoring Task Force issued a press release October 11, 2017 that stated the Middle James region (includes Albemarle and Charlottesville) was in a drought watch condition, with low rainfall and stream flows. Mr. Mawyer stated that comments have been made that from August to September 2017 our area had more rain than the three prior years. But for the year 2017, rainfall was 11 inches low. He stated that even though they may have had rain over a short period, 2017 was not a high rain year.

Mr. Mawyer commented that he had done an interview in November 2017 about the leakage from the gates and the possibility that Rivanna could have released less from one gate had the release been monitored more closely. He stated that one person had suggested that switching operations away from South Rivanna to Observatory Water Treatment Plant in August instead of doing it in October, that would have saved a lot of water – but the reservoir had been 77% full on September 17, and the community had been expecting multiple tropical storms coming up the coast. Mr. Mawyer stated that Rivanna had always acknowledged that the reservoir dropped from 77% full to 42% full between September 17 and October 3, with the gates, drought-like conditions, the USGS/DEQ gauge, and possibly other items being factors. He emphasized that Rivanna has always been transparent with that data to anyone who asked.

Mr. Mawyer stated that the community water supply plan and the drought of 2001-2002 were the drivers for where they were now in building a pipeline. He noted that the RWSA Board would get the demand study and safe yield study in a year or so, and in their routine annual process of reviewing the CIP and the 34 projects within it, they would prioritize those. Mr. Mawyer stated that the plan was to build the pipeline in the timeframe of 2027 to 2040, with an estimated eight years needed to build it – and it could accelerate or decelerate in the future, with the Board having an opportunity to look at reliability and other factors. He stated that the current permit states that in the Sugar Hollow Reservoir, they release 100% of the inflow from Sugar Hollow to the Moormans River below, and the new permit stated that after the pipeline was built only 90% must be released. Mr. Mawyer stated that this had been discussed with the implication of the pipeline being bad for the river. He stated that four million gallons per day were currently transferred out of Sugar Hollow to fill Ragged Mountain, which would no longer be required after the pipeline was built, so the reservoir level as a whole would stay higher and there would be more water to release to the river. Mr. Mawyer added that the 90% was more reflective of natural flow in the Moormans, which was an objective of the original community water supply plan dating to 2006.

Mr. Mawyer reported that the Ragged Mountain Dam was completed in 2014, and 1 billion additional gallons had been added for a total capacity of 1.5 billion of water storage in the reservoir, which was a big part of the water supply solution. He stated that they were in the process of designing a construction upgrade to the Observatory Water Treatment Plant, which takes water out of the Ragged Mountain Reservoir, and to increase that capacity from 5-6 million gallons per day treatment capacity to 10 MGD. Mr. Mawyer emphasized that the water supply must be treated, piped, and distributed for someone to use it at the tap, which was the ultimate destination. He noted that it was expected for Observatory to be upgraded to more capacity within the next five years, adding that Rivanna had been working on the nine-mile pipeline for the Rivanna to Ragged Mountain route – as well as updating the water demand studies that predicted more water would be needed by 2040.

Mr. Mawyer mentioned that Rivanna's graphs support the claim that water demand had slowed down in the community, and in 2006 the demand was 9-12 MGD, with the average monthly demand over the 12 months leading to July 2018 being 9.1 MGD. He noted that the former study had predicted that they would need 14.5 MGD by 2025, but Rivanna felt that this would likely not be the case once the new study was completed. Mr. Mawyer stated that the new data would be brought before the Board, which would make the decision as to when the project would occur, but no one had committed to shovels in the ground at this point. He emphasized that the community water supply plan involved 10 years of discussion, agreement, and disagreement, which yielded the plan on which Rivanna was proceeding.

Dr. Palmer thanked him for the comprehensive review, and clarified that no one had committed to a time for the shovels in the ground – but that was not the case for whether or not to do the project, as the pipeline was part of the community water supply plan.

Mr. Mawyer agreed, stating that he meant the timing of when the shovels went in the ground.

Dr. Palmer stated that during the drought in the fall of 2017, the decision to decrease the release into the South Fork required Rivanna to go to the DEQ, who in turn stated that in order to decrease the release from the reservoir they must place water restrictions on the public drinking water customers.

Mr. Mawyer explained that DEQ was charged with protecting the environment of the state and allocating those resources, such as drinking water supply, so DEQ would say they control all the waters of the state – including the Rivanna River. He stated that when the RWSA asked to withdraw water from the Rivanna River and Rivanna Reservoir, they were required to get a permit to do that.

Dr. Palmer added that to preserve the water in the reservoir, the DEQ must grant permission because Rivanna would be altering permit conditions.

Mr. Mawyer clarified that when Rivanna applied for the permit to build the new dam, take more water out of the local streams, the Rivanna Reservoir, and the Ragged Mountain Reservoir, DEQ agreed but stated this was a sharing agreement between the environment and the community – with each getting water. He stated that part of Sugar Hollow's permit requirement is that 100%

of water coming in had to be released to the stream, with 70% of water coming into Rivanna Reservoir having to be released to the stream. He explained that when the reservoir level started to decline from September 17 to October 3, they were looking at where all the water was going as they were taking 8 MGD to be treated at the water treatment plant with 3 MGD leaking out through gates – with the level dropping much quicker than anticipated.

Mr. Mawyer stated that Rivanna called DEQ immediately and stated they needed to stop releasing so much water into the river until they could get the reservoir refilled, and DEQ agreed but stated it was a “balancing situation” that would require the community to share some of the reduced flow into the river by going into mandatory water restrictions. He added that it was DEQ’s requirement prior to granting Rivanna a variance to have the release reduced from 70% down to 10% of inflow, and the RWSA held a special meeting on October 5 to address the issue and the pending water restrictions. Mr. Mawyer added that all three parties – the City, County, and ACSA – approved the mandatory restrictions as required by the DEQ.

Mr. O’Connell asked what the timeframe was for the demand study that included a bathymetric survey of the reservoirs – particularly the public comment timeframe.

Mr. Mawyer responded that it would be 12 to 15 months, with a boat to be put on the reservoirs with a device that measured the bottom, then calculations done to assess the reservoirs’ volumes. He stated that there would also be a separate consultant studying population growth and trends over the last few years, what may happen in the future, and the County and City’s information regarding building permits and trends that planning groups use to project growth over the next 50 years. He stated that the reservoir studies would look at how much siltation occurred since the last measurement of the reservoirs, and those studies would be completed and combined to create two graphs that show demand trends and projected future water usage.

Mr. Mawyer stated that this would also include analysis of water conservation measures, low-flow toilets, low-flow shower heads, and other things that are contemporary within a water conservation regimen of what water demand would be and how much water would be available. He noted that they would need to make sure that the water available at least exceeded the water demand; otherwise they would be at much higher risk for mandatory water restrictions if there were another extended drought. Mr. Mawyer mentioned that he had been at a conference where a speaker stated, “The next drought of record could start tomorrow,” especially given unpredictable long-term weather patterns.

Mr. Mawyer emphasized that they needed to be prepared, and as engineers they wanted to have the facilities in place beforehand – not afterward – and the community would not likely embrace extended mandatory restrictions due to RWSA not being able to fulfill those needs.

7. CONSENT AGENDA

a. Staff Report on Finance

b. Staff Report on Ongoing Projects

497 *c. Staff Report on Operations*

498
499 *d. Recommendation: Award Construction Contract for the Crozet Interceptor System Pump*
500 *Station Improvements Project; Anderson Construction, Inc.*

501
502 **Dr. Palmer moved to approve the Consent Agenda as presented. Ms. Galvin seconded the**
503 **motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the**
504 **vote.**

505
506 **8. OTHER BUSINESS**

507
508 *a. Presentation: South Rivanna Dam Update - Gates and Meter: Jennifer Whitaker, Director of*
509 *Engineering & Maintenance*

510
511 Ms. Whitaker reported that she would spend time walking through some of the history of the
512 September/October 2017 event and how it ties into the bigger picture and some of the discussions
513 held to date. She stated that she wanted to present all of the work Rivanna had been doing on the
514 downstream side of that equation, and in August she would return to address the upstream side,
515 USGS gauges, inflow, and all the information that is upstream from the dam. Ms. Whitaker stated
516 that the information presented at this meeting would include everything investigated in the dam
517 itself – things that Rivanna largely controlled and would continue to have operational control
518 over.

519
520 Ms. Whitaker stated that the South Fork Dam was built in the mid-1960s and was about 70 feet
521 tall and 700 feet long, and it was under federal jurisdiction because there was a small
522 hydroelectric power plant. She noted that there had been a question about inspection after the
523 flood and there was as FERC inspection, and they came and looked at that facility as part of their
524 routine annual review. She stated that the dam and reservoir were part of the urban water supply,
525 with almost 1,300 million gallons of total storage and just over 880 million gallons of usable
526 storage.

527
528 Ms. Whitaker presented a photo and stated that the reservoir was on the left side, with the raw
529 water pump station being integral to the dam facility itself. She noted that the boat ramp was on
530 the upstream side, hydroelectric went down the slope, and she presented a photo that showed the
531 north and south mud gates and a pipe running from the reservoir side adjacent to the raw water
532 pump station through the bank down to the hydroelectric facility and into the river. Ms. Whitaker
533 presented a photo showing the north tower and north side, south tower and south side, the raw
534 water pump station, the apron, and the hydropower facility. She stated that the picture showed
535 typical dry summer conditions, and that the face of the dam only dried up every several years.

536
537 Ms. Whitaker stated that the tower and gate were the points of control, with the outlet being
538 where water exited the structure – and there were two different locations in all facilities where the
539 gate was controlled and the water exited. Ms. Whitaker noted that in the south tower and south
540 gate, the tower sat on top of the dam and the south mud gate was where the water actually exited.
541 She stated that there was a 36-inch pipe that traveled thru the dam and the top picture was the
542 north mud gate outlet, which was in the bottom of the stairs where the pipe came out to the roller

543 bucket. She noted that the gate was discharging water into the trough, which took water from the
544 top of the dam and directed into the center channel so the embankments were not overflowed.

545
546 Dr. Palmer asked which ones had been a problem in the drought in 2017.

547
548 Ms. Whitaker responded that it was both gates, noting that there were three penetrations in the
549 dam; all of them were an issue.

550
551 Ms. Whitaker referenced the hydropower side of the dam, noting the location of the hydropower
552 outlet in the picture, the south mud gate outlet, and the tower and the gate – which were separate
553 from the outlet points. She presented photos showing the reservoir, the drop in elevation, and the
554 recovery. She stated that Rivanna had implemented a few mitigation measures: reducing demand
555 through water restrictions, and they switched in October between the South Rivanna and
556 Observatory water treatment plants from the typical 8 Rivanna/2 Observatory mgd production to a
557 5/5. Ms. Whitaker stated that on any given day, the numbers were slightly up or down from there.
558 She stated that staff identified the leaks from the gates and was able to reduce it to about a 0.5
559 million-gallons per day, and in the process found a flaw in the SCADA system which was
560 registering flow in the meter and corrected it – coordinating extensively with DEQ through the
561 whole process.

562
563 Ms. Whitaker stated that she talked about the three penetrations: north, by Miller's Cottage Lane;
564 south, where the meter is; and the hydropower penetration. She stated that with the north mud
565 gate and hydropower facility, the gates were constructed in 1966, and Rivanna was releasing
566 about 3 MGD. Ms. Whitaker referenced a picture taken during the drought and stated that the
567 water coming out plus what was leaking out of the hydropower facility was about 3 MGD. She
568 stated that in looking at that, it may not seem like a lot of water – but over time, it created a
569 problem. Ms. Whitaker stated that there was a brand new leaf screen with a flow meter on the raw
570 water pump station, and the water coming out dumped into the roller bucket on the south side.
571 She stated that they have visual observations on the roller bucket on the north side and were able
572 to compare a known quantity of water to a known quantity of water on the other side, and make
573 an estimation of how much they were actually releasing. Ms. Whitaker emphasized that it was not
574 a precise measurement but was a comparison to a known measurement, which was how staff was
575 able to estimate it.

576
577 Ms. Whitaker stated that Rivanna had brought in some industrial divers who spent a lot of time
578 working at dams around the Mid-Atlantic region, and they confirmed there were leaking gates –
579 because typically gates around water supplies leaked and were not intended to be completely leak
580 proof. She stated that they looked at ways to address it, and it was recommended by them to put a
581 mix of material in that basically caused a seal. Ms. Whitaker stated that the dive team suggested
582 that Rivanna use a combination of cypress mulch, which doesn't degrade as badly as hardwood
583 mulch or other types of material, and a natural kitty litter comprised of ground clay with some
584 bentonite in it. She explained that the kitty litter was safe for the water supply and was put in on
585 the upstream side, then sucked against the gates to seal them off.

586
587 Mr. O'Connell asked when that happened.

588

589 Ms. Whitaker responded that it was early October 2017 and confirmed that it happened soon after
590 staff realized what was going on in the South Rivanna Reservoir.

591

592 Ms. Whitaker reported that in each of the towers at all three of the penetrations, there was a
593 chamber that revealed the reservoir on the upstream side, with flow coming into the chamber
594 from the reservoir through the concrete in the dam through the bulkhead gate. She explained that
595 a bulkhead gate was a slide gate that sat on rails and had the ability to go up and down, normally
596 sitting in the up position, and the chamber was fairly deep within a confined space.

597

598 Dr. Palmer asked if it was currently open or closed.

599

600 Ms. Whitaker responded that it was open, with water coming into the bottom, and she noted that it
601 was believed to have been open since 1966. She noted the location of the actual mud gate. She
602 indicated that there was a pipe stem attached to the wall that went down into the water, and before
603 the meeting there was a question about the piece that was actually moving – so she pulled up a
604 picture of what was put in at Ragged Mountain, as she wanted the Board to get a feel for what
605 was underwater at the end of the valve stem. Ms. Whitaker explained that what was at the end of
606 the valve stem was a gate that covered the hole, as pictured, with the stem holding the gate up and
607 the gate being pushed down or pulled up as the stem was activated. She stated that the issue was
608 having to go into the dam structure, as there was a bulkhead, a gate underwater, and confined
609 space. Ms. Whitaker stated that when the clay bentonite and cypress mulch material were put in, it
610 could go against the chamber and be sucked against the gate or put in the reservoir and sucked
611 through the bulkhead opening and into the gate.

612

613 Dr. Palmer asked if the divers went into that area.

614

615 Ms. Whitaker responded that they could go either into the reservoir side or into the mud gate side.

616

617 Ms. Galvin asked if the bentonite and cypress mulch were just sucked in to plug the holes through
618 some divets.

619

620 Ms. Whitaker confirmed that this was the case. She explained that water was moving slowly and
621 approached the opening then sped up, and it was a little faster so the material was just sucked in
622 to plug those holes.

623

624 Ms. Galvin asked how often the material must be replaced.

625

626 Ms. Whitaker noted that the north mud gate and hydropower had not leaked at all since the
627 material was put in, in October 2017, as the clay expands and binds with the mulch to create a
628 seal material.

629

630 Ms. Galvin asked if there was resin on the cypress mulch that created the seal.

631

632 Ms. Whitaker responded that it wasn't really resin, it just bonded like concrete – in the same way
633 yard mud and mulch might mix together to form a wet seal.

634
635 Dr. Palmer commented that they would have to go into that side for it to be sucked up against the
636 gate.
637
638 Ms. Whitaker replied that it could also be on the reservoir side, as the water was moving from the
639 reservoir along the flow arrow into the chamber and along the flow arrow into the gate. She
640 confirmed that it needed to be sucked up against the gate, not against the open bulkhead – which
641 would come into play when they began discussing what to do in the future.
642
643 Dr. Palmer commented that it seemed that it would be more difficult to get it to the gate on the
644 other side.
645
646 Ms. Whitaker confirmed that there were some logistical issues that would be mentioned when
647 they discussed diving.
648
649 Mr. O’Connell asked if she was going to cover the permanent fix in this presentation.
650
651 Ms. Whitaker confirmed that they would be.
652
653 She reported that the south mud gate was also constructed in 1966, but Rivanna installed a new
654 meter in 2016 as part of the water supply plan – a band meter that went inside the pipe and was
655 installed by the manufacturer onsite and certified as properly functional. She stated that they
656 started with a theoretical investigation of what was going on in the outlet structure through the
657 meter, shortly after October 2017, and they had people come out and do some measurements and
658 look at the meter and setup. Ms. Whitaker stated that what became quickly obvious was that this
659 was not a theoretical exercise, and from the study they could tell they had reasonable flow
660 measurements at low levels – but high levels, the hydraulics were not performing as a theoretical
661 engineering flow. She stated that they had done all they can do on paper and needed to find
662 another approach, so staff began talking to Rivanna’s consulting reservoir specialist and ended up
663 talking to DEQ’s stream gauging staff, who also calibrated all of the stream gauges and helped
664 with prior issues at Sugar Hollow.
665
666 Ms. Whitaker stated that in April, the DEQ crew brought all of their equipment and worked with
667 Andrea Terry and Victoria Fort of Rivanna staff: running the meter in the south mud gate, taking
668 stream flow measurements, and developing conclusions from that information. She stated the
669 team worked in several places in the stream to set up a cross-section, taking stream flow
670 measurements, reading the SCADA data to see what the meter indicated about what was being
671 released versus what was being physically measured in the stream. She stated that they were able
672 to take different flow readings, what DEQ was able to read, and the percent difference – and at
673 about 9 MGD, with the flow meter currently reading very reasonably.
674
675 Ms. Whitaker noted that they also found that between the 9 and the 20-million per day cap, the
676 higher the velocity the more the meter was off. She stated that they plotted that information and
677 created a calibration curve that showed when the meter read a certain level, what was actually
678 coming out of it. Ms. Whitaker explained that the hydraulics were not going to change in the dam.
679 The idea of drilling or boring another type of discharge structure in the dam was a cost-

prohibitive approach, and physically it was challenging to see how they would do that. She emphasized that they needed to use existing facilities and find a way to use those facilities. Additionally, they were working with DEQ to reestablish a river gauging station just under the Berkmar bridge. Ms. Whitaker noted that DEQ approached Rivanna as well as both City and County parks and recreation departments to consider the river gauge, and the Rivanna River Company along with other recreational river users were interested in it.

Ms. Whitaker stated that RWSA indicated that they would like to partner and offered to pay for the capital and reinstatement costs, which would allow DEQ to have a permanent flow meter in this location. Ms. Whitaker stated that the reason it mattered was because it provided an opportunity to calibrate the meter coming out of the dam and provide a clear picture of what was necessary to keep it calibrated. She explained that one of the findings of the process was that there were times they just stopped spilling over the South Fork spillway – and they were required to release 70% of inflow or a 20 MGD cap. Ms. Whitaker stated that they found that the early phases of the dry period or drought when they were required to release 20 MGD, there were several days when they were releasing more than 30 – 35 MGD. She noted that as they got closer to the 10 MGD release rate, they got increasingly more accurate, so it impacted the beginning of the drought and was cited as one of the reasons the reservoir plummeted so quickly.

Ms. Whitaker explained that in an effort to get a feel for the gates and what should be done long-term, RWSA contracted with Schnabel Engineering, who brought in an industrial diver to come in and dive the facilities and look at the condition of the gates and bulkheads. She stated that they have estimated a cost of \$300-325K to replace the two gates, which was basically to lower the bulkheads in and remove the gates – with some opportunity to refurbish them possible. Ms. Whitaker presented photos of the dive rig, noting that the chambers were very deep and went under the height of the normal reservoir pool. She stated that it would require a full dive rig to do that work. Ms. Whitaker reported that the hydropower facility was currently sealed, with plans to relinquish the exemption – which would require a decommissioning plan. She explained that there was a 72-inch plate that sat in the chamber on the other end of the actuator at 65 feet deep, and that would all come out, with plates and gaskets then permanently sealed.

Ms. Whitaker summarized her report that the hydropower facility was no longer leaking downstream, there was no water seen or heard coming out of it; the north mud gate was temporarily sealed, the south mud gate meter had been calibrated and would be adjusted via the calibration curve. They determined in the SCADA a more accurate method of calculating the daily total flow coming out of the meter. They were working with DEQ to reestablish the South Rivanna River gauging station, and they were discussing about the cost benefit of going in and physically replacing the two mud gates. She pointed out that they knew that this was a big component of what the problem was and had spent the last nine months deep diving into the causes and the solutions.

Mr. Gaffney commented that the Board had heard parts of this over the last nine months, but her detailed report had provided great information.

Ms. Whitaker responded that the reassurance for staff was that they knew they had much more control and knowledge about how all of this worked going forward, so the second the water

726 stopped spilling over the reservoir, there were actionable items in place that would prevent this
727 from being an issue going forward.
728
729 Mr. O'Connell asked when she envisioned the funding or project being in place to make all the
730 repairs.
731
732 Ms. Hildebrand noted that staff would need to come back to the Board with a request for funding,
733 and asked when they anticipated coming back to them with a permanent solution.
734
735 Mr. Mawyer responded that staff would likely have a recommendation for the Board in August,
736 noting that the release requirement only applied when the flow was not going over the reservoir –
737 so it did not happen often. He stated they knew currently that they had a certain amount leaking
738 out of the gates, but that was subtracted out of the amount they were required to release and took
739 credit for it, so in that respect it did not hurt anything. He stated that staff wanted to have that
740 discussion with the Board as to whether they wanted to spend the money to fix a half-million
741 gallon “leak”, or just account for it every day and continue as we are, as it was questionable as to
742 how much that amount could be reduced.
743
744 Ms. Whitaker added that even a brand new gate would have some leakage, and Rivanna’s permit
745 allowed that amount to be subtracted out.
746
747 Mr. Mawyer stated that in October 2017, when they came to the realization that there were leaks,
748 staff began subtracting that from the required release immediately once it was quantified.
749
750 Mr. O'Connell asked if DEQ had agreed with all the math they were using.
751
752 Mr. Mawyer confirmed that they had.
753
754 Ms. Whitaker stated that it was important with raw water supply gates to remember that the whole
755 point of them was to hold back 800 million gallons of water. She stated that it did a very good job
756 with that, but with metal sitting in the water over time, there was some deterioration at the edges –
757 and the dive showed there had been a little bit of deterioration, which was where the leak was
758 coming through. She noted that they would never leave a gate that was questionably functional,
759 but this one was completely functional from a dam safety perspective and the question was
760 whether it had served its life and needed to be replaced.
761
762 Mr. Gaffney stated that staff would return with options as opposed to a specific solution.
763
764 Ms. Hildebrand asked if there was concern that the repairs to the north mud gate would not be
765 long term since they were temporarily sealed, but she understood that staff was watching it.
766
767 Mr. O'Connell asked if her question was how long the kitty litter would last.
768
769 Ms. Whitaker clarified that staff was watching it and did work with the divers, who provided a
770 procedure and where to buy the material, and there were other ways to plug it on a temporary
771 basis. She added that there were valid questions as to whether the 1/2 MGD was worth repairing.

772
773 Dr. Palmer asked if they could plug it without diving.
774
775 Ms. Whitaker responded that the divers had done it originally but it could be plugged without
776 diving, noting that the facility was highly dependent on weather so if they were having very high
777 flows, it was hard to get in and around the dam for safety reasons. She explained that bringing the
778 divers in made it much faster because they had all the protective equipment and were able to tie
779 off, with water done from the surface not as effective as subaqueous work. She added that over
780 the course of several days, they could mitigate a leak.
781
782 *b. Presentation: Capital Construction Update: Scott Schiller, Engineering Manager, Engineering*
783 *& Maintenance*
784
785 Mr. Schiller reported that Rivanna had been installing GAC systems at the five water treatment
786 plants and had some other general improvements to the plants as well, such as a new chlorine
787 contact tank and new lime feed at South Rivanna, and new chemical feed systems in Crozet. He
788 stated that the GAC project was substantially complete in May 2018, and there were already good
789 indications of reductions of DBPs in the system as a result of that. He stated that the work had
790 been performed by Ulliman Schutte, at a budget of \$29 million, with final completion expected in
791 the next few weeks.
792
793 Mr. O'Connell asked if there had been a delivery to Observatory.
794
795 Mr. Schiller responded that the material had been delivered, and it was a matter of getting it to the
796 vessels that was a challenge.
797
798 Mr. Mawyer noted that it would be installed either this week or next.
799
800 Mr. Schiller added that all of the other facilities were in place and operating.
801
802 Mr. O'Connell asked if it was fair to say that all the others were at 100% operation.
803
804 Mr. Mawyer responded that they were, but North Rivanna had a pressure disk that activated and
805 they were putting in a new disk, so that was technically down but it was being repaired by
806 installation of the new disk.
807
808 Mr. Schiller reported that the Moores Creek odor control project had new grit facilities with
809 covers over headworks and primary clarifiers, and he noted the location of a grit collector in the
810 structures, with the facility actually washing the grit before its discharge.
811
812 Mr. Mawyer asked him to point to the gate on the wastewater system that was up, noting that it
813 could be lowered to cut off flow from going into the wastewater treatment process, so it was
814 similar to the reservoir gate.
815
816 Mr. Schiller reported that it also included a new bio-scrubber, as pictured, and they were able to
817 bypass the EQ tank, which was part of the process as well and was a fairly large source of odors.

818 He stated that the work was substantially complete in May 2018 and had a budget of about \$10.4
819 million.

820
821 Mr. Schiller stated that the Crozet Finished Water Pump Station project replaced the existing
822 pump station, which dated to the 1960s and had served its useful life. He stated the new station
823 would have a higher capacity and was designed to be expanded. He stated that there were VFDs²
824 included so there were a number of different improvements beyond what was there previously. He
825 stated the work was being done by Anderson Construction, and he referenced an image of the new
826 facility and the new generator that would power the entire treatment plant. Mr. Schiller stated that
827 the project was about 90% complete, with final completion scheduled for September and an
828 overall budget of \$2.6 million.

829
830 Mr. Schiller reported that the next project was the roofing project at the Moores Creek facility,
831 with the majority of the roofs being part of the facilities expansion in the early 80s and the
832 administration building being upgraded a few years ago. He stated that the maintenance facilities
833 and pump stations at the plant, as well as the blower building, would be part of this project. Mr.
834 Schiller stated that the work was being done by Triangle Roofing, who also did the administration
835 building, and they would be installing roofs and lightning protection systems at all the structures.
836 He noted that they were about 95% complete at this point, with a few downspouts and work on
837 exhaust fans to be done, but the roof system was pretty much intact.

838
839 Mr. Gaffney asked about the expected lifespan for these roofs.

840
841 Mr. Schiller responded that there was a 20-year watertight warranty on them, with the previous
842 ones lasting close to 40 years. He added that the project was estimated to be completed in
843 September, with an overall budget of \$1.2 million.

844
845 Mr. Schiller reported that the Ivy Transfer Station project involved a new solid waste transfer
846 facility of 11,600 square feet, and he referenced a view of the front entrance and the big collection
847 hopper where the container would be located. He stated the contractor was Lantz, and the project
848 was about 85% complete, with work currently being done on the access roads in that facility –
849 with plan for substantial completion and operation in August. Mr. Schiller noted that once the
850 new facility was up, there would be demolition of the old facility and some additional work
851 onsite, with a total project budget of \$3.06 million.

852
853 Mr. Mawyer mentioned that Rivanna planned for the ribbon-cutting to be held August 23rd.

854
855 Mr. Schiller reported that the wholesale water metering project consisted of 25 new meter vaults
856 to be located at City and County boundaries, with 23 of the 25 vaults installed but some of them
857 having reporting errors, so they were working with the manufacturer to get them resolved. He
858 noted that the two remaining vaults were to be completed, one being worked on by Faulconer
859 Construction. He stated that Linco did the majority of the facilities, but Faulconer had been
860 brought in to do the more difficult site. He noted that the overall project was about 95% complete,

² Editor's Note: VFD's are variable frequency drives.

with construction work to be done and the program to be in place in September 2018, with a budget of \$3.6 million.

Mr. Schiller reported that the project to install a second centrifuge in the solids handling building at Moores Creek was intended to take the place of the old filter press that backed up to the existing centrifuge, which would help improve redundancy, operational efficiency, and odor control. He stated that this was done as a change order to the odor control project, with MEB Contractors doing the work – with the project completed in May 2018 and having a budget of \$1.29 million. He noted that this was above the floor where the containers collected dewatered solids.

Mr. Schiller reported that the digester coating project was complete at digester #1 to better seal the inside of the structure and contain the methane within the structure itself. He stated the pilot testing of the coatings in digester #1 was successful, with more methane collected and improved odor control, gas collection, and structural integrity of the new basins themselves. He stated that this was done through Lyttle Utilities, with digester #1 finished in April 2018 and work begun on digester #2, with plans to move forward with digester #3 in the near future. Mr. Schiller mentioned that the total overall budget was \$1.54 million.

Mr. Gaffney asked if there was an estimate on money saved by using the methane versus the gas.

Mr. Schiller responded that he was not aware of that.

Mr. Castillo stated that they were capturing about 40% more at digester #1, but they had not yet figured out what that equated to in savings.

Mr. Mawyer mentioned that they were preparing to do an assessment of that because some of the equipment was due for replacement and they wanted to make sure there was value there before they proceeded.

Mr. Schiller stated they were moving into a number of design and study projects, but there was also the expansion of the Crozet Water Treatment Plant and the Crozet flow equalization tank coming up in Spring 2019, at the same time as Observatory and South Rivanna improvements.

9. OTHER ITEMS FROM BOARD/STAFF NOT ON AGENDA

There were no other items presented.

10. CLOSED MEETING

There was no closed meeting held.

11. ADJOURNMENT

905 **Mr. O’Connell moved to adjourn the meeting. Dr. Palmer seconded the motion, which**
906 **passed 5-0. Mr. Jones was absent from the meeting and the vote. Ms. Galvin had left the**
907 **meeting and was not present for the vote.**

908
909 **The RWSA Board adjourned the meeting at 3:50 p.m.**
910

DRAFT

MEMORANDUM

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

FROM: BILL MAWYER, EXECUTIVE DIRECTOR

SUBJECT: EXECUTIVE DIRECTOR'S REPORT

DATE: AUGUST 28, 2018

Recognitions

SP GOAL: Workforce Development

Our Laboratory recently passed a certification inspection from the Virginia Department of General Services / Laboratory Certification. Congratulations to our Lab Manager, Dr. Bill Morris, and his staff, Patricia Defibaugh and Debra Hoyt.

Beaver Creek Dam Improvements

SP GOAL: Infrastructure and Master Planning

We received grant funding in an amount up to **\$32,800** for the Beaver Creek Dam Modifications project from the Dam Safety, Flood Prevention and Protection Assistance Fund administered by the Virginia Department of Conservation and Recreation. Our Senior Engineer, Victoria Forte, identified this grant opportunity and submitted all of the supporting documentation.

South Rivanna Dam Gate Repairs

SP GOAL: Infrastructure and Master Planning

Repairs to the gates will be included in next year's Capital Budget, FY 2019 – 2020.

Community Outreach

SP GOAL: Communication & Collaboration

Our Water Resources Manager, Andrea Terry, gave a presentation on Reservoir Water Quality and Management to the Albemarle County Service Authority Board of Directors.

I gave a presentation to the members of the Cove Garden Ruritan Club about our Community Water Supply Plan and Solid Waste facilities earlier this month.

We will be meeting with the Beaver Creek Reservoir sculling club and the WAHS rowing team representatives about future work in and around the reservoir next week.

Lauren Hildebrand and I met with the Chris Engel, the Director of Economic Development for the City of Charlottesville last week, and I am scheduled to meet with the Albemarle County Economic Development Authority in September.

Communication and SCADA Line to Sugar Hollow Reservoir Facilities

SP GOAL: Communication & Collaboration

This week, CenturyLink will complete installation of Ethernet services to our facilities at the Sugar Hollow Reservoir (SHR), as well as DSL service to residents in the area.

This Ethernet line will allow us to control and/or monitor facilities including:

- an inflatable crest gate bladder on top of the dam
- water level gauge
- flow control gates on the outlet tower to the Moormans River
- the shutoff valve on the pipeline to Ragged Mountain Reservoir (RMR)
- an emergency power generator for the PLCs which control the dam crest gate

This service will cost about \$720 per month and will benefit our operating procedures and minimize operating costs by:

- Reducing the time required for staff to travel and work on the facilities at SHR.
- Adding more functionality to the new shutoff valve and PLC serving the pipeline from SHR to RMR.
- Allowing real-time remote response and control of the valve, gate and crest gate bladder.
- Allowing data exchange / SCADA with multiple Water Treatment Plants. Currently we only connect with the Observatory Water Treatment Plant.
- Allowing us to install cameras to remotely monitor the dam, for safety (to “see” the bladder and any debris that may be present after a storm) to “see” the Moormans river downstream, which will allow us to better plan and execute releases from the dam.

The infrastructure extension for this project by CenturyLink was completed through a collaborative contracting effort with RWSA, “The Inn at Sugar Hollow” and the “Sugar Hollow DSL Citizens Group” to make the placement of fiber and DSL equipment to provide higher speed service to customers in this area financially viable. The only way CenturyLink could proceed with the project was to share the cost of the fiber build across all three projects through a financial model which resulted in a much lower cost for all parties.

MEMORANDUM

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

**FROM: LONNIE WOOD, DIRECTOR OF FINANCE AND
ADMINISTRATION**

SUBJECT: JULY MONTHLY FINANCIAL SUMMARY – FY 2019

DATE: AUGUST 28, 2018

Urban Water flows and rate revenues are 15% over budget estimates for July and Urban Wastewater flows and rate revenues are 4% under budget. Revenues and expenses are summarized in the table below:

	Urban Water	Urban Wastewater	Total Other Rate Centers	Total Authority
Operations				
Revenues	\$ 684,341	\$ 765,966	\$ 176,324	\$ 1,626,631
Expenses	(582,850)	(654,454)	(192,804)	(1,430,108)
Surplus (deficit)	<u>\$ 101,491</u>	<u>\$ 111,512</u>	<u>\$ (16,480)</u>	<u>\$ 196,523</u>
Debt Service				
Revenues	\$ 530,756	\$ 827,947	\$ 97,622	\$ 1,456,325
Expenses	(537,121)	(720,634)	(50,149)	(1,307,904)
Surplus (deficit)	<u>\$ (6,365)</u>	<u>\$ 107,313</u>	<u>\$ 47,473</u>	<u>\$ 148,421</u>
Total				
Revenues	\$ 1,215,097	\$ 1,593,913	\$ 273,946	\$ 3,082,956
Expenses	(1,119,971)	(1,375,088)	(242,953)	(2,738,012)
Surplus (deficit)	<u><u>\$ 95,126</u></u>	<u><u>\$ 218,825</u></u>	<u><u>\$ 30,993</u></u>	<u><u>\$ 344,944</u></u>

Urban Wastewater received the annual Nutrient Exchange Credit of \$104,060 and Albemarle County's annual septage receiving support of \$109,441 in July.

Some expense categories are over the prorated year-to-date budget as follows, but will even out over the course of the year compared to budget estimates, unless otherwise noted:

Personnel Costs (all departments) – The annual contribution to health savings accounts was posted in July as well as the quarterly payment for Worker Compensation Insurance.

Other Services & Charges (all departments) - The annual property and liability insurance premium of \$120,700 was paid in July.

Information Technology (Engineering) – The Engineering department paid \$25,000 in July to renew an annual computer software license agreement.

Operations & Maintenance (Crozet Water) – Crozet Water is over budget on Beaver Creek Reservoir algae treatment.

Attachments

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018
Fiscal Year 2019

Consolidated
Revenues and Expenses Summary

Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 16,387,174	\$ 1,365,598	\$ 1,477,256	\$ 111,658	8.18%
Lease Revenue	100,000	8,333	10,582	2,249	26.99%
Admin., Maint. & Engineering Revenue	462,000	38,500	38,723	223	0.58%
Other Revenues	528,084	44,007	136,413	92,406	209.98%
Interest Allocation	28,050	2,338	2,380	43	1.84%
Total Operating Revenues	\$ 17,505,308	\$ 1,458,776	\$ 1,665,355	\$ 206,579	14.16%

Expenses

Personnel Cost	\$ 8,429,784	\$ 663,263	\$ 694,949	\$ (31,687)	-4.78%
Professional Services	710,250	59,188	18,492	40,696	68.76%
Other Services & Charges	2,814,735	234,561	332,279	(97,718)	-41.66%
Communications	143,105	11,925	6,548	5,377	45.09%
Information Technology	341,450	28,454	31,031	(2,577)	-9.06%
Supplies	43,920	3,660	8,070	(4,410)	-120.49%
Operations & Maintenance	3,719,660	309,972	280,920	29,051	9.37%
Equipment Purchases	459,400	38,283	26,292	11,991	31.32%
Depreciation	843,000	70,250	70,250	-	0.00%
Reserve Transfers	-	-	-	-	
Total Operating Expenses	\$ 17,505,304	\$ 1,419,556	\$ 1,468,832	\$ (49,276)	-3.47%
Operating Surplus/(Deficit)	\$ 4	\$ 39,220	\$ 196,523		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 14,852,531	\$ 1,237,711	\$ 1,237,710	\$ (1)	0.00%
Use of Reserves for 2016 Bond DS	300,000	25,000	25,000	-	0.00%
Septage Receiving Support - County	109,440	9,120	109,441	100,321	1100.01%
Buck Mountain Surcharge	118,600	9,883	-	(9,883)	-100.00%
Buck Mountain Lease Revenue	1,600	133	-	(133)	-100.00%
Trust Fund Interest	46,400	3,867	15,018	11,152	288.40%
Reserve Fund Interest	344,000	28,667	69,157	40,491	141.25%
Total Debt Service Revenues	\$ 15,772,571	\$ 1,314,381	\$ 1,456,327	\$ 141,946	10.80%

Debt Service Costs

Total Principal & Interest	\$ 12,295,400	\$ 1,024,617	\$ 1,024,617	\$ -	0.00%
Reserve Additions-Interest	907,600	75,633	69,157	6,476	8.56%
Debt Service Ratio Charge	725,000	60,417	60,417	-	0.00%
Reserve Additions-CIP Growth	1,844,575	153,715	153,715	-	0.00%
Total Debt Service Costs	\$ 15,772,575	\$ 1,314,381	\$ 1,307,905	\$ 6,476	0.49%
Debt Service Surplus/(Deficit)	\$ (4)	\$ (0)	\$ 148,421		

Summary

Total Revenues	\$ 33,277,879	\$ 2,773,157	\$ 3,121,681	\$ 348,525	12.57%
Total Expenses	33,277,879	2,733,937	2,776,737	(42,800)	-1.57%
Surplus/(Deficit)	\$ 0	\$ 39,219	\$ 344,944		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Urban Water Rate Center
Revenues and Expenses Summary

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 7,034,788	\$ 586,232	\$ 675,832	\$ 89,600	15.28%
Lease Revenue	70,000	5,833	7,502	1,669	28.61%
Miscellaneous	-	-	-	-	
Interest Allocation	12,000	1,000	1,007	7	0.66%
Total Operating Revenues	\$ 7,116,788	\$ 593,066	\$ 684,341	\$ 91,275	15.39%

Expenses

Personnel Cost	\$ 1,903,779	\$ 150,362	\$ 158,685	\$ (8,323)	-5.54%
Professional Services	329,250	27,438	13,912	13,526	49.30%
Other Services & Charges	582,700	48,558	75,267	(26,709)	-55.00%
Communications	64,200	5,350	4,487	863	16.13%
Information Technology	65,300	5,442	293	5,148	94.61%
Supplies	5,000	417	1,066	(649)	-155.79%
Operations & Maintenance	1,570,660	130,888	114,054	16,835	12.86%
Equipment Purchases	106,600	8,883	5,817	3,066	34.51%
Depreciation	300,000	25,000	25,000	-	0.00%
Reserve Transfers	-	-	-	-	
Subtotal Before Allocations	\$ 4,927,489	\$ 402,338	\$ 398,581	\$ 3,757	0.93%
Allocation of Support Departments	2,189,298	173,260	184,269	(11,009)	-6.35%
Total Operating Expenses	\$ 7,116,787	\$ 575,598	\$ 582,850	\$ (7,252)	-1.26%
Operating Surplus/(Deficit)	\$ 1	\$ 17,468	\$ 101,491		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 5,863,271	\$ 488,606	\$ 488,606	\$ 0	0.00%
Trust Fund Interest	18,000	1,500	5,151	3,651	243.42%
Reserve Fund Interest	184,000	15,333	36,999	21,666	141.30%
Buck Mountain Surcharge	118,600	9,883	-	(9,883)	-100.00%
Lease Revenue	1,600	133	-	(133)	-100.00%
Total Debt Service Revenues	\$ 6,185,471	\$ 515,456	\$ 530,756	\$ 15,301	2.97%

Debt Service Costs

Total Principal & Interest	\$ 4,190,796	\$ 349,233	\$ 349,233	\$ -	0.00%
Reserve Additions-Interest	184,000	15,333	36,999	(21,666)	-141.30%
Debt Service Ratio Charge	400,000	33,333	33,333	-	0.00%
Reserve Additions-CIP Growth	1,410,675	117,556	117,556	-	0.00%
Total Debt Service Costs	\$ 6,185,471	\$ 515,456	\$ 537,122	\$ (21,666)	-4.20%
Debt Service Surplus/(Deficit)	\$ -	\$ -	\$ (6,365)		

Rate Center Summary

Total Revenues	\$ 13,302,259	\$ 1,108,522	\$ 1,215,097	\$ 106,576	9.61%
Total Expenses	13,302,258	1,091,054	1,119,972	(28,918)	-2.65%
Surplus/(Deficit)	\$ 1	\$ 17,468	\$ 95,126		
Costs per 1000 Gallons	2.09		1.79		
Thousand Gallons Treated or Flow (MGD)	3,397,700	283,142	326,489	43,347	15.31%
	9.309		10.532		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Crozet Water Rate Center
Revenues and Expenses Summary

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 957,384	\$ 79,782	\$ 79,782	\$ -	0.00%
Lease Revenues	30,000	2,500	3,080	580	23.21%
Interest Allocation	1,700	142	146	4	2.98%
Total Operating Revenues	\$ 989,084	\$ 82,424	\$ 83,008	\$ 584	0.71%

Expenses

Personnel Cost	\$ 288,389	\$ 22,783	\$ 24,004	\$ (1,222)	-5.36%
Professional Services	30,000	2,500	-	2,500	100.00%
Other Services & Charges	126,960	10,580	12,889	(2,309)	-21.82%
Communications	4,450	371	112	259	69.89%
Information Technology	14,200	1,183	-	1,183	100.00%
Supplies	620	52	424	(372)	-719.91%
Operations & Maintenance	261,150	21,763	37,875	(16,112)	-74.04%
Equipment Purchases	26,450	2,204	204	2,000	90.74%
Depreciation	30,000	2,500	2,500	-	0.00%
Reserve Transfers	-	-	-	-	-
Subtotal Before Allocations	\$ 782,219	\$ 63,935	\$ 78,007	\$ (14,072)	-22.01%
Allocation of Support Departments	206,863	16,373	17,292	(918)	-5.61%
Total Operating Expenses	\$ 989,082	\$ 80,308	\$ 95,299	\$ (14,990)	-18.67%
Operating Surplus/(Deficit)	\$ 2	\$ 2,115	\$ (12,290)		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 995,568	\$ 82,964	\$ 82,964	\$ -	0.00%
Trust Fund Interest	1,800	150	526	376	250.43%
Reserve Fund Interest	6,700	558	1,325	766	137.27%
Total Debt Service Revenues	\$ 1,004,068	\$ 83,672	\$ 84,814	\$ 1,142	1.36%

Debt Service Costs

Total Principal & Interest	\$ 426,071	\$ 35,506	\$ 35,506	\$ -	0.00%
Reserve Additions-Interest	571,300	47,608	1,325	46,284	97.22%
Reserve Additions-CIP Growth	6,700	558	558	-	0.00%
Total Debt Service Costs	\$ 1,004,071	\$ 83,673	\$ 37,389	\$ 46,284	55.32%
Debt Service Surplus/(Deficit)	\$ (3)	\$ (0)	\$ 47,425		

Rate Center Summary

Total Revenues	\$ 1,993,152	\$ 166,096	\$ 167,823	\$ 1,727	1.04%
Total Expenses	1,993,153	163,981	132,688	31,293	19.08%
Surplus/(Deficit)	\$ (1)	\$ 2,115	\$ 35,135		
Costs per 1000 Gallons	5.02		5.08		
Thousand Gallons Treated	196,946	16,412	18,765	2,353	14.34%
Flow (MGD)	0.540		0.605		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Scottsville Water Rate Center
Revenues and Expenses Summary

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 443,328	\$ 36,944	\$ 36,944	\$ -	0.00%
Interest Allocation	750	63	63	1	1.20%
Total Operating Revenues	\$ 444,078	\$ 37,007	\$ 37,007	\$ 1	0.00%

Expenses

Personnel Cost	\$ 153,885	\$ 12,162	\$ 12,679	\$ (517)	-4.25%
Professional Services	20,000	1,667	1,420	247	14.80%
Other Services & Charges	28,680	2,390	3,728	(1,338)	-55.99%
Communications	3,210	268	177	90	33.67%
Information Technology	7,000	583	-	583	100.00%
Supplies	750	63	-	63	100.00%
Operations & Maintenance	66,570	5,548	10,693	(5,146)	-92.76%
Equipment Purchases	14,000	1,167	108	1,058	90.71%
Depreciation	20,000	1,667	1,667	(0)	0.00%
Reserve Transfers	-	-	-	-	
Subtotal Before Allocations	\$ 314,095	\$ 25,513	\$ 30,473	\$ (4,960)	-19.44%
Allocation of Support Departments	129,988	10,293	10,747	(454)	-4.41%
Total Operating Expenses	\$ 444,083	\$ 35,806	\$ 41,220	\$ (5,414)	-15.12%
Operating Surplus/(Deficit)	\$ (5)	\$ 1,200	\$ (4,213)		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 129,280	\$ 10,773	\$ 10,773	\$ (0)	0.00%
Trust Fund Interest	400	33	150	117	350.54%
Reserve Fund Interest	3,300	275	668	393	142.99%
Total Debt Service Revenues	\$ 132,980	\$ 11,082	\$ 11,591	\$ 510	4.60%

Debt Service Costs

Total Principal & Interest	\$ 129,680	\$ 10,807	\$ 10,807	\$ -	0.00%
Reserve Additions-Interest	3,300	275	668	(393)	
Reserve Additions-CIP Growth	-	-	-	-	
Total Debt Service Costs	\$ 132,980	\$ 11,082	\$ 11,475	\$ (393)	-3.55%
Debt Service Surplus/(Deficit)	\$ -	\$ -	\$ 117		

Rate Center Summary

Total Revenues	\$ 577,058	\$ 48,088	\$ 48,599	\$ 510	1.06%
Total Expenses	577,063	46,888	52,695	(5,807)	-12.38%
Surplus/(Deficit)	\$ (5)	\$ 1,200	\$ (4,096)		
Costs per 1000 Gallons	23.70		27.24		
Thousand Gallons Treated or Flow (MGD)	18,738	1,562	1,513	(49)	-3.11%
	0.051		0.049		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Urban Wastewater Rate Center
Revenues and Expenses Summary

Budget FY 2019	Budget Year-to-Date	Actual Year-to-Date	Budget vs. Actual	Variance Percentage
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 7,277,082	\$ 606,424	\$ 628,482	\$ 22,058	3.64%
Stone Robinson WWTP	28,084	2,340	1,778	(562)	-24.03%
Septage Acceptance	410,000	34,167	30,575	(3,592)	-10.51%
Nutrient Credits	90,000	7,500	104,060	96,560	1287.46%
Miscellaneous Revenue	-	-	-	-	
Interest Allocation	12,500	1,042	1,072	30	2.87%
Total Operating Revenues	\$ 7,817,666	\$ 651,472	\$ 765,966	\$ 114,494	17.57%

Expenses

Personnel Cost	\$ 1,282,792	\$ 101,121	\$ 105,168	\$ (4,047)	-4.00%
Professional Services	54,000	4,500	-	4,500	100.00%
Other Services & Charges	1,816,225	151,352	207,316	(55,964)	-36.98%
Communications	10,430	869	178	691	79.50%
Information Technology	57,250	4,771	826	3,945	82.68%
Supplies	2,700	225	106	119	53.00%
Operations & Maintenance	1,408,900	117,408	77,367	40,041	34.10%
Equipment Purchases	74,500	6,208	5,470	738	11.89%
Depreciation	470,000	39,167	39,167	(0)	0.00%
Reserve Transfers	-	-	-	-	
Subtotal Before Allocations	\$ 5,176,797	\$ 425,622	\$ 435,598	\$ (9,976)	-2.34%
Allocation of Support Departments	2,640,868	209,059	218,856	(9,797)	-4.69%
Total Operating Expenses	\$ 7,817,665	\$ 634,681	\$ 654,454	\$ (19,773)	-3.12%
Operating Surplus/(Deficit)	\$ 1	\$ 16,791	\$ 111,512		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 7,854,820	\$ 654,568	\$ 654,568	\$ (0)	0.00%
Use of Reserves for 2016 Bond DS	300,000	25,000	25,000	-	0.00%
Septage Receiving Support - County	109,440	9,120	109,441	100,321	1100.01%
Trust Fund Interest	26,200	2,183	9,176	6,993	320.28%
Reserve Fund Interest	148,000	12,333	29,762	17,429	141.31%
Total Debt Service Revenues	\$ 8,438,460	\$ 703,205	\$ 827,947	\$ 124,742	17.74%

Debt Service Costs

Total Principal & Interest	\$ 7,539,261	\$ 628,272	\$ 628,272	\$ -	0.00%
Reserve Additions-Interest	148,000	12,333	29,762	(17,429)	-141.31%
Debt Service Ratio Charge	325,000	27,083	27,083	-	0.00%
Reserve Additions-CIP Growth	426,200	35,517	35,517	-	0.00%
Total Debt Service Costs	\$ 8,438,461	\$ 703,205	\$ 720,634	\$ (17,429)	-2.48%
Debt Service Surplus/(Deficit)	\$ (1)	\$ (0)	\$ 107,313		

Rate Center Summary

Total Revenues	\$ 16,256,126	\$ 1,354,677	\$ 1,593,913	\$ 239,236	17.66%
Total Expenses	16,256,126	1,337,886	1,375,088	(37,202)	-2.78%
Surplus/(Deficit)	\$ (0)	\$ 16,791	\$ 218,825		
Costs per 1000 Gallons	2.31		2.23		
Thousand Gallons Treated or Flow (MGD)	3,390,400	282,533	292,862	10,329	3.66%
	9.289		9.447		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Glenmore Wastewater Rate Center
Revenues and Expenses Summary

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 372,720	\$ 31,060	\$ 31,060	\$ -	0.00%
Interest Allocation	600	50	51	1	2.68%
<i>Total Operating Revenues</i>	\$ 373,320	\$ 31,110	\$ 31,111	\$ 1	0.00%

Expenses

Personnel Cost	\$ 94,490	\$ 7,449	\$ 7,791	\$ (342)	-4.59%
Professional Services	3,000	250	-	250	
Other Services & Charges	39,510	3,293	3,312	(19)	-0.59%
Communications	2,600	217	172	45	20.84%
Information Technology	3,350	279	-	279	100.00%
Supplies	100	8	-	8	100.00%
Operations & Maintenance	121,450	10,121	10,141	(20)	-0.19%
Equipment Purchases	2,900	242	200	42	17.24%
Depreciation	5,000	417	417	0	0.00%
<i>Subtotal Before Allocations</i>	\$ 272,400	\$ 22,275	\$ 22,032	\$ 243	1.09%
Allocation of Support Departments	100,915	7,997	8,368	(371)	-4.64%
<i>Total Operating Expenses</i>	\$ 373,315	\$ 30,272	\$ 30,400	\$ (128)	-0.42%
<i>Operating Surplus/(Deficit)</i>	\$ 5	\$ 838	\$ 711		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 1,586	\$ 132	\$ 132	\$ (0)	-0.13%
Trust Fund Interest	-	-	-	-	
Reserve Fund Interest	1,000	83	207	124	148.96%
<i>Total Debt Service Revenues</i>	\$ 2,586	\$ 216	\$ 339	\$ (0)	-0.08%

Debt Service Costs

Total Principal & Interest	\$ 1,586	\$ 132	\$ 132	\$ -	0.00%
Reserve Additions-Interest	1,000	83	207	(124)	-148.96%
<i>Total Debt Service Costs</i>	\$ 2,586	\$ 216	\$ 340	\$ (124)	-57.60%
<i>Debt Service Surplus/(Deficit)</i>	\$ -	\$ -	\$ (0)		

Rate Center Summary

Total Revenues	\$ 375,906	\$ 31,326	\$ 31,451	\$ 125	0.40%
Total Expenses	375,901	30,487	30,740	(252)	-0.83%
Surplus/(Deficit)	\$ 5	\$ 838	\$ 711		
Costs per 1000 Gallons	8.60		8.99		
Thousand Gallons Treated or Flow (MGD)	43,412	3,618	3,380	(238)	-6.57%
	0.119		0.109		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Scottsville Wastewater Rate Center
Revenues and Expenses Summary

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Operations Rate Revenue	\$ 301,872	\$ 25,156	\$ 25,156	\$ -	0.00%
Interest Allocation	500	42	42	0	0.37%
Total Operating Revenues	\$ 302,372	\$ 25,198	\$ 25,198	\$ 0	0.00%

Expenses

Personnel Cost	\$ 94,515	\$ 7,451	\$ 7,791	\$ (340)	-4.57%
Professional Services	2,000	167	-	167	100.00%
Other Services & Charges	28,400	2,367	1,979	387	16.37%
Communications	2,630	219	232	(12)	-5.70%
Information Technology	2,350	196	-	196	100.00%
Supplies	100	8	290	(282)	-3380.36%
Operations & Maintenance	57,850	4,821	6,126	(1,305)	-27.07%
Equipment Purchases	3,200	267	200	67	25.00%
Depreciation	18,000	1,500	1,500	-	0.00%
Subtotal Before Allocations	\$ 209,045	\$ 16,995	\$ 18,118	\$ (1,123)	-6.61%
Allocation of Support Departments	93,328	7,395	7,768	(373)	-5.04%
Total Operating Expenses	\$ 302,372	\$ 24,390	\$ 25,886	\$ (1,496)	-6.13%
Operating Surplus/(Deficit)	\$ (0)	\$ 807	\$ (688)		

Debt Service Budget vs. Actual

Revenues

Debt Service Rate Revenue	\$ 8,006	\$ 667	\$ 667	\$ (0)	-0.02%
Trust Fund Interest	-	-	15	15	
Reserve Fund Interest	1,000	83	196	112	134.92%
Total Debt Service Revenues	\$ 9,006	\$ 751	\$ 878	\$ 127	16.96%

Debt Service Costs

Total Principal & Interest	\$ 8,006	\$ 667	\$ 667	\$ -	0.00%
Reserve Additions-Interest	-	-	196	(196)	
Estimated New Principal & Interest	1,000	83	83	-	
Total Debt Service Costs	\$ 9,006	\$ 751	\$ 946	\$ (196)	-26.09%
Debt Service Surplus/(Deficit)	\$ -	\$ -	\$ (68)		

Rate Center Summary

Total Revenues	\$ 311,378	\$ 25,948	\$ 26,076	\$ 127	0.49%
Total Expenses	311,378	25,141	26,832	(1,691)	-6.73%
Surplus/(Deficit)	\$ (0)	\$ 807	\$ (757)		
Costs per 1000 Gallons	15.14		14.21		
Thousand Gallons Treated or Flow (MGD)	19,966	1,664	1,822	158	9.51%
	0.055		0.059		

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Administration

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Payment for Services SWA	\$ 460,000	\$ 38,333	\$ 38,333	\$ (0)	0.00%
Miscellaneous Revenue	2,000	167	206	39	23.67%
Total Operating Revenues	\$ 462,000	\$ 38,500	\$ 38,539	\$ 39	0.10%

Expenses

Personnel Cost	\$ 1,796,150	\$ 140,716	\$ 152,736	\$ (12,021)	-8.54%
Professional Services	228,000	19,000	3,160	15,840	83.37%
Other Services & Charges	140,980	11,748	15,999	(4,251)	-36.18%
Communications	20,280	1,690	957	733	43.37%
Information Technology	138,500	11,542	4,554	6,988	60.54%
Supplies	21,000	1,750	5,711	(3,961)	-226.36%
Operations & Maintenance	60,400	5,033	2,988	2,046	40.65%
Equipment Purchases	27,500	2,292	1,042	1,250	54.55%
Depreciation	-	-	-	-	
Total Operating Expenses	\$ 2,432,810	\$ 193,771	\$ 187,147	\$ 6,624	3.42%

Department Summary

Net Costs Allocable to Rate Centers		\$ (1,970,810)	\$ (155,271)	\$ (148,608)	\$ (6,663)	4.29%
<u>Allocations to the Rate Centers</u>						
Urban Water	44.00%	\$ 867,157	\$ 68,319	\$ 65,387	\$ 2,932	
Crozet Water	4.00%	\$ 78,832	\$ 6,211	\$ 5,944	\$ 267	
Scottsville Water	2.00%	\$ 39,416	\$ 3,105	\$ 2,972	\$ 133	
Urban Wastewater	48.00%	\$ 945,989	\$ 74,530	\$ 71,332	\$ 3,198	
Glenmore Wastewater	1.00%	\$ 19,708	\$ 1,553	\$ 1,486	\$ 67	
Scottsville Wastewater	1.00%	\$ 19,708	\$ 1,553	\$ 1,486	\$ 67	
	100.00%	\$ 1,970,810	\$ 155,271	\$ 148,608	\$ 6,663	

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Maintenance

<i>Budget FY 2019</i>	<i>Budget Year-to-Date</i>	<i>Actual Year-to-Date</i>	<i>Budget vs. Actual</i>	<i>Variance Percentage</i>
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Operating Budget vs. Actual

Notes

Revenues

Miscellaneous Revenue

Total Operating Revenues

-	-	184	184	
\$ -	\$ -	\$ 184	\$ 184	

Expenses

Personnel Cost

Professional Services

Other Services & Charges

Communications

Information Technology

Supplies

Operations & Maintenance

Equipment Purchases

Depreciation

Total Operating Expenses

\$ 1,304,247	\$ 102,614	\$ 99,674	\$ 2,940	2.87%
-	-	-	-	
17,500	1,458	6,544	(5,086)	-348.73%
17,325	1,444	58	1,386	96.02%
6,500	542	-	542	100.00%
2,000	167	272	(105)	-62.95%
64,300	5,358	5,641	(282)	-5.27%
105,650	8,804	8,086	719	8.16%
-	-	-	-	
\$ 1,517,522	\$ 120,387	\$ 120,273	\$ 114	0.09%

Department Summary

Net Costs Allocable to Rate Centers

\$ (1,517,522)	\$ (120,387)	\$ (120,089)	\$ 70	-0.06%
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Allocations to the Rate Centers

Urban Water

30.00%

\$ 455,256

\$ 36,116

\$ 36,027

\$ 89

Crozet Water

3.50%

\$ 53,113

\$ 4,214

\$ 4,203

\$ 10

Scottsville Water

3.50%

\$ 53,113

\$ 4,214

\$ 4,203

\$ 10

Urban Wastewater

56.50%

\$ 857,400

\$ 68,019

\$ 67,850

\$ 168

Glenmore Wastewater

3.50%

\$ 53,113

\$ 4,214

\$ 4,203

\$ 10

Scottsville Wastewater

3.00%

\$ 45,526

\$ 3,612

\$ 3,603

\$ 9

100.00%	\$ 1,517,522	\$ 120,387	\$ 120,089	\$ 298
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Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Laboratory

Budget FY 2019	Budget Year-to-Date	Actual Year-to-Date	Budget vs. Actual	Variance Percentage
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Operating Budget vs. Actual

Notes

Revenues

N/A

Expenses

Personnel Cost	\$ 301,100	\$ 23,678	\$ 24,941	\$ (1,262)	-5.33%
Professional Services	-	-	-	-	
Other Services & Charges	14,230	1,186	1,058	128	10.81%
Communications	800	67	-	67	
Information Technology	2,500	208	-	208	100.00%
Supplies	2,150	179	75	104	58.12%
Operations & Maintenance	53,500	4,458	10,081	(5,622)	-126.11%
Equipment Purchases	72,100	6,008	133	5,875	97.78%
Depreciation	-	-	-	-	
Total Operating Expenses	\$ 446,380	\$ 35,785	\$ 36,287	\$ (502)	-1.40%

Department Summary

Net Costs Allocable to Rate Centers		\$ (446,380)	\$ (35,785)	\$ (36,287)	\$ 502	-1.40%
<u>Allocations to the Rate Centers</u>						
Urban Water	44.00%	\$ 196,407	\$ 15,745	\$ 15,966	\$ (221)	
Crozet Water	4.00%	17,855	1,431	1,451	(20)	
Scottsville Water	2.00%	8,928	716	726	(10)	
Urban Wastewater	47.00%	209,799	16,819	17,055	(236)	
Glenmore Wastewater	1.50%	6,696	537	544	(8)	
Scottsville Wastewater	1.50%	6,696	537	544	(8)	
	100.00%	\$ 446,380	\$ 35,785	\$ 36,287	\$ (502)	

Rivanna Water & Sewer Authority
Monthly Financial Statements - July 2018

Engineering**Operating Budget vs. Actual****Revenues**

Payment for Services SWA

Total Operating Revenues

\$	-	\$	-	\$	-	\$	-
\$	-	\$	-	\$	-	\$	-

Expenses

Personnel Cost

Professional Services

Other Services & Charges

Communications

Information Technology

Supplies

Operations & Maintenance

Equipment Purchases

Depreciation & Capital Reserve Transfers

Total Operating Expenses

\$	1,210,438	\$	94,926	\$	101,479	\$	(6,553)	-6.90%
	44,000		3,667		-		3,667	100.00%
	19,550		1,629		4,188		(2,559)	-157.08%
	17,180		1,432		176		1,256	87.72%
	44,500		3,708		25,357		(21,649)	-583.80%
	9,500		792		127		665	84.00%
	54,880		4,573		5,956		(1,383)	-30.24%
	26,500		2,208		5,032		(2,823)	-127.85%
	-		-		-		-	
\$	1,426,548	\$	112,935	\$	142,315	\$	(29,380)	-26.01%

Department Summary

Net Costs Allocable to Rate Centers

\$	(1,426,548)	\$	(112,935)	\$	(142,315)	\$	29,380	-26.01%
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Allocations to the Rate Centers

Urban Water

47.00%	\$	670,477	\$	53,080	\$	66,888	\$	(13,808)
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Crozet Water

4.00%		57,062		4,517		5,693		(1,175)
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Scottsville Water

2.00%		28,531		2,259		2,846		(588)
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Urban Wastewater

44.00%		627,681		49,691		62,619		(12,927)
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Glenmore Wastewater

1.50%		21,398		1,694		2,135		(441)
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Scottsville Wastewater

1.50%		21,398		1,694		2,135		(441)
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100.00%	\$	1,426,548	\$	112,935	\$	142,315	\$	(29,380)
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MEMORANDUM

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

**FROM: JENNIFER WHITAKER, DIRECTOR OF ENGINEERING &
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

SUBJECT: STATUS REPORT: ONGOING PROJECTS

DATE: AUGUST 28, 2018

This memorandum reports on the status of the following Capital Projects as well as other significant operating, maintenance and planning projects.

Under Construction

1. Wholesale Water Master Metering
2. Crozet Finished Water Pump Station
3. Moores Creek AWRRF Roof Replacements
4. Sugar Hollow Reservoir to Ragged Mountain Reservoir Transfer Flow Meter
5. Piney Mountain Tank Rehabilitation
6. Interceptor Sewer & Manhole Repair
7. Crozet Interceptor Pump Stations Bypass & Isolation Valves
8. Urgent and Emergency Repairs

Design and Bidding

9. Observatory Water Treatment Plant Expansion
10. South Rivanna Water Treatment Plant Improvements
11. Crozet Water Treatment Plant Expansion
12. Interconnect Lower Sugar Hollow and Ragged Mountain Raw Water Mains
13. South Fork Rivanna Reservoir to Ragged Mountain Reservoir Water Line Right-of-Way
14. Avon to Pantops Water Main
15. Crozet Flow Equalization Tank
16. Crozet Interceptor Pump Station Rebuilds
17. Security Enhancements
18. Valve Repair – Replacement (Phase 2)

19. Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Line and Raw Water Pump Station
20. Crozet Raw Water Pump Station and Hypolimnetic Oxygenation System

Planning and Studies

21. South Rivanna Hydropower Plant Decommissioning
22. Drinking Water Infrastructure Plan – Crozet Area
23. Urban Water Demand and Safe Yield Study
24. Urban Finished Water Infrastructure Master Plan
25. MCAWRRF Digester Sludge Storage Improvements
26. MCAWRRF Aluminum Slide Gate Replacements
27. Glenmore Secondary Clarifier Coating
28. Sugar Hollow Dam – Rubber Crest Gate Replacement and Intake Tower Repairs
29. South Rivanna River Crossing and North Rivanna Transmission Main
30. Route 29 Pump Station
31. Buck’s Elbow & Crozet Waterball Tank Painting
32. Asset Management Plan
33. Engineering and Administration Building
34. Beaver Creek Dam Alterations

1. Wholesale Water Master Metering

Design Engineer:	Michael Baker International (Baker)
Construction Contractor:	Linco, Inc.
Construction Start:	January 2016
Percent Complete:	95%
Base Construction Contract +	
Change Orders to Date = Current Value:	\$2,228,254 - \$240,604.24 = \$1,987,649.76
Expected Completion Date:	September 2018
Total Capital Project Budget:	\$3,600,000

Current Status:

Three water treatment plant flow meters, and 23 of 25 distribution system flow meters have been installed. Of those 23 meters, 16 are currently functional and 7 are experiencing reporting errors. Meter troubleshooting is ongoing with the intent of having all meters functional in September 2018. Completion of the Rt. 29 site is scheduled for August. The final remaining site located adjacent to Ivy Road, will be completed by Faulconer Construction Co. by September under the existing on-call contract. In May 2018, a final version of the *Wholesale Metering Administration and Implementation Policy* was completed and forwarded to the ACSA and the City. RWSA terminated the construction contract with Linco, Inc. on April 2, 2018 and is coordinating the remaining work in-house.

History:

In January 2012, a Water Cost Allocation Agreement was signed by the City of Charlottesville (City) and ACSA designating how the two agencies would share in the financing of the New Ragged Mountain Dam project. Within the agreement is a general provision developed by the ACSA and City to enhance measurement of the water usage by each of the distribution agencies.

The Board authorized staff in August of 2012 to enter into an agreement with Michael Baker International, Inc. (Baker) to complete an engineering study on metering plan alternatives. Baker's study identified several alternatives for a metering plan based on combinations of metering and estimating methodologies. Based on feedback from ACSA, the City, and RWSA, Baker recommended a Jurisdictional Approach which included installation of water meters at 34 locations at the City/County corporate boundary and at each of the three urban water treatment plants at an estimated cost of \$6.4 million. At its September 2013 meeting, the RWSA Board of Directors requested staff to proceed with the Jurisdictional Coverage Approach. In February 2014, the Board of Directors authorized Baker to complete preliminary and final design for the project and to provide bid-phase services. The final design includes construction of 25 metering systems in underground vaults and required acquisition of twenty (20) permanent water line easements and one (1) permanent access easement.

2. Crozet Finished Water Pump Station

Design Engineer:	Short Elliot Hendrickson (SEH)
Construction Contractor:	Anderson Construction, Inc.
Construction Start:	May 2017
Percent Complete:	95%
Base Construction Contract + Change Orders to Date = Current Value:	\$1,941,000
Expected Completion Date:	September 2018
Total Capital Project Budget:	\$2,600,000

Current Status:

Start-up and testing of equipment is underway. Operations and Maintenance Manuals have been distributed and training will begin during the week of August 20. The new pump station was tied into the existing distribution system at the end of July and will be put into service at the conclusion of the demonstration period

History:

As part of the FY 2016 CIP, the Crozet Water Treatment Plant was studied to expand the treatment capacity to secure future demand needs of the Crozet community. Prior to any plant expansion, it was determined that the finished water pumping facilities were in need of replacement. The existing pump station is very small and was constructed as part of the original plant construction in the late 1960s. The pumping equipment and controls are outdated, and reduce operational reliability and efficiency. The pump house is located in a low, poorly drained area near the ground storage clearwell, and drainage issues exist. Due

to the age and condition of pumps, electrical systems, building systems and controls, it has been determined that a full station replacement is necessary. An Alternatives Analysis Report was completed in June 2016.

Bids were received and opened for the project on March 7, 2017. The apparent low bidder was Anderson Construction, Inc. from Lynchburg, VA. The Board of Directors approved the contract bid award of \$1,941,000 at the March 2017 meeting, a Notice of Award was issued on April 10, 2017, and a Notice to Proceed was issued on May 3, 2017.

The filter plant effluent line to the ground storage tank has been installed, tested, disinfected and placed into service. The existing generator and electrical lines have been relocated and placed into a temporary location. The pipeline and generator were relocated in order to make room for the new pump station foundation excavation. Partial removal of old, existing asbestos cement (transite) pipe was completed in July. The building is complete.

3. Moores Creek AWRRF Roof Replacements

Design Engineer:	Hazen and Sawyer
Construction Contractor	Triangle Roofing Services, Inc.
Construction Start:	March 2018
Percent Complete	95%
Base Construction Contract + Change Orders to Date = Current Value:	\$818,000
Expected Completion:	October 2018
Total Capital Project Budget:	\$1,264,000

Current Status:

All roof replacement work is now complete. Lightning protection systems have been installed in seven of the eight buildings. A change order to replace roof vents on Maintenance Building 1 and Sludge Pump Station No. 2 is being executed and a punch list for remaining work items is being generated. Contractor is waiting for delivery of the roof vents.

History:

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. Following additional review of the conditions of various buildings located at the Moores Creek AWRRF, this project also now

includes replacement of the roof systems Sludge Pumping Building, the Primary Pump Building, and the Effluent Pump Building.

In December 2016, the Board of Directors authorized staff to enter into a work authorization with Hazen and Sawyer to design bidding documents to replace the identified roofs at Moores Creek AWRRF. An application was submitted to the Albemarle County Architectural Review Board and approval was obtained. Construction bids were received on September 7, 2017 to replace the metal roof on eight buildings and award of the project was approved by the Board at the September 2017 Board Meeting. A Notice of Award was provided to Triangle Roofing Services, Inc. on October 10, 2017.

4. Sugar Hollow to Ragged Mountain Reservoir Transfer Flow Meter

Design Engineer:	Michael Baker International (Baker)
Construction Contractor:	G.L. Howard
Construction Start:	October 2018
Percent Complete	5%
Base Construction Contract + Change Orders to Date = Current Value:	\$41,000 (additional value to follow)
Expected Completion:	November 2018
Total Capital Project Budget:	\$315,000

Current Status:

RWSA staff facilitated an on-site meeting with the contractor to finalize the project's scope of work. As a result of this meeting, additional permitting requirements associated with the removal/abandonment of the Gatekeeper House's utilities were identified. The contractor is reviewing the revised scope and permitting requirements and is finalizing any modifications to the project's budget and schedule. Once a revised project budget and schedule is received from the contractor, a final Work Authorization will be developed with the contractor to cover the remaining aspects of the project. The initial Work Authorization covered the purchase of the project's long lead items. Delivery of final long lead items is anticipated by September 20th. This project requires the Sugar Hollow to Ragged Mountain Reservoir transfer line to be out of service, and as such, any transfer line needs will be coordinated with the RWSA Water and Maintenance Departments.

History:

RWSA staff has worked with the design engineers to complete plan and profile design drawings for this project. The project will include installation of a flow meter on the 18-inch diameter Sugar Hollow Reservoir discharge pipe and a control valve that can be operated remotely through the Observatory WTP SCADA system. The control valve will modulate the amount of flow being transferred between the two reservoirs, the flow meter will record data, and staff will be able to remotely monitor the data through the SCADA system. Additional work has been added to this project including replacement of an existing, original gate valve at the site, demolition of four existing small utility structures and sheds that have not been used in many years, demolition of the existing Gatekeeper's House, and a separate control valve vault that will optimize the accuracy of the new flow

meter by creating adequate separation distance between the meter and modulating control valve. The structures to be demolished and removed have been inspected and tested for asbestos containing materials and lead based paint. As a result, there will be some special abatement work required. Several long lead items were purchased by the contractor as a result of a recent Work Authorization. Some of the items purchased include the control valve, control valve vault, gate valve, and process piping.

5. Piney Mountain Tank Rehabilitation

Design Engineer:	Johnson, Mirmiran & Thompson (JMT)
Construction Contractor:	Utility Service Co, Inc.
Construction Start:	April 2019
Percent Complete:	0%
Base Construction Contract +	
Change Orders to Date = Current Value:	\$251,700 + \$12,585 = \$264,285
Expected Completion:	July 2019
Total Capital Project Budget:	\$500,000

Current Status:

The Piney Mountain Tank Rehabilitation project will require a shutdown of the tank for over three months. Due to unforeseen complications with an extended tank shutdown and other ongoing construction activities in the North Rivanna Water System, construction of the Piney Mountain Tank repairs has been postponed until spring 2019. Utility Service Co., Inc will remain the general contractor for this project.

History:

The 700,000 gallon Piney Mountain Tank serves the North Rivanna pressure zone. A routine inspection of the Piney Mountain Tank in April of 2012 revealed several deformed roof rafters, indicating the potential for structural deficiency. An in-depth structural inspection was performed in May of 2013 and a list of recommended roof repairs provided. This project includes consultant services for design and bidding of necessary roof repairs and other ancillary items, as well as construction, construction administration, and inspection services. Long term plans for the Rt. 29 service area include the modification or elimination of this facility. The current recommended improvements are needed in order to maintain the existing tank in service for at least the next 10 years.

The project was advertised for bid on November 28, 2017 and bids were opened on January 9, 2018. At its January meeting, the RWSA Board of Directors approved staff's recommendation of award to Utility Service Co., Inc., the apparent low bidder on the project.

6. Interceptor Sewer and Manhole Repair

Design Engineer:	Frazier Engineering
Construction Contractor:	IPR Northeast
Construction Start:	November 2017
Percent Complete:	10%
Base Construction Contract +	
Change Orders to Date = Current Value:	\$1,244,337.19
Expected Completion:	2020
Total Capital Project Budget:	\$1,962,389

Current Status:

Frazier Engineering continues to conduct condition assessment activities and has completed a preliminary review of previous CCTV results. Manhole inspections on various interceptors were completed and a report documenting the results is being developed. An initial work authorization with the contractor to perform additional CCTV investigations has begun and completion is expected by September 2018. Initial results from the investigation have been provided to Frazier Engineering for review. Additional investigation and rehabilitation work will follow after the initial round of CCTV investigations.

History:

Results from sewer flow monitoring and modeling under the Comprehensive Sanitary Sewer Study provided awareness to specific inflow and infiltration (I&I) concerns in the collection system and resulted in strengthened commitments from the City, ACSA and RWSA to continue professional engineering services to aid in the rehabilitation and repair of the sewer collection system. Engineering services will be used for sewer infrastructure condition assessments and the development of a sewer rehabilitation bid package for the procurement of a contractor to perform the recommended rehabilitation work.

7. Crozet Interceptor Pump Stations Bypass and Isolation Valves

Design Engineer:	Johnson, Mirmiran & Thompson (JMT)
Construction Contractor:	TBD
Construction Start:	September 2018
Percent Completion:	0%
Base Construction Contract +	
Change Order to Date = Current Value:	TBD
Expected Completion Date:	November 2018
Total Capital Project Budget:	\$720,000

Current Status:

The Contract Documents were advertised for bidding and bids were opened on July 10, 2018. A Notice of Award was provided to Anderson Construction on August 6, 2018 and execution of the Contract Documents is underway. Once documents have been fully

executed, a Pre-Construction Meeting will be scheduled and a Notice to Proceed will be provided.

History:

There are four pump stations located in the Crozet Interceptor system that help convey flow from the Crozet Area into the Morey Creek Interceptor and the rest of the urban collection system. These pump stations were constructed in the 1980s and provided no means of isolating each pump station from its downstream force main. This condition complicates maintenance-related activities as each time a pump station component needs to be serviced or replaced, the volume of wastewater within the force main must be addressed at the pump station as it drains back to the wet well. In addition, the Crozet Interceptor pump stations also have limited storage within their wet wells, and any reduction of down time as a result of dealing with the impacts of no isolation valves, decreases the amount of time available to work on the equipment. In order to alleviate this condition, temporary valves called “line stops” will be temporarily installed on the force mains downstream of the pump stations to allow enough time for a new isolation valve to be installed. Isolation valves will be located in order to provide the maximum amount of down time available based on current system conditions for future pump station maintenance activities. While line stops are in place, bypass connections will also be 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 for which the isolation valves alone cannot account.

8. Urgent and Emergency Repairs

Staff is currently working on several urgent repairs within the water and wastewater systems as listed below:

Project No.	Project Description	Approx. Cost
2017-03	Crozet Sewer Force Main Air Release Valve Repair	\$135,000
2018-01	Rivanna Interceptor – RVI-MH-32 Erosion Repair	\$50,000
2018-06	South Rivanna Dam Apron and River Bank Repairs	\$200,000

- **Crozet Sewer Force Main Air Release Valve Repair**

During routine inspections of the sewer force main, the Maintenance Department identified that the saddle for one of the air release valves was loose and needed to be repaired. Due to the profile of the force main however, it is not possible to dewater the force main and take pressure off the pipe at this location without the installation of line stops. As a result, a contractor was contacted to begin development of a method to address the issue and a site meeting was conducted. The contractor has provided estimated pricing and a work authorization is being developed. Coordination with the property owner is underway and this repair will be scheduled sequentially with the Rivanna Interceptor manhole repair this summer/fall.

- Rivanna Interceptor – RVI-MH-32 Erosion Repair

During routine inspections of the Rivanna Interceptor, the Maintenance Department observed some significant erosion around RVI-MH-32. A site meeting was held with the contractor and the City of Charlottesville to confirm the cause of the erosion and determine the preferred method of repair, as the repair will impact a section of the Rivanna Trail. The contractor has provided estimated pricing and a work authorization is being developed. This repair will be scheduled sequentially with the Crozet Sewer Force Main repair this summer/fall.

- South Rivanna Dam Apron and River Bank Repairs

Intense rainfall between May 30-31 resulted in extensive flooding throughout Charlottesville and parts of Albemarle County, with flows over the South Fork Rivanna Dam reaching more than 7 feet over the spillway crest at its peak. Staff has inspected the dam and abutments to determine the extent of damage resulting from the extreme flooding. Although there is no discernible damage to the dam itself, staff found erosion damage to the north downstream river bank and substantial displacement of large stone downstream of the dam to form a rock dam and pool below the north apron. Additionally, some damage to concrete structures on both aprons was noted, including possible creation of voids beneath the concrete and loss of concrete joint filler. Repairs to the river bank and removal of the rock dam will take place in late summer and fall of 2018 under RWSA's on-call construction contract. Repairs to the north and south concrete aprons will be designed by Schnabel Engineering and those services procured separately from the on-call contract.

9. Observatory WTP Expansion

Design Engineer:	Short Elliot Hendrickson, Inc. (SEH)
Project Start:	October 2017
Project Status:	Preliminary Engineering Report
Construction Start:	October 2019
Completion:	December 2022
Total Capital Project Budget:	\$18,630,000

Current Status:

The final draft of the PER has been distributed and is being reviewed by RWSA staff. Following completion of the PER, a Work Authorization with the design engineer will be developed for design, bidding and construction administration services. Design documents will be completed by May 2019.

History:

This project will consider the design and costs for upgrading the plant systems to achieve a consistent 7 MGD plant capacity, as well as consider the costs involved with upgrading the plant to 10 or 12 MGD capacity. Much of the Observatory Water Treatment Plant is original to the 1953 construction. In an effort to better understand the needed future improvements, a Condition Assessment Report was completed by SEH in October of 2013.

The approved Capital Improvement Plan project was based on the findings from this report. A portion of this project was expedited in order to repair and replace old, existing equipment that was not functional. The flocculator systems have been replaced and upgraded as part of the Drinking Water Activated Carbon and WTP Improvements project (GAC). The second flocculator system was started up in May 2017, and both systems are currently in full service.

10. South Rivanna Water Treatment Plant Improvements

Design Engineer:	Short Elliot Hendrickson (SEH)
Project Start:	October 2017
Project Status:	Preliminary Engineering Report
Construction Start:	October 2019
Completion:	December 2022
Total Capital Project Budget:	\$7,500,000

Current Status:

The final draft of the PER has been distributed and is being reviewed by RWSA staff. Following completion of the PER, a Work Authorization with the design engineer will be developed for design, bidding and construction administration services. Design documents will be completed by May 2019.

History:

The South Rivanna Water Treatment Plant is currently undergoing significant upgrades as part of the Granular Activated Carbon Project. Several other significant needs have also been identified and have been assembled into a single project. The projects herein include: expansion of the coagulant storage facilities; installation of additional filters to meet firm capacity needs; the addition of a second variable frequency drive at the Raw Water Pump Station; the relocation for the electrical gear from a sub terrain location at the Sludge Pumping Station; a new building on site for additional office, lab, control room and storage space; improvements to storm sewers to accept allowable WTP discharges; and the construction of a new metal building to cover the existing liquid lime feed piping and tanks. The scope of this project will not increase plant treatment capacity.

11. Crozet Water Treatment Plant Expansion

Design Engineer:	Short Elliot Hendrickson (SEH)
Project Start:	August 2016
Project Status:	Advertising for Bids
Construction Start:	November 2018
Completion:	December 2020
Total Capital Project Budget:	\$7,000,000

Current Status:

Construction documents were completed in June 2018. Drawings and permit applications

have been submitted to and reviewed by Albemarle County. Comments by the County have been addressed and the design package has been resubmitted for final approval. The project is now being advertised for construction and bids will be opened on September 6.

History:

This project was created to analyze the feasibility of increasing the supply capacity of the existing Crozet WTP by modernizing plant systems. The goal is to not drastically increase the plant footprint in regard to the existing filter plant, flocculation tanks, and sedimentation basins. By modernizing the outdated equipment within these treatment systems, the plant discharge capacity can be improved by approximately 100% (to 2 mgd).

SEH completed a Preliminary Engineering Report (PER) for this project and some preliminary watershed data collection. In addition, raw water jar testing was performed to finalize the type of treatment parameters necessary for the upgrade work, and the testing results were incorporated into the PER. A new Work Authorization with SEH was executed to perform preliminary and final design documents, as well as construction administration services.

12. Interconnection Lower Sugar Hollow and Ragged Mountain Raw Water Mains

Design Engineer:	Dewberry Engineers
Project Start:	October 2017
Project Status:	Alternatives Evaluation
Construction Start:	October 2018
Completion:	January 2019
Total Capital Project Budget:	\$225,000

Current Status:

A Work Authorization with Dewberry was executed to evaluate several alignment options and to identify the most suitable alignment. Feasible alignments and construction cost estimates have been submitted and the recommended alignment as well as the overall cost/benefit have been evaluated by RWSA staff. Report comments have been returned to the consultant and a final report is expected this month.

History:

The two 18-inch water mains that supply water from Ragged Mountain Reservoir to Observatory Water Treatment Plant are 71 and 109 years old. 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 raw water to the Observatory Water Treatment Plant. This project will serve to interconnect the two raw water lines near the Route 29/Fontaine Avenue Intersection, which will provide improved reliability and operability in the event of raw water line breaks.

13. South Fork Rivanna Reservoir to Ragged Mtn. Reservoir Water Line Right-of-Way

Design Engineer:	Michael Baker International (Baker)
Project Start:	October 2017
Project Status:	Preliminary Engineering Report
Completion:	2021
Total Capital Project Budget:	\$2,295,000

Current Status:

The PER will be completed by September 2018. Preliminary design work began in November 2017. Property owners have been contacted to request permission to access properties for topographical surveying which will take place following completion of the PER. A recommendation for a tentative final alignment was presented at a community information meeting in June. Easement acquisition negotiations are anticipated by May 2019. A portion of the raw water line associated with this project located in the Birdwood Golf Course has been identified to proceed into construction in order to coordinate any disturbance with planned golf course improvements. A request is being brought to the Board this month to approve the necessary funds.

History:

The approved 50-year Community Water Supply Plan includes the future construction of a raw water line from the South Fork Rivanna Reservoir to the Ragged Mountain Reservoir. This water line will replace the existing Upper Sugar Hollow Pipeline along an alternative alignment to increase raw water transfer capacity in the Urban Water System. The preliminary route for the water line followed the proposed Route 29 Charlottesville Bypass; however, the Bypass project was suspended by VDOT in 2014, requiring a more detailed routing study for the future water line. This project includes a routing study, preliminary design and preparation of easement documents, as well as acquisition of water line easements along the approved route.

RWSA has negotiated a scope and fee with Michael Baker International for the routing study, preliminary design, plat creation and easement acquisition process.

14. Avon to Pantops Water Main

Design Engineer:	Michael Baker International (Baker)
Project Start:	August 2017
Project Status:	Preliminary Engineering Report
Construction Start:	2020
Completion:	2022
Total Capital Project Budget:	\$13,000,000

Current Status:

Route alignment determination, hydraulic modeling, and preliminary design were underway. Additional modeling was completed to incorporate several new ACSA and City water projects, and potential upgrades related to VDOT work. Another stakeholder

meeting was held with the City and ACSA in mid-July to discuss the new model results and potential waterline corridors. Due to the complicated nature of our finished water systems, it was decided 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. A separate Board Report for this work is included in the board packet this month.

History:

The focus of this project is on the southern half of the urban area water system which is currently served predominantly by the Avon Street and Pantops water 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 reduced system flexibility. In 1987, the City and ACSA developed the Southern Loop Agreement which laid out two key phases (with the first being built at the time). The 1987 Agreement and planning efforts will service as a starting point for this current project.

An engineering contract has been negotiated and was approved by the Board of Directors in July 2017.

15. Crozet Flow Equalization Tank

Design Engineer:	Schnabel Engineering
Project Start:	October 2016
Project Status:	0% Design Complete
Construction Start:	2019
Completion:	2020
Total Capital Project Budget:	\$3,300,000

Current Status:

A work authorization with Schnabel Engineering was finalized and a Project Kick-off Meeting was held on July 12, 2018. A data collection period has begun which includes a wetlands investigation of the project site and will be followed by an evaluation of the existing Pump Station No. 4. A topographic survey of the site has also been completed. Design documents are expected to be complete by February 2019.

History:

A 2016 update to the 2006 model was completed which evaluated the I&I reduction goals previously established and future capital project needs. Based on the results of that study, it was determined that the Crozet Interceptor system and namely the existing Crozet Pump Stations (1 through 4) have adequate capacity to handle the 2015 peak wet weather flow from the Crozet Service Area during a two-year storm. However, as projected growth in the service area occurs, peak wet weather flows in the area under the storm conditions established in the updated model will begin to exceed the firm capacities of the pump stations by 2025. Additional I&I reductions in order to reduce flows enough to not exceed

the pump station firm capacities are not feasible and as a result, the construction of a flow equalization tank was identified as the best method to alleviate wet weather capacity issues.

While the study indicates that capacity should not be an issue until 2025, a flow equalization tank would also provide a significant benefit to the maintenance of the Crozet Pumping Station system which currently lacks system storage necessary to allow adequate time to perform repairs on the pumps and the associated force mains while the system is down. As a result, it is important to progress into the siting study for the flow equalization tank to ensure that it can be constructed in time for the 2025 flow targets but also to facilitate less complicated and more thorough maintenance on the system that has not been possible previously.

Greeley and Hansen completed a siting study to determine the location for the flow equalization tank based on the results of the comprehensive model update. The results of the siting study were reviewed with ACSA and a final tank location was determined.

16. Crozet Interceptor Pump Station Rebuilds

Design Engineer:	TBD
Project Start:	July 2018
Project Status:	25% Design Complete
Construction Start:	2019
Completion:	2023
Total Capital Project Budget:	\$525,000

Current Status:

Staff is reviewing the overall scope of work for the project and will be coordinating with the Maintenance Department regarding schedule and preferred equipment and materials. Work will be performed via quote packages and the need for consultant assistance is being determined.

History:

The Crozet Interceptor Pump Stations were constructed in the 1980's and many of the components are still original. The project will include the replacement of pumps and valves at Pump Station No. 2 in order to improve pumping capabilities at this location and provide spare parts for the pumps at Pump Station No. 1. This work will also include roof replacements at all four pump stations, siding replacement for the wet well enclosure at Pump Station No. 3, and installation of a new water well at Pump Station No. 3. Components of this project will be coordinated and timed to properly coincide with the Crozet Flow Equalization Tank project.

17. Security Enhancements

Design Engineer:	TBD
Project Start:	July 2018
Project Status:	Preliminary Design
Construction Start:	2019
Completion:	2021
Total Capital Project Budget:	\$2,400,000

Current Status:

Staff has begun coordination of an upcoming, preliminary meeting among various RWSA personnel. The meeting will be based upon the information contained in the final 2018 Risk Assessment (RA) Report, and the goal of the meeting is to develop an internal Security Project Team. This team will help RWSA prioritize the implementation of the RA's recommendations based upon their applicability to RWSA's raw and finished water systems, wastewater system, and internal capabilities. As the project's scope of work is refined through the internal Project Team, a consultant will be selected to provide project assistance. As such, a Work Authorization will be developed by RWSA staff to begin the design process.

History:

As required by the Federal Bioterrorism Act of 2002, water utilities must conduct Vulnerability Assessments and have Emergency Response Plans. RWSA recently completed an updated Risk Assessment of its water system in collaboration with the Albemarle County Service Authority (ACSA), City of Charlottesville (City), and University of Virginia (UVA). A number of security improvements that could be applied to both the water and wastewater systems were identified. The purpose of this project will be to install security improvements at RWSA facilities including additional security gate and fencing components, vehicle bollards, facility signage, camera system enhancements, additional security lighting, intrusion detection systems, door and window hardening, installation of industrial strength locks, communication technology and cable hardening, and an enhanced access control program.

18. Valve Repair – Replacement (Phase 2)

Design Engineer:	N/A
Project Start:	July 2018
Project Status:	Preliminary Design
Construction Start:	Spring 2019
Completion:	Summer 2020
Total Capital Project Budget:	\$500,000

Current Status:

RWSA staff has continued its review of documents associated with Phase 1 of the Valve Repair-Replacement Project and begun drafting design documents for Phase 2. Several meetings will be coordinated in the coming weeks, including those with staff from the RWSA Water and Maintenance Departments, ACSA, City, and VDOT. Once feedback has been incorporated and all design documents are finalized, a Request for Bids will be issued. Staff anticipates bidding taking place in Fall of 2018 with construction starting in Spring of 2019.

History:

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. This project will replace the highest-priority valves that are identified during the condition assessment as not operable and not repairable. In addition, valves that are identified in the condition assessment as being inoperable and repairable will be repaired as a part of the project. Phase I of the Valve Repair-Replacement Project replaced several inoperable and unrepairable valves in the North Rivanna Finished Water System. Phase II will continue replacing inoperable and unrepairable valves in the North Rivanna Finished Water System, but it will also replace valves on the South Rivanna, Crozet, Pantops, and Southern Loop Finished Water Systems. Once these inoperable and unrepairable valves have been replaced, the focus will shift to replacing older isolation valves. Numerous valves in the North Rivanna and South Rivanna Finished Water Systems are 50+ years old, and replacing these valves will enhance the resiliency and reliability of the two systems.

19. Ragged Mountain Reservoir to Observatory Water Treatment Plant Raw Water Line and Raw Water Pump Station

Design Engineer:	Michael Baker International (Baker)
Project Start:	August 2018
Project Status:	Work Authorization in Progress
Construction Start:	2021
Completion:	2023
Total Capital Project:	\$6,526,000

Current Status:

A Work Authorization is being negotiated with Michael Baker International for the raw water line routing study, preliminary design, plat creation and the easement acquisition process. A site evaluation study to recommend a location for the raw water pump station is currently being conducted under the South Rivanna River to Ragged Mountain Reservoir Water Line Right-of-Way Work Authorization with Baker.

History:

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 may eventually have the capacity to treat 10 million gallons per day (mgd). The new pipeline is expected to be constructed of 36-inch ductile iron and will approximately 14,000 feet in length. The opportunity to integrate the Observatory WTP raw water supply line with the proposed South Rivanna Reservoir to RMR raw water main project is currently being investigated as part of the approved 50-year Community Water Supply Plan.

The RMR to Observatory WTP raw water pump station is planned to replace the existing Stadium Road and Royal pump stations, which have exceeded their design lives or will require significant upgrades with the Observatory WTP expansion. The pump station will pump up to 10 million gallons per day (mgd) of raw water 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 mgd of raw water from RMR back to the SRR WTP.

20. Beaver Creek Dam – New Raw Water Pump Station, Intake and Hypolimnetic Oxygenation System

Design Engineer:	Hazen & Sawyer
Project Start:	August 2018
Project Status:	Work Authorization Under Negotiation
Construction Start:	2021
Completion:	2023
Total Capital Project Budget:	\$6,100,000

Current Status:

Staff has requested a Work Authorization (scope and fee) from Hazen and Sawyer for design of the Raw Water Pump Station and Intake and the Hypolimnetic Oxygenation System. Design is expected to begin in fall of 2018.

History:

The Drinking Water Infrastructure Plan for the Crozet water service area, developed by Hazen and Sawyer, 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 will reduce reliance on algaecide treatments by increasing dissolved oxygen in the reservoir. This system will be designed as part of the new raw water pump station and intake by Hazen and Sawyer, with assistance from DiNatale in preparing the system specifications.

21. South Rivanna Hydropower Plant Decommissioning

Consultant:	Gomez and Sullivan
Project Start:	October 2016
Project Status:	Exemption Surrender Process – Phase 2 Underway
Construction Start:	2019
Completion:	2020
Total Capital Project Budget:	\$1,000,000

Current Status:

A consultation document was provided to local regulatory agencies and a meeting was held on May 21, 2018 with the agencies to discuss the decommissioning process. Minor comments were provided by those agencies and development of the surrender application for submission to FERC is underway. As part of the application, a draft decommissioning plan has been developed and is being reviewed by RWSA. Submission of the application to FERC is anticipated for September 2018.

History:

RWSA constructed a hydropower plant at the South Fork Rivanna Dam in 1987. Power generation at the plant was limited for a number of years due to various mechanical issues. In December 2011, RWSA retained HDR to perform a mechanical and electrical equipment assessment and to provide recommendations for capital expenditures and continued operation. This assessment identified the need to perform a number of mechanical and electrical modifications to improve operation of the hydropower plant. On June 16, 2013, while the plant was down for testing associated with repairs to the speed reducer and generator, the powerhouse flooded during a heavy rainfall event. A post-flood inspection indicated that the rising water damaged the electrical equipment. In addition to electrical system issues, the turbine blades were “stuck” and inoperable prior to the flood event. Prior to beginning any rehabilitation work on the hydropower plant, it was determined that a feasibility study should be performed that reviewed previous recommendations and took into account interaction with the Federal Energy Regulatory Commission (FERC) to determine if it was cost effective for RWSA to rehabilitate the facility. The feasibility study was conducted by Gomez and Sullivan and concluded that rehabilitation of the facility would most likely not provide a return on investment based on current market conditions. Staff recommended that RWSA proceed with surrendering the exemption to licensure with FERC and decommission the facility. During the meeting

on October 25, 2016, the Board of Directors agreed with the recommendation and staff began to proceed with the surrender process.

Work associated with the first phase of the exemption surrender process with Gomez and Sullivan and Van Ness Feldman was completed confirming with FERC what the next steps in the surrender process would include. A work authorization with Gomez and Sullivan for Phase 2 of the exemption surrender process was finalized in August 2017 and includes tasks to manage the local regulatory agencies consultation process and development of the surrender application and decommissioning plan.

22. Drinking Water Infrastructure Plan – Crozet Area

Design Engineer:	Hazen and Sawyer
Project Start:	June 2017
Project Status:	95% Complete
Completion:	Fall 2018
Total Capital Project Budget:	\$300,000

Current Status:

Staff met with VDEQ and other State and Federal Agencies on March 12, 2018 to provide a pre-application project overview as well as Safe Yield and Minimum Instream Flow information. Additional information (as requested by DEQ) was provided on June 6, 2018. A presentation of the report finished were provided in an update to the Crozet Community Advisory Committee on June 20, 2018.

History:

The Crozet water service area continues to see expanded growth in the average and maximum day water demands. Discussion with county and ACSA officials have confirmed recent growth trends that water use is increasing in Crozet. While some projects are currently underway to address the immediate need in Crozet, this project will develop a comprehensive mid and long-range plan (50 years) for the entire water system including; raw water supply, raw water pumping and conveyance, finished water treatment, finished water pumping, and finished water distribution and storage. Future water demand projections will be an important part of this project. At the June 27, 2017 Board Meeting, it was approved to award this planning project to the consulting engineering firm of Hazen and Sawyer. An Engineering Services Agreement was executed on July 5, 2017.

Numerous meetings with Albemarle County Community Development representatives were held in 2017 and 2018. A meeting with the Crozet Community Advisory Committee was held on June 21, 2017 and again on June 20, 2018. The preliminary findings and results of the DWIP were presented.

23. Urban Water Demand and Safe Yield Study

Design Engineer:	Hazen and Sawyer
Project Start:	August 2018
Project Status:	Work Authorization Approval
Construction Start:	N/A
Completion:	2019
Total Capital Project Budget:	\$154,000

Current Status:

We have completed negotiation with Hazen and Sawyer and the request for approval of the work authorization is included in a separate Board Report this month.

History:

The City of Charlottesville, Albemarle County Service Authority, and RWSA entered into the Ragged Mountain Dam Project Agreement in 2012. This Agreement included 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. 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.

24. Urban Finished Water Infrastructure Master Plan

Design Engineer:	Michael Baker International (Baker)
Project Start:	August 2018
Project Status:	Work Authorization Approval
Construction Start:	N/A
Completion:	2019
Total Capital Project Budget:	\$253,000

Current Status:

We have completed negotiation with Michael Baker and the request for approval of the work authorization is included in a separate Board Report this month. This project was originally slated for FY 2023, however, recent work on other urban water plant and water line projects has prompted the need for a comprehensive master plan sooner.

History:

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. Many previously identified projects in the urban finished water treatment and distribution system are under in preliminary engineering, design or construction. As such, staff have identified a need to develop a current and ongoing finished water master plan.

25. MCAWRRF Digester Sludge Storage Improvements

Design Engineer:	TBD
Project Start:	Fall 2018
Project Status:	Preliminary Design
Construction Start:	Spring 2019
Completion:	Fall 2019
Total Capital Project Budget:	\$265,000

Current Status:

Preparation of construction documents will progress this Fall. Implementation of this work will commence after Digester No. 2 and No. 3 are both coated and back in service.

History:

With the second centrifuge installation, additional capacity for storage of digested sludge would provide the Authority operational flexibility it does not currently have. Additionally, the sole sludge storage tank at the MCAWRRF was constructed in 1959 of reinforced concrete and is in need of repairs. This project would convert one of the three existing anaerobic digesters (Digester No. 1) into a sludge storage tank through piping modifications, and would provide redundancy to the existing sludge storage tank so it can be removed from service, cleaned, inspected, and repaired with minimal impact to the existing sludge dewatering operations. The piping configuration would also allow flexibility for the anaerobic digester to be used as either an anaerobic digester or sludge storage tank as needed for operations. 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.

26. MCAWRRF Aluminum Slide Gate Replacements

Design Engineer:	N/A
Project Start:	August 2018
Project Status:	Preliminary Design
Construction Start:	March 2019
Completion:	June 2019
Total Capital Project Budget:	\$470,000

Current Status:

Engineering staff is reviewing the technical nature of this work to determine if any engineering consulting services are needed. We have reached out to manufacturer's for slide gate information.

History:

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 influent 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.

27. Glenmore Secondary Clarifier Coating

Design Engineer:	N/A
Project Start:	Fall 2018
Project Status:	Preliminary Design
Construction Start:	2019
Completion:	2019
Total Capital Project Budget:	\$50,000

Current Status:

Engineering staff is reviewing the technical nature of this work to determine if any engineering consulting services are needed.

History:

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 clarifier.

28. Sugar Hollow Dam – Rubber Crest Gate Replacement and Intake Tower Repairs

Design Engineer:	Schnabel Engineering
Project Start:	September 2018
Project Status:	Work Authorization Under Negotiation
Construction Start:	2019
Completion:	2021
Total Capital Project Budget:	\$940,000

Current Status:

Schnabel Engineering will be the designer on the project. Staff expects to proceed with design in fall of 2018 with construction to begin in 2019.

History:

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 inspected and evaluated. 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.

29. South Rivanna River Crossing and North Rivanna Transmission Main

Design Engineer:	Michael Baker International (Baker)
Project Start:	August 2018
Project Status:	Work Authorization Under Negotiation
Construction Start:	2021
Completion:	2023
Total Capital Project Budget:	\$5,340,000

Current Status:

Staff has begun negotiations with Michael Baker for the first work authorization for design services for this project.

History:

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. 20 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, RWSA plans 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.

30. Route 29 Pump Station

Design Engineer:	Michael Baker International (Baker)
Project Start:	August 2018
Project Status:	Work Authorization Under Negotiation
Construction Start:	2021
Completion:	2022
Total Capital Project Budget:	\$2,300,000

Current Status:

The 1.6-acre parcel of land for the pump station was identified in a 2008 design report prepared by Michael Baker. Negotiations with the property owner were not successful, and the property was acquired through condemnation proceedings authorized at the May 2017 RWSA Board Meeting. Final legal proceedings related to the condemnation have been completed. Staff has begun negotiations with Michael Baker for the first work authorization for design services for this project.

History:

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 update was completed in June of 2018 to reflect the changes in the system and demands since 2007. This project, along with the South Rivanna River Crossing and North Rivanna Transmission Main project 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 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.

31. Bucks Elbow Tank and Crozet Waterball Tank Painting

Design Engineer:	TBD
Project Start:	August 2018
Project Status:	Work Authorization Under Negotiation
Construction Start:	2020
Completion:	2021
Total Capital Project Budget:	\$1,200,000

Current Status:

Following selection of a consultant to complete the work, staff will begin negotiation of the first work authorization for design services for this project.

History:

The two million-gallon Bucks 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. 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 as well as installation of an active mixing system at the Bucks Elbow Tank to decrease stratification and improve overall water quality in the Crozet area. Minor repairs and improvements to both tanks will also be included in this work. Construction of the tank improvements are expected to begin in spring of 2020.

32. Asset Management Plan

Design Engineer:	GHD, Inc.
Project Start:	July 2018
Project Status:	Work Authorization Under Negotiation
Completion:	2020
Total Capital Project Budget:	\$500,000

Current Status:

A work authorization and Agreement has been finalized with GHD to perform the first phase of the process which includes the development of an asset management framework and implementation roadmap. An internal Asset Management Project Team is being assembled and a kick-off meeting is being coordinated with GHD.

History:

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. 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 has been 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.

33. Engineering and Administration Building

Design Engineer:	Dewberry
Project Start:	April 2018
Project Status:	Space Needs Analysis
Construction Start:	2021
Completion:	2023
Total Capital Project Budget:	\$3,000,000

Current Status:

An assessment of space needs for the departments housed within the existing Administration Building and Engineering Building has been completed and layouts for an expanded Administration Building have been developed along with a draft final report. The report and layouts are being reviewed by a committee at RWSA to provide any additional comments before the documents are finalized.

History:

RWSA currently has its administrative headquarters in two buildings on the grounds of the MCAWRRF. 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 expansion. There is currently a need to house additional staff; increase office and meeting space; plan for the replacement of the trailers; bring IT server workrooms to modern standards; and provide classroom space for education outreach. Staff has procured a consultant to perform a space needs analysis and provide recommendations on how to address future building needs.

34. Beaver Creek Dam Alterations

Design Engineer:	Schnabel Engineering
Project Start:	February 2018
Project Status:	Preliminary Design and Community Outreach
Construction Start:	2021
Completion:	2023
Total Capital Project Budget:	\$14,900,000

Current Status:

Following the completion of an updated alternatives analysis by Schnabel Engineering, staff met with members of Albemarle County and ACSA staff to discuss the preferred alternative. It was determined that staff would 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. Staff expects completion of a Preliminary Engineering Report in fall of 2018 and final design to begin in late 2018.

History:

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. 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 and a reservoir oxygenation system project.

Schnabel Engineering developed three alternatives for upgrading the capacity of the Beaver Creek Dam Spillway in 2012. Following the adoption of a new Probable Maximum Precipitation (PMP) Study on December 9, 2015 and the release of DCR guidelines for implementing the PMP study in March of 2016, RWSA determined it would proceed with an updated alternatives analysis and Preliminary Engineering Report for upgrading the dam spillway. In 2017, RWSA entered into a term contract with Schnabel Engineering for dam-related engineering services. The preliminary design work for this project is being completed under Schnabel's term contract.

MEMORANDUM

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

FROM: DAVE TUNGATE, DIRECTOR OF OPERATIONS

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

SUBJECT: OPERATIONS REPORT FOR JULY 2018

DATE: AUGUST 28, 2018

WATER OPERATIONS:

The average daily/monthly total water distributed for July 2018 was as follows:

<i>Water Treatment Plant</i>	<i>Average Daily Production (MGD)</i>	<i>Total Monthly Production (MG)</i>	<i>Maximum Daily Production in the Month (MGD)</i>
Observatory	1.52	45.68	---
South Rivanna	8.90	267.08	---
North Rivanna	<u>0.46</u>	<u>13.73</u>	---
Urban Total	10.88	326.49	11.68 (7/3/18)
Crozet	0.63	18.76	0.857 (7/12/18)
Scottsville	<u>0.053</u>	<u>1.60</u>	0.094 (7/11/18)
RWSA Total	11.56	346.85	---

- All RWSA water treatment facilities were in regulatory compliance during the month of June.

Status of Reservoirs (as of August 14, 2018):

- Urban Reservoirs: 98.83 % of Total Useable Capacity
- Ragged Mountain Reservoir is full
- Sugar Hollow Reservoir is – 0.22 feet (98.6%)
- South Rivanna Reservoir is full (100%)
- Beaver Creek Reservoir is full (100%)
- Totier Creek Reservoir is full (100%)

WASTEWATER OPERATIONS:

All RWSA Water Resource Recovery Facilities (WRRFs) were in regulatory compliance with their effluent limitations during the month of July 2018. Performance of the WRRFs in July was as follows compared to the respective VADEQ permit limits:

WRRF	<i>Average Daily Effluent Flow (mgd)</i>	<i>Average CBOD₅ (ppm)</i>		<i>Average Total Suspended Solids (ppm)</i>		<i>Average Ammonia (ppm)</i>	
		<i>RESULT</i>	<i>LIMIT</i>	<i>RESULT</i>	<i>LIMIT</i>	<i>RESULT</i>	<i>LIMIT</i>
Moore's Creek	9.2	1.0	10	1.1	22	0.01	2.0
Glenmore	0.105	1.8	15	2.7	30	0.11	NL
Scottsville	0.059	2.0	25	1.7	30	0.18	NL
Stone Robinson	0.000	NR	30	NR	30	NR	NL

NR = Not Required

NL = No Limit

<QL: Less than analytical method quantitative level (2 ppm for CBOD, and 1 ppm for TSS) is reported as zero.

Nutrient discharges at the Moore's Creek AWRRF were as follows for July 2018:

<i>State Annual Allocation (lb./yr.)</i>		<i>Average Monthly Allocation (lb./mo.)*</i>	<i>Moore's Creek Discharge (lb./mo.)</i>	<i>Performance as % of Average Allocation*</i>
Nitrogen	282,994	23,583	5872	25%
Phosphorous	18,525	1,544	348	23%

*State allocations are expressed as annual amounts. One-twelfth of that allocation is an internal monthly benchmark for comparative purposes only.

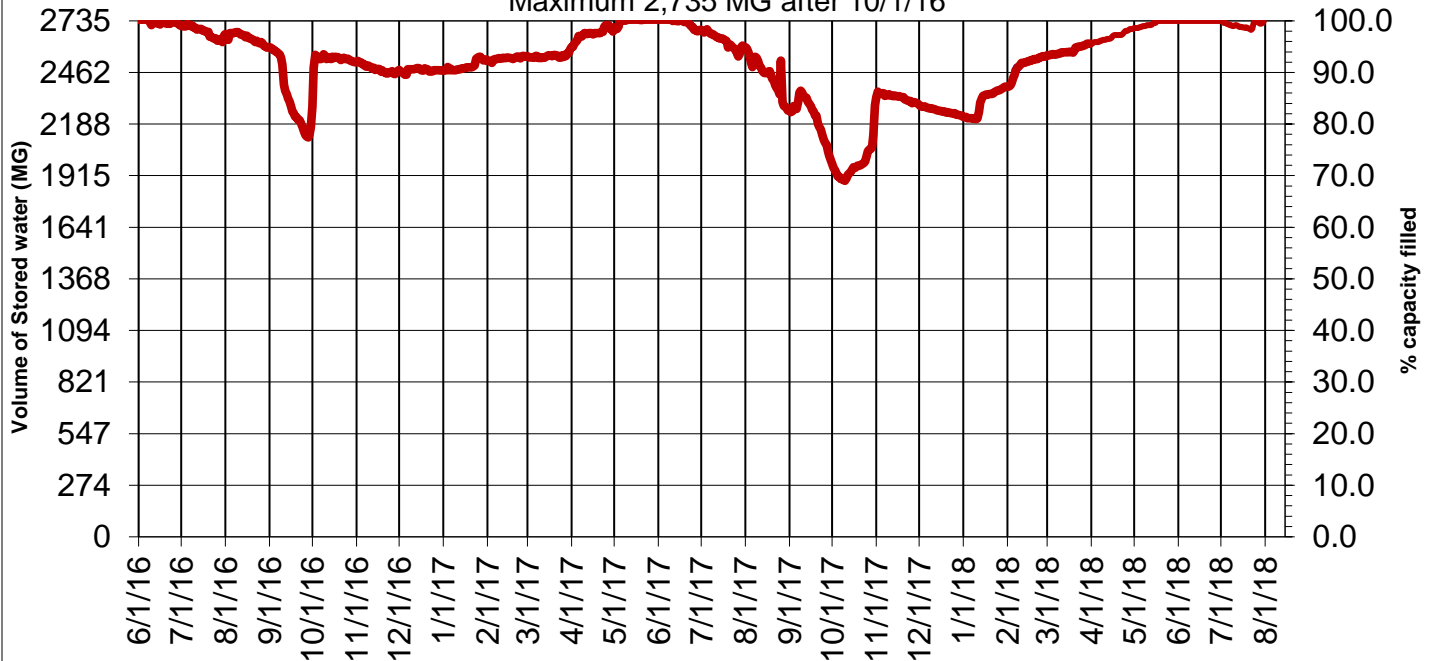
WATER AND WASTEWATER DATA:

The following graphs are provided for review:

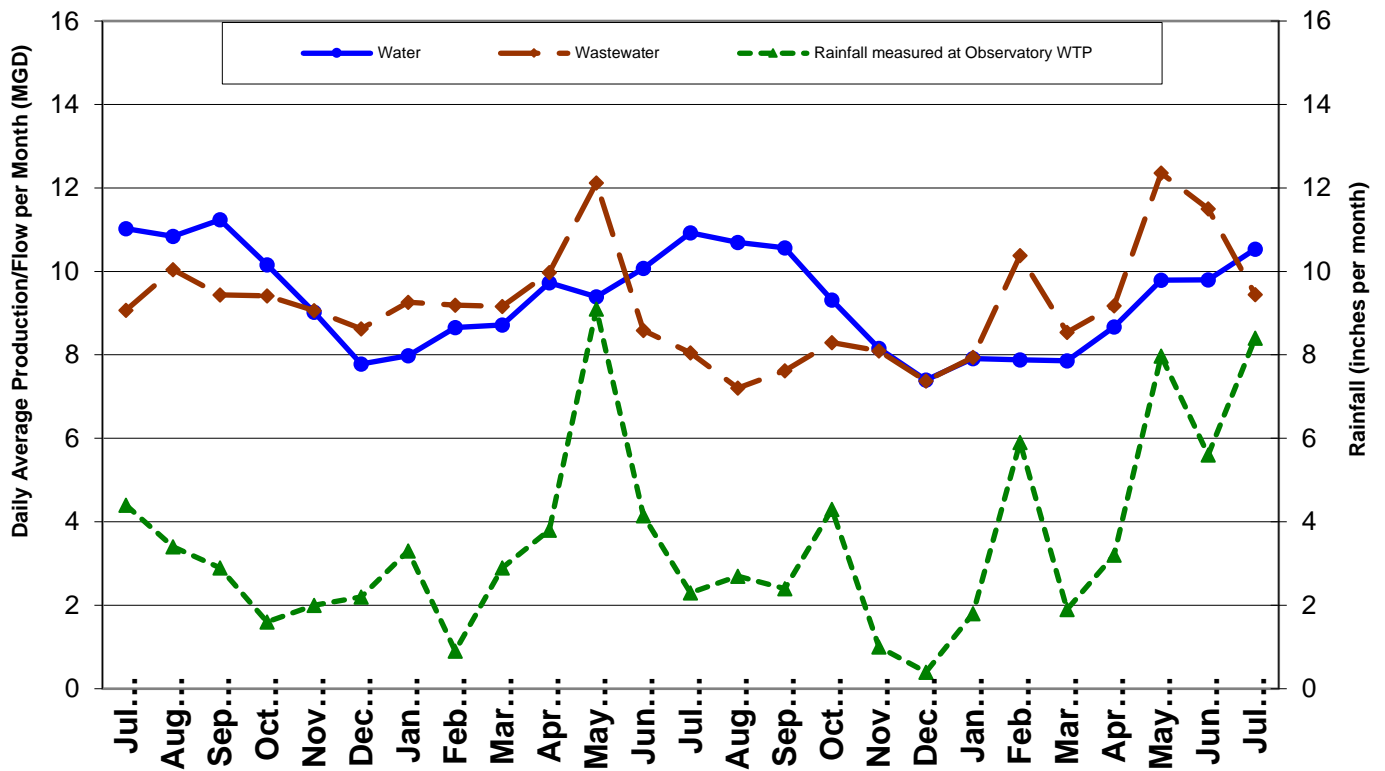
- Usable Urban Reservoir Water Storage
- Urban Water and Wastewater Flows versus Rainfall

Usable Urban Reservoir Water Storage

Maximum 2,735 MG after 10/1/16



Urban Water and Wastewater Flows versus Rainfall



MEMORANDUM

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

**FROM: JENNIFER A. WHITAKER, DIRECTOR OF ENGINEERING AND
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

**SUBJECT: CAPITAL IMPROVEMENT PLAN AMENDMENT – RT. 29 N
WATER PUMP STATION SITE ACQUISITION PROJECT**

DATE: AUGUST 28, 2018

This request is for additional funding totaling \$500,000 to be added to the project budget, based upon the fair market value and residual damages established by the Court through condemnation proceedings for the 1.6 acre property acquired by the RWSA in May 2017. The property is located near the Hollymead Town Center and Airport Road. The additional funds include property acquisition, legal, expert witness and other expenses incurred through the condemnation process.

When constructed by 2023, this project will include new drinking water pipelines, a booster pumping station building, and water storage tanks, and will provide an interconnection between the areas presently served by the South Rivanna Water Treatment Plant and the North Rivanna Water Treatment Plant. This interconnection is needed to (i) provide for redundancy of service in the event of an emergency and during drought conditions, (ii) adequately serve the growing needs of the Rte. 29 area generally north of Airport Road, and (iii) improve infrastructure conditions in the northern service area by lowering excessive operating pressures.

Board Action Requested:

Staff requests the Board of Directors authorize an amendment to the FY 2019-2023 Capital Improvement Plan to increase the project budget \$500,000 from \$1.22 M to \$1.72 M.

MEMORANDUM

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

**FROM: JENNIFER A. WHITAKER, DIRECTOR OF ENGINEERING AND
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

**SUBJECT: CAPITAL IMPROVEMENT PLAN AMENDMENT –
SCOTTSVILLE WATER TREATMENT PLANT FINISHED
WATER METERING IMPROVEMENTS**

DATE: AUGUST 28, 2018

Rivanna Water and Sewer Authority (RWSA) owns and operates the Scottsville Water Treatment Plant which was constructed in 1967. The plant is permitted to provide up to 0.25 MGD of 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, we are proposing to amend the Capital Improvement Plan for Fiscal Years 2019 to 2023 (adopted in June 2018) with a project to modify the high service pump discharge piping to allow for the installation of a finished water meter. Short Elliot Hendrickson, Inc. (SEH) reviewed the layout of the discharge piping and provided cost estimates for engineering services and construction. Based on these estimates and other project-related costs, we established a total estimated CIP budget of \$145,000.

Board Action Requested:

Staff requests the Board of Directors amend the Capital Improvement Plan for Fiscal Years 2019 – 2023 to include the Scottsville Water Treatment Plant Finished Water Metering Improvements project with a total budget of \$145,000.



STRATEGIC PLAN QUARTERLY UPDATE

3rd Quarter – 2018

Report to the Board of Directors
August 28, 2018

RIVANNA
WATER AND SEWER AUTHORITY
& SOLID WASTE AUTHORITY

Goal Team Composition

Goal	Champion
Communications	Katie McIlwee
Environmental Stewardship	Andrea Terry
Solid Waste Services	Phil McKalips
Workforce Development	Betsy Nemeth / Lonnie Wood
Infrastructure	Scott Schiller
Operational Optimization	Tim Castillo / David Tungate

Goal Team Work: Tactic Development



Strategies

1. Workforce Development

- A. Develop a comprehensive staffing, classification, & compensation plan
- B. Conduct a training needs assessment & enhance the training program

2. Operational Optimization

- A. Continually evaluate, prioritize, & improve key business & operational processes
- B. Protect our workforce & the public through continually growing a culture of safety

3. Communication & Collaboration

- A. Create & maintain internal communication platforms
- B. Create & implement a comprehensive public outreach plan

4. Environmental Stewardship

- A. Increase internal environmental engagement
- B. Designate resources to support environmental outreach & green initiatives

5. Solid Waste Services

- A. Determine community needs & preferred service levels
- B. Enhance partnerships with local governments & the University of Virginia

6. Infrastructure & Master Planning

- A. Implement an Authority-wide asset management program
- B. Develop & maintain long-term master plans for all critical asset classes

By the Numbers

Overall plan completion: 32%

By Goal:

• Workforce Development	38%
• Operational Optimization	31%
• Communication & Collaboration	20%
• Environmental Stewardship	37%
• Solid Waste Services	25%
• Infrastructure & Master Planning	43%

Recent Activity

1. Workforce Development

- A. New pay scales implemented on 7-1-18
- B. Completed PVCC Leadership Training on 6-5-18

2. Operational Optimization

- A. Completed Authority wide safety survey
- B. Upgraded routers to improve cyber security
- C. Gas collection improvement: Digester #1 sealing complete and Digester #2 underway

3. Communication & Collaboration

- A. Draft Records Management Policy has been completed
- B. Development of an Employee Portal is underway

4. Environmental Stewardship

- A. Created a standing Employee Environmental Committee
- B. Documented existing environmentally-friendly activities within each department

5. Solid Waste Services

- A. List of partnership organizations, and POCs, developed
- B. Defined Authority's existing services and practices

6. Infrastructure & Master Planning

- A. Developed and advertised Asset Management Plan RFP
- B. Began identifying need for additional Master Plans, such as Finished Water Master Plan, IT Master Plan, and OWTP & SRWTP Property Needs Assessment

Next Steps

1. Workforce Development

- A. Finalize Master Staffing Plan and review with Board
- B. Develop Leadership Development Training for future leaders

2. Operational Optimization

- A. Meet with new Safety Manager to review results of survey to develop workplan for improvement
- B. Complete sealing of Digester #2

3. Communication & Collaboration

- A. Conduct departmental records survey to complete records management and file creation policies
- B. Complete Employee Portal to increase internal communication
- C. Develop Communications Policy

4. Environmental Stewardship

- A. Coordinate with Comms. & Collaboration to disseminate information on on-going environmental activities
- B. Identify and plan for activities/projects to engage employees
- C. Coordinate with Workforce Devel. for Employee Environmental Committee staffing needs

5. Solid Waste Services

- A. Craft a messaging strategy for RSWA and its services
- B. Communicate existing services to public and partner organizations

6. Infrastructure & Master Planning

- A. Finalize Asset Management Committee and prepare for kick-off meeting with consultant
- B. Continue to organize asset information and complete the effort as part of the Asset Management Plan development process



QUESTIONS?

Workforce Development Tactics

Develop a comprehensive staffing, classification, & compensation plan

- Implement approved pay grade schedule - July 1
- Develop Master Staffing Plan
- Review staffing plans with BOD, gain approval (CONCEPTUALLY) of plan, formal approval will occur in budget approval for next fiscal year's new positions
- Continued annual review of staffing needs at an executive level

Conduct a training needs assessment & enhance the training program

- 12 month training calendar
- PVCC Leadership Training
- Employee Development Plans
- New Employee Training - scheduling, comm., trainers, ON-BOARDING specific to positions
- Training communication and scheduling

Operational Optimization Tactics

Continually evaluate, prioritize, & improve key business & operational processes

- Inventory and prioritize critical business and operational processes
- Identify key performance indicators for each department
- Research appropriate benchmarks/best practices
- Select one key business or operational process to improve as a pilot
- Create training to support efficiency and effectiveness improvements

Protect our workforce & the public through continually growing a culture of safety

- Identify and prioritize 10 safety concerns in each department regarding design engineering, operations, and preventative maintenance
- Research successful public-sector safety programs, including health and safety audits for project design
- Develop and communicate guidance for safety incident reporting, near misses, and suggestions
- Monitor and evaluate the outcomes from the vulnerability assessment
- Develop recommendations to improve cyber security

Communication & Collaboration Tactics

Create & maintain internal communication platforms

- Inventory current internal communications efforts and ensure all employees have equal access to internal communications
- Collaborate with Employee Council
- Create internal communication “trees” for specific types of information (e.g. safety, emergency information, on-boarding/off-boarding, etc.)
- Research and develop a digital communications protocol"
- Review SOPs for job duties
- Standardize records management protocols

Create & implement a comprehensive public outreach plan

- Inventory current public outreach activities
- Research communication planning best practices
- Develop communication service level agreements with ACSA and the City of Charlottesville
- Create communication contact lists (names, roles, responsibilities) for City of Charlottesville, Albemarle County, ACSA, and UVA
- Evaluate social media outreach options, including Facebook
- Partner with local schools and civic groups for facility tours and environmental education

Environmental Stewardship Tactics

Increase internal environmental engagement

- Inventory green initiatives
- Partner with Community/env'l groups
- Research other Organizations on green initiatives
- Identify Environmental Engagement goals
- Develop communication tools
- Create Green Road shows

Designate resources to support environmental outreach & green initiatives

- Create a standing Employee Environmental Committee (structure)
- Create a staffing plan (existing and potential new position) Coordinate with Workforce Development
- Develop an annual budget for green initiatives and activities

Solid Waste Services Tactics

Determine community needs & preferred service levels

- Research Existing Solid Waste and Recycling Practices/Data
- Communicate Data and Existing Services to Public
- Design Outreach
- Conduct Outreach
- Analyze Outreach Data
- Report on Outreach Results to Exec. Dir. & Board

Enhance partnerships with local governments & the University of Virginia

- List Potential Partnership Organizations (POs)
- Identify Points of Contact for each PO
- Craft Message (what we are, resources we have, what we do)
- Contact Pos; discuss our resources, operations, needs; define their resources, needs, operations
- Evaluation Process (turn #4 into possible Programs and evaluate)
- Present possible Programs to Exec. Dir. and Board for action (and, if needed, funding)
- Implement

Infrastructure & Master Planning Tactics

Implement an Authority-wide asset management program

- Develop an RFP for an Asset Management Plan
- Create an Asset Management Committee and Prepare for AM
- Identify and Meet Short Term Software Needs
- Procure Consultant Assistance (Phase 1 - Strategic Plan)
- Organize Current Asset Information
- Develop an Asset Management Strategic Plan

Develop & maintain long-term master plans for all critical asset classes

- Inventory all existing master plans
- Identify existing master plan obligations
- Conduct gap analysis to get to comprehensive master plans
- Classify all critical asset classes, functions, and departments that require master planning (in conjunction with Strategy 1, Tactic 5)
- Assign champions to asset class master plans
- Create a process to ensure that master plan-prioritized recommendations are linked to capital improvement program

MEMORANDUM

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

**FROM: LONNIE WOOD, DIRECTOR OF FINANCE AND
ADMINISTRATION**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

SUBJECT: FY 2020 – 2025 SIX-YEAR STAFFING PLAN

DATE: AUGUST 28, 2018

Creating a long-term staffing plan is one of our strategies within the goal of Workforce Development for the Strategic Plan.

Both Authorities' staff and management worked together last spring as part of the budget process to put together a six-year staffing plan. The FY 2019 recommendations in the plan were reviewed and approved by both Boards with the adoptions of the respective budgets in May of 2018. Subsequently, staff has updated the plan this past month, and one of our tactics is to present this plan to the Boards because staffing is an important driver not only in budgeted costs but expected levels of services.

The staffing plan is meant to be a living document that will be continuously updated as we progress through each budget year and address projects within the CIP, changes in technologies and treatment, new facilities, regulatory demands and customer expectations. The plan will change or shift positions over time. Staff has viewed this as an important strategic planning effort, much like the CIP, in communicating future needs of both Authorities to our customers and the Board of Directors.

Included with this memo is a brief narrative to give some background relative to the history of the Authorities' resources concerning staffing levels. There are also some data tables that show this history (Table 3 & 4). I will be glad to answer any questions during the meeting on past staffing levels; however, the first two tables showing the planned positions will be the focus of a brief discussion at the meeting.

Rivanna Authorities

Six-year

Staffing Plan

FY 2020 – FY 2025

Introduction

Staff has had several discussions over the past several months that started during the Capital Improvement Plan (CIP) update. The Authority has historically put significant efforts into infrastructure and capital project planning and execution which is culminated in the yearly update and adoption of the six-year CIP. The greatest asset at the two Authorities is our human resources. The people that plan, manage, run systems for treatment, haul, maintain equipment, test results, provide customer service and support the business functions that make everything happen are the core of these entities. Without our staff, the infrastructure in place or being constructed would have no purpose.

The Executive Director and his Director team decided that a six-year staffing plan was needed and is just as important as the CIP, if not more so. With the successful process of developing a forward-looking and goal-centric strategic plan, this effort has identified staffing needs for the next five years that will help current needs for support and look forward in meeting the goals and mission of the recently adopted Strategic Plan.

The staffing summary identified for both Authorities is presented in Table 1. The details of each position identified is presented in Table 2.

Background

The Water and Sewer Authority, apart from the last few years, has had stable and sometimes declining work force budgets. Some of this was made possible by realizing some efficiencies in the ENR project implementation. Some automation efficiencies allowed for fewer staff for Wastewater. There was also the economic downturn that provided the incentive to reduce staff and replace some of those functions with contractor services such as grounds crew and certain maintenance functions. A history of both Authorities' full-time equivalent (FTE) approved budgeted positions is presented in Table 3.

An example of where the Water and Sewer Authority has limited operations staff is in the area of Water Treatment Plant (WTP) Operators. Regulations promulgated by the Virginia Department of Health (VDH) require specific levels of staffing for treatment plants of different sizes. Many years ago, Rivanna requested and received from VDH a waiver that allowed for the Observatory WTP and South Rivanna WTP to fund and staff only one operator per shift instead of the normally required two operators. (Currently, the waiver does not apply to the South Rivanna WTP). In today's highly technical and complex process environment, staff feels that it is a "best management practice" to staff both South Rivanna WTP and the Observatory WTP with two Operators at all times while the plant is in service, not just one, regardless of the waiver that currently exists. In order to properly staff both Observatory WTP and South Rivanna WTP,

the Authority needs to hire and train additional Operators. These Operators will provide additional oversight for water quality, increased ability to complete preventive maintenance tasks, and create a safer work environment.

The Solid Waste Authority has seen a significant decline in staffing resources. This was due to the decline in tonnages received at the transfer station and the reduction of material received at the recycling centers. Some of these needs were met by contracting with manpower services, especially at the recycling centers, reducing hours of operations and eliminating some services. However, today some services have been restored or even increased with composting, daily paint acceptance and partnering with UVa to process cardboard delivered. There was also pressure to reduce administrative costs across the board for Solid Waste as a whole. Operational staffing issues at the Solid Waste Authority currently can be critical at times. A changing workforce is providing challenges that were not seen before.

Many years ago, there was a Solid Waste Director and a Recycling Manager that handled all contracts, personnel and staffing issues, customer inquiries and complaints, reporting requirements, materials sold at market and more. Today those needs are handled by the Ivy Manager or the Administrative staff. Shifting responsibilities to the administrative staff at the same time as reducing the Solid Waste share of administrative costs meant the Water Authority was in some ways and in terms of allocated costs, subsidizing Solid Waste administrative needs. The Safety Manager was converted to be the Environmental Manager (along with safety responsibilities) to oversee the remediation efforts at Ivy when the Corrective Action Plan was being implemented, because the Director position was eliminated or left unfilled until recently when it was created again. The safety position incidentally was eliminated in 2010 and recreated in 2017. Those duties were taken over by Admin during that 7-year span.

Summary

The Authorities have done more with less in many circumstances. Water & Sewer capital spending went from \$2 million annually in 2007 to \$32 million in 2017 (a 1,500% increase). The operating budget was roughly \$16 million in 2007 and today is \$33 million (a 107% increase). Staffing resource during this same time increased 9%, and most of that in the last two years as shown in Table 3. A comparison of the Albemarle County Service Authority (ACSA) staffing is relevant to some degree because they are experiencing some of the same growth needs and pressures as the Water and Sewer Authority. Table 4 shows the FTE staffing resource changes over this same period. This is relevant because as a direct customer, the ACSA has greater needs from Rivanna for information sharing, planning/collaborating with professional staff, customer needs and regulatory obligations which is indicative of the needs placed on Rivanna.

The need for a planning approach to staffing needs was put together to address some of these background issues and where we are now. It is also presented as a good planning tool to address where we, as two separately but closely intertwined Authorities, want to go into the future as we meet our strategic goals and needs of our customers.

**Rivanna Authorities
Six-Year Staffing Plan**

Table 1

Water & Sewer

FY 2020

1. Water Operator
2. Construction Inspector

FY 2021

3. Lab Technician
4. Construction Inspector
5. Accounting Associate

FY 2022

6. IT Technician
7. Administrative Coordinator/Procurement
8. Mechanic / Trainee

FY 2023

9. Dam Safety Engineer / CIP
10. Management / Budget Analyst
11. SCADA Technician

FY 2024

12. Water Operator
13. Instrumentation Technician

FY 2025

14. IT Technician - Cyber Security

Total 14 Positions

Solid Waste

FY 2020

1. Attendant - McIntire
2. Attendant - Ivy
3. Attendant - Paper sort

FY 2021 - 2025

To be determined as services expands and change. Discussions have been ongoing.

Water & Sewer

FY 2020

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
1. Water Operator	The ACSA has requested that RWSA take over the operation of the Red Hill community well. This water system will also be upgraded to provide fluoridation and pH adjustments using sodium hydroxide. Because of these changes, the system will need to be physically checked every day by an operator. This system services the elementary school and several local residences (approximately 6). Our goal is to have the plants properly staffed according to best practices and Virginia Department of Health regulations and to properly perform daily, weekly and monthly preventative operating maintenance. Additional staffing is required to meet those goals. There is also a need to have one operator who can visit the remote non-urban plants to assist on specialized maintenance items that require more than one operator to perform.	Operational Optimization, Environmental/Permit/Operational Compliance
2. Construction Inspector/Utility Marker	In the interest of cost savings and greater quality control, both RWSA and RSWA are in the process of shifting away from contracted construction inspection. While specialty inspections will still be required, many of the projected capital projects will be inspected and documented by in-house staff. As the number and variety of projects increase, additional staff is needed to meet this demand.	Infrastructure & Operational Optimization

FY 2021

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
3. Lab Technician (distribution system, reservoir and watershed sampling)	Historically, sampling of the distribution systems, reservoirs and watersheds has been conducted by staff from three different departments. In order to best obtain consistency and efficiency of these sampling programs, it would be beneficial to have these programs under the supervision of one Manager. This position would take over the sampling currently being conducted by licensed Water Treatment Plant Operators, the Laboratory Chemist and current Laboratory Technician freeing up their time for higher level tasks (e.g., plant operations and advanced analytical testing). It will also allow the Water Manager and the Laboratory Manager to focus on higher level initiatives. The new Laboratory Technician would work closely with the current Water Quality Specialist to conduct the various sampling programs under the general direction of the Laboratory Manager. Also, this new position will support the increasing analytical loads that the RWSA Laboratory has been experiencing as a result of increased regulatory compliance and process operation requirements.	Operational Optimization, Environmental Stewardship, Environmental/Permit/Operational Compliance
4. Construction Inspector/Utility Marker	In the interest of cost savings and greater quality control, both RWSA and RSWA are in the process of shifting away from contracted construction inspection. While specialty inspections will still be required, many of the projected capital projects will be inspected and documented by in-house staff. As the number and variety of projects increases, additional staff is needed to meet this demand.	Infrastructure & Operational Optimization
5. Accounting Associate	The current accounting staff has not expanded in nearly two decades. During that time the number of operating and capital transactions have increased from \$10 million then to \$31 million today. Revenue bonds have grown from \$35 million then to \$160 million today. This level of business growth is and will stress the accounting and finance function into the future. The complexity of the cost allocations related to the capital expansions is very significant. This position is needed to support the two separate Authorities to meet their outstanding financial reporting and compliance expectations as soon as possible.	Operational Optimization, overall support of all goal implicitly

Water & Sewer

FY 2022

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
6. IT Technician	With the addition of significant security systems, as included in the CIP, will require added network communications and hardware servicing. This will require a staff person to be responsible for security and IT protocol to maintain the integrity of the security systems. Years ago, the Authority installed security systems but did not staff the system accordingly and the systems failed and we returned to old lock and key systems. General IT help desk support is in need as more users and systems are added to our team.	Operational Optimization, Infrastructure Master Planning
7. Administrative Coordinator/ Procurement - Admin.	Many positions at the Authority have multiple responsibilities. The HR Manager is also the front Office Manager. The responsibilities of the HR Manager have grown over the last decade, which has inturn had an impact on the administrative functions. As more employees are added, employee recruiting, support and development have pushed other needs off. Procurement and contract management have been significantly increasing over the years with no additional support in that area of business in 20 years. The addition of a staff person to manage the daily front office staffing, focus on procurement/contract management, upgrades to office systems will allow the HR Manager to perform necessary HR functions and focus on strategic goals.	Workforce Development, Operational Optimization, Communication
8. Mechanic/Trainee	With the modernization of all the water and wastewater treatment plants, there has been a significant increase in equipment inventory and overall assets. There is a need for additional staffing to meet this maintenance need. Due to the unique nature of work in the water and wastewater industry, it is essential to train and mentor new employees. This position would allow the Authority to hire a less skilled employee and provide them with the necessary training to fill a mechanic position as they become vacant.	Workforce Development, Infrastructure & Master Planning; Operational Optimization

FY 2023

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
9. Dam Safety Engineer/CIP Coordinator	As the Capital Improvement Program and Operational Program continues to grow, so is the need for project management staffing. Current staff are managing the development, review and construction oversite process; the dam safety program; capital design and construction; line maintenance; system master planning, and asset management.	Infrastructure, Master Planning, Operational Compliance
10. Management/Budget Analyst/Admin.	Possible upgrade to a current Admin. Assistant position but the volume of budgetary and operational administrative needs by all departments would support a new position. Operational Managers have seen an increasing work load related to safety administration, timekeeping, training requirements/tracking, etc. while still being responsible for the ultimate product where a centralized support could create efficiencies. The needs of a more skilled position to set up and handle more complex reporting (budget and operational) writing and analytical support, in-depth research of office systems and administrative policy considerations, requires a more skilled position than our classification system currently provides.	Operational Optimization, Infrastructure Master Planning
11. SCADA Technician	Again, with the major capital projects being constructed and completed, the expectation is the SCADA and instrumentation systems will most likely double in size and complexity. Older systems installed at the wastewater treatment plants will require continuous upgrades. These systems are critical in meeting regulatory and environmental expectations. Our staff currently is supporting the construction projects as well as older system maintenance.	Operational Optimization, Infrastructure Planning, Environmental/Permit/Operational Compliance

Water & Sewer

FY 2024

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
12. Water Operator	Our goal to have the plants properly staffed according to best practices and Virginia Department of Health regulations, and to properly perform daily, weekly and monthly preventative operating maintenance. Additional staffing is required to meet those goals.	Operational Optimization, Environmental/Permit/Operational Compliance
13. Instrumentation Technician	Once the Instrumentation Specialist position is well established and once the increased number of devices have been installed and will be online with the major upgrades and expansions of the main water plants, this position is needed to further support the more technically dependent systems being installed and used for core businesses. Qualified contractors are becoming difficult to find which we currently rely heavily upon.	Operational Optimization, Infrastructure Planning, Environmental/Permit/Operational Compliance

FY 2025

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
14. IT Technician - Cyber Security	Cyber security is becoming an increasingly specialized and time consuming task. Many utilities have full-time jobs dedicated solely to cyber security and disaster recovery. The industry is moving towards mobile devices linking to internal networks that help manage the various processes, alarms and controls through SCADA and related wide area network connections. This is an area that most industry experts are saying needs to be specifically addressed by utilities. This position would also support the internal security networks, camera systems (that are supported by servers and data storage), and communication networks that support them.	Operational Optimization, Infrastructure Master Planning

Solid Waste

FY 2020

Positions	Needs and Duty Descriptions	Strategic Plan Impacts
1. Attendant - McIntire	There are 3 part-time positions that work at McIntire Center currently. These positions cover 57 hours per week of operations to the public. The staffing of this facility with part-time employees makes it difficult to staff and schedule from a management standpoint. Having a more reliable staffing situation by converting two of the part-time FTE positions to a full time position is the goal. This position is a net -0- adding of FTE's. It will have additional costs for benefits.	Provide reliable Solid Waste Services
2. Attendant - Ivy	This position will be dependent on the outcome and approvals of the master plan for the Ivy site to provide a much broader array of recycling services at the Ivy site. A full-time attendant would be needed to help the public as they visit the center, unload, direct traffic and safely operate the center's compactors, trucking/bin pick-up and delivery activities, and maintain the site.	Provide reliable Solid Waste Services
3. Attendant - Paper Sort	The Paper Sort volumes of waste fiber, metal and plastic wastes received for processing and loading into trailers has increased and requires a need for a full-time attendant/operator. This facility currently has only a part-time 0.25 FTE budgeted to it. However, we are using an operator at Ivy to fill in the periods of time when the part-time attendant is not available.	Provide reliable Solid Waste Services

FY 2021 - FY 2025

To be determined as service expansion discussions have been ongoing

RIVANNA AUTHORITIES

Last 15 Fiscal Years

Number of Employees by Department or Identifiable Activity

Table 3

	Fiscal Years Ended June 30,															FTE Changes	
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	#	%
Number of budgeted FTE positions:																	
Joint Operations Management	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	(1.00)	-50%
Water	24	24	24	24	24	23	23	23	23	22	23.4	23.4	23.4	25.4	26.4	2.40	10%
Wastewater	18	18	18	16	16	16	15	18	18	17	17	17	17	16	16	(2.00)	-11%
Laboratory	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	-	0%
Operations	47	47	47	45	45	44	43	46	46	44	45.4	45.4	45.4	45.4	46.4	(0.60)	-1%
Engineering	7	7	7	9	10	10	9	9	9	9	9	9	9	12	11	4.00	57%
Maintenance - Note 1	14	14	15	14	14	14	15	16	16	17	17	17	16	16	17	3.00	21%
Administration / Finance	11	11	11	11	11	11	10	10	10	10	10	10	11	11	11	-	0%
IT / SCADA	1	1	1	1	2	2	2	2	2	2	2	2	4	4	6	5.00	500%
Support Departments	33	33	34	35	37	37	36	37	37	38	38	38	40	43	45	12.00	36%
RSWA Total FTE Staffing	80	80	81	80	82	81	79	83	83	82	83.4	83.4	85.4	88.4	91.4	11.40	14%
Administration	2	2	2	2	2	1	1								1	(1.00)	-50%
Ivy Operations and Environmental	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	(1.00)	-33%
Ivy Transfer / Operations Allocated Positions	8.5	8.5	8.5	9.5	9.5	9.5	6	7.5	7.5	3.2	3.2	3.2	3.2	3.2	5.2	(3.30)	-39%
Drivers and Equipment Allocated Positions	3	3	3	3	3	3	3	4	4	4	4	4	4	4	5	2.00	67%
Recycling Operations	4.2	4.2	4.2	3.63	3.63	2.1	1.1							1.25	1.75	(2.45)	-58%
RSWA Total FTE Staffing	20.7	20.7	20.7	20.13	20.13	17.6	13.1	13.5	13.5	9.2	9.2	9.2	9.2	10.45	14.95	(5.75)	-28%
Total Both Authorities	100.7	100.7	101.7	100.1	102.1	98.6	92.1	96.5	96.5	91.2	92.6	92.6	94.6	98.9	106.4	5.7	5.6%

Note 1 - these positions were in Water and Wastewater prior to FY 2010

ALBEMARLE COUNTY SERVICE AUTHORITY
FULL-TIME EMPLOYEES
LAST 15 FISCAL YEARS

Table 4

Department	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	FTE Increases 15 Years.	
Administration/IT	6	6	6	8	8	8	9	9	10	10	10	10	10	10	10	4	67%
Finance	11	11	13	13	14	14	14	14	15	15	16	16	16	17	17	6	55%
Combined	17	17	19	21	22	22	23	23	25	25	26	26	26	27	27	10	59%
Engineering	13	13	15	15	15	15	15	15	16	16	16	16	16	17	17	4	31%
Maintenance	23	31	31	31	31	31	31	31	31	31	32	33	33	33	33	10	43%
Combined	36	44	46	46	46	46	46	46	47	47	48	49	49	50	50	14	39%
Total	53	61	65	67	68	68	69	69	72	72	74	75	75	77	77	24	45%

MEMORANDUM

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

**FROM: JENNIFER WHITAKER, DIRECTOR OF ENGINEERING &
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

**SUBJECT: CAPITAL IMPROVEMENT PLAN AMENDMENT -
AUTHORIZATION FOR A WATER LINE PROJECT ON THE
BIRDWOOD PROPERTY**

DATE: AUGUST 28, 2018

Authorization and funding are requested to install a raw water line along the east boundary of the Birdwood property while the golf course is closed for reconstruction. If approved, construction of the water line will be competitively bid with construction to start in November 2018 and completion by October 2019. A project budget of \$7 million has been estimated to acquire the easements and complete installation of the water line including consultant construction administration fees.

The Community Water Supply Plan includes extending a raw water line from the South Rivanna Reservoir to the Ragged Mountain Reservoir. The preliminary alignment for this water line is located along the east boundary of the Birdwood golf course between Rt. 250 and Reservoir Road. The Birdwood property is owned by the University of Virginia Foundation (UVAF). UVAF has plans to close the golf course and reconstruct the golf course over a one-year period starting this fall. Staff have been coordinating with UVAF to plan installation of our water line while the golf course is closed and under construction as a strategy to minimize our construction costs and the impact on golf course operations. Our project will include installation of about 6000 LF of 36" ductile iron pipe located at varying depths in the proposed alignment between the golf course and the property boundary.

In accordance with the Ragged Mountain Dam Agreement, the cost for this work will be allocated 80% to the ACSA and 20% to the City. We will include the funding for this project in the upcoming bond issuance. Debt service costs will be reflected in the FY 2020 Annual Budget.

Board Action Requested:

RWSA staff requests the Board of Directors to consider authorizing installation of this water line from November 2018 – October 2019 and the addition of \$7 million to the FY 2019 – 2023 Capital Improvement Plan for this project.

Water Line Project

on the

Birdwood Property

Request for Authorization to Proceed and Funding



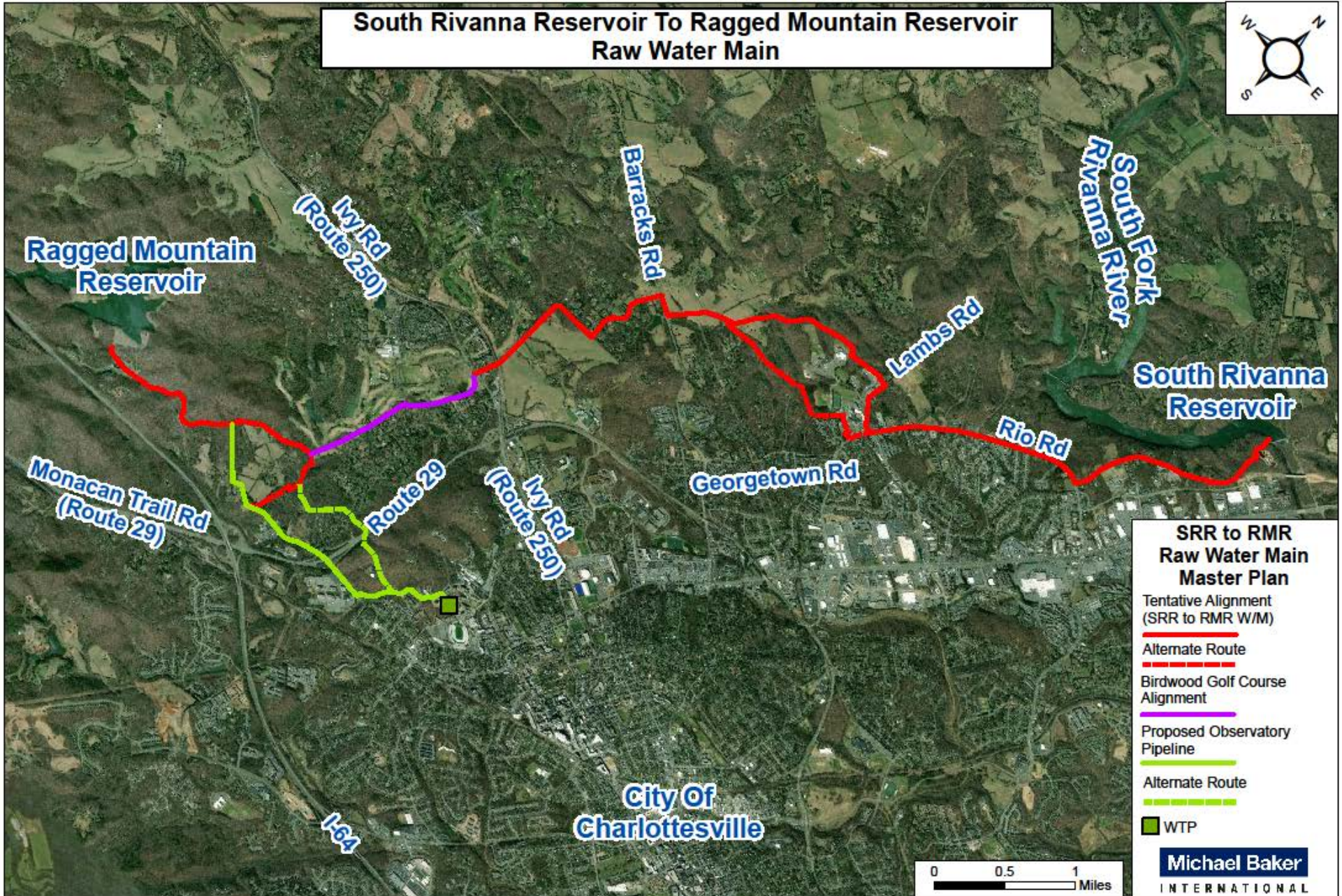
Presented by:

Bill Mawyer, Executive Director

Michelle Simpson, Senior Civil Engineer

August 28, 2018

South Rivanna Reservoir To Ragged Mountain Reservoir Raw Water Main



Scope of Work

- 6,000 LF of 36" ductile iron pipe
- Part of raw water line connecting South Rivanna Reservoir and Ragged Mountain Reservoir
- Schedule:
 - Advertise for Construction Bids Early September 2018
 - Award by RWSA Board October 23, 2018
 - Start Construction December 2018
 - Construction Completion October 2019
- Estimated Project Budget: \$7 M

Why build the water line now?

- Coordinate with Birdwood golf course reconstruction while the course is closed from fall 2018 – fall 2019
 - Lower construction cost to complete water line installation now, as compared to after the golf course reconstruction has been completed
 - Lessen environmental impacts by completing the work concurrently with installation of new golf course features and Dominion Energy underground electric line
 - Avoids operational and financial impacts to the golf course in the future
 - Reduces noise and nuisance impacts to neighbors from multiple years of projects
- Ductile Iron Pipe Research Association indicates there should be no detrimental affect on the pipe and gaskets to be installed years before usage begins. DIP is corrosion resistant and can be encased with a protective polyethylene material as an extra layer of corrosion protection. Thicker pipe can be specified to extend pipe life.

Birdwood Water Line Alignment



Project Challenges

- Limited access to the site
- Impacts to adjacent neighbors in Belair along Canterbury Road, especially if blasting is required
- Multiple contractors working in the same or adjacent areas
- Creek crossings and wetlands
- Tree clearing during Indiana Bat roosting season

To Move Forward

- Request Board authorization to proceed, and to amend the FY 2019 CIP to include a budget of \$7 M for the project.
- Staff will meet with the UVA Foundation to finalize easements.

Questions?

MEMORANDUM

**TO: RIVANNA WATER AND SEWER AUTHORITY
BOARDS OF DIRECTORS**

**FROM: JENNIFER WHITAKER, DIRECTOR OF ENGINEERING &
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

**SUBJECT: CAPITAL IMPROVEMENT PLAN AMENDMENT: REQUEST FOR
AUTHORIZATION - URBAN WATER DEMAND AND SAFE YIELD
STUDY**

DATE: AUGUST 28, 2018

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 work for the bathymetric survey of the South Rivanna Reservoir and the Ragged Mountain Reservoir is underway and was authorized in July 2018. The bathymetric work is being conducted by Draper Aden and is expected to be completed by the end of this year. Subsequent to collecting the reservoir survey data, the demand 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.

Through our term contract for Water Treatment Plant Services, staff requested that Hazen and Sawyer provide a scope of work for this project. Following review and comment of the draft work authorization by ACSA and the City, RWSA engineering staff has negotiated an initial scope of work to include:

- Develop demand forecasts following meetings with stakeholders (including the City, ACSA, and City and County planning departments), evaluations of previous reports and master/comprehensive planning documents, and analysis of water supply, treatment and customer billing data.
- Perform hydrologic modeling to update the existing safe yield.
- Provide two community meeting opportunities.
- Provide final reports on demand forecasts and safe yield.

Board Action Requested:

Staff requests that the Board of Directors authorize the Executive Director to execute a Work Authorization with Hazen and Sawyer for a total not to exceed \$140,000 for the Urban Water Demand and Safe Yield Study, and any amendments to the Work Authorization, only when necessary for the completion of this project, provided the total amount of all amendments does not exceed 10% of the total Work Authorization fee.

Staff also requests the Board of Directors to authorize an increase of \$54,000 to the total project capital budget for the Urban Water Demand and Safe Yield Study. This authorization will increase the total project budget from \$100,000 to \$154,000.

MEMORANDUM

**TO: RIVANNA WATER AND SEWER AUTHORITY
BOARDS OF DIRECTORS**

**FROM: JENNIFER WHITAKER, DIRECTOR OF ENGINEERING &
MAINTENANCE**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

**SUBJECT: CAPITAL IMPROVEMENT PLAN AMENDMENT: URBAN
FINISHED WATER INFRASTRUCTURE MASTER PLAN**

DATE: AUGUST 28, 2018

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. Many previously identified projects in the urban finished water treatment and distribution system are in various stages of analysis and design. As such, staff have identified a need to develop a current and ongoing finished water master plan to further direct and coordinate these and future efforts.

Through our term contract for Water and Sewer Engineering Services, we requested that Michael Baker Engineering provide a scope of work for this project. Following review and comment of the draft work authorization by ACSA and the City, RWSA engineering staff has negotiated an initial scope of work to include:

- Collect existing water system operating data and reports
- Calibrate hydraulic water model using field testing data
- Develop criteria to evaluate the performance of the overall water system in conjunction with community stakeholders (City and ACSA)
- Using the demand projections developed separately under the Urban Water Demand Projection and Safe Yield Study, develop a matrix of hydraulic modeling scenarios for future planning of the system
- Evaluate modeled alternatives and develop a ranking of improvements with input from stakeholders
- Develop Finished Water Master Plan to include future CIP projects with estimated installation period and budgetary costs

Board Action Requested:

Staff requests that the Board of Directors authorize the Executive Director to execute a Work Authorization with Michael Baker International, Inc. for the Urban Finished Water System Master Plan for a fee not to exceed \$230,000, and any amendments to the Work Authorization, only when necessary for the completion of this project, provided the total amount of all amendments does not exceed 10% of the total Work Authorization fee.

Staff also requests the Board of Directors to authorize an increase of \$103,000 to the total project capital budget for the Urban Finished Water System Master Plan, and to include it in the FY 2019 capital budget. This authorization will increase the total project budget from \$150,000 to \$253,000 and move the funding from FY2023 where it was included in the latest Capital Improvement Plan as adopted in June 2018.

Urban Water Supply Program Update

Safe Yield, Demand and Infrastructure Master Plan



Presented by:

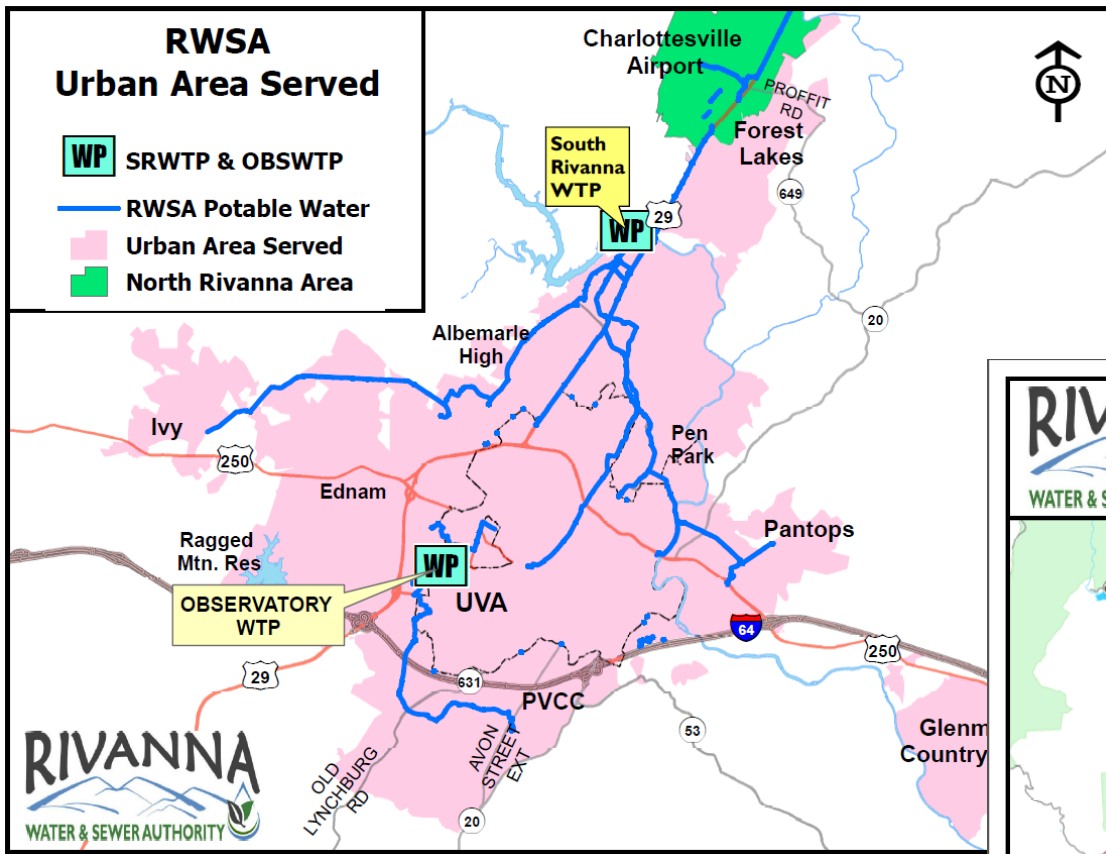
Bill Mawyer, Executive Director

Jennifer Whitaker, Director of Engineering & Maintenance

August 28, 2018

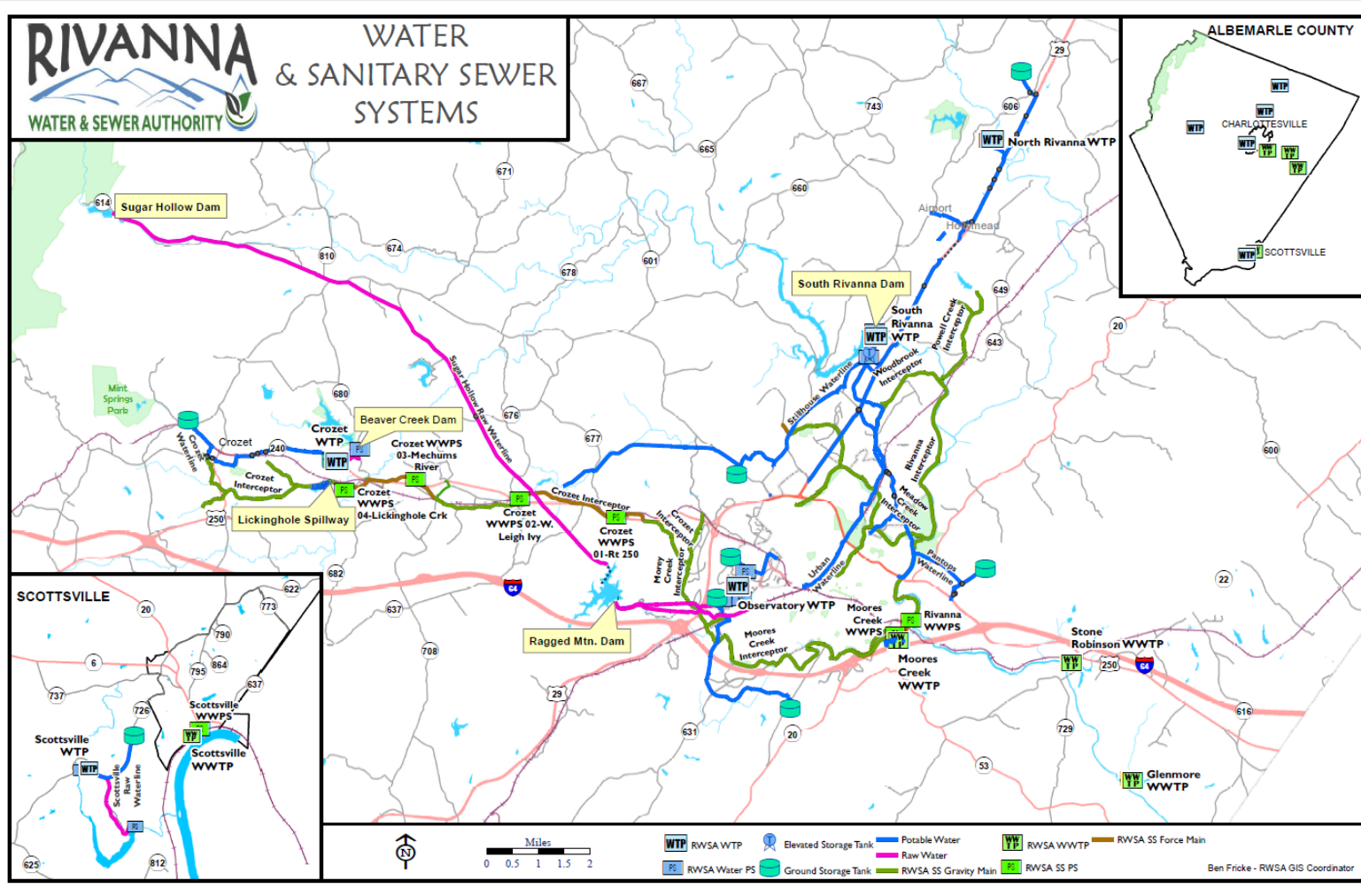
RWSA Urban Area Served

- WP** SRWTP & OBSWTP
- RWSA Potable Water
- Urban Area Served
- North Rivanna Area



RIVANNA WATER & SEWER AUTHORITY

WATER & SANITARY SEWER SYSTEMS

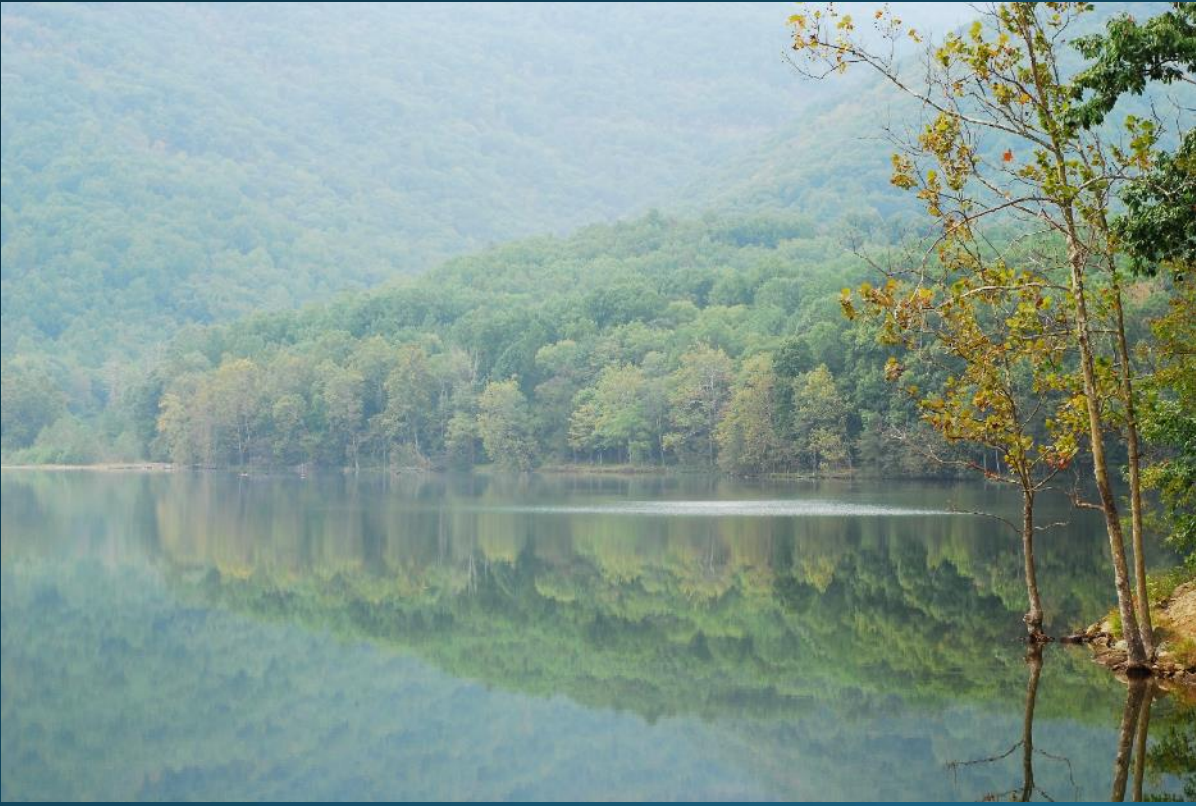


Urban Water Supply Program

- Task 1: Model Current Safe Yield from the Urban Reservoirs
(Ragged Mtn, South Rivanna, Sugar Hollow)
 - Task 2: Complete Bathymetric Studies of South Rivanna and Ragged Mtn Reservoirs
 - Task 3: Assess Future Water Demand and Safe Yield
 - Task 4: Complete an Urban Finished Water Infrastructure Master Plan
 - Task 5: Review information with VDEQ for permit renewal, by 2023
-
- Completion of Tasks 1 - 3: June 2019
 - Completion of Task 4: November 2019

Task 1: Safe Yield from the Urban Reservoirs

as modeled by Hydrologics



Sugar Hollow Reservoir

Alternatives

1. Without the SRR to RMR Water Line (current status)
2. With the SRR to RMR Water Line
3. With an additional 12 feet of water in the RMR, and without the SRR to RMR Water Line
4. With an additional 12 feet of water in the RMR, and with the SRR to RMR Water Line

Additional Safe Yield

Alternatives	Safe Yield (MGD)
1. Without SRR to RMR water Line (current status)	16.4
2. With SRR to RMR Water Line	+3.1
3. With addnl 12 feet of water in RMR, and without SRR to RMR water line	+2.6
4. With addnl 12 feet of water in RMR, and with SRR to RMR water line	+5.0

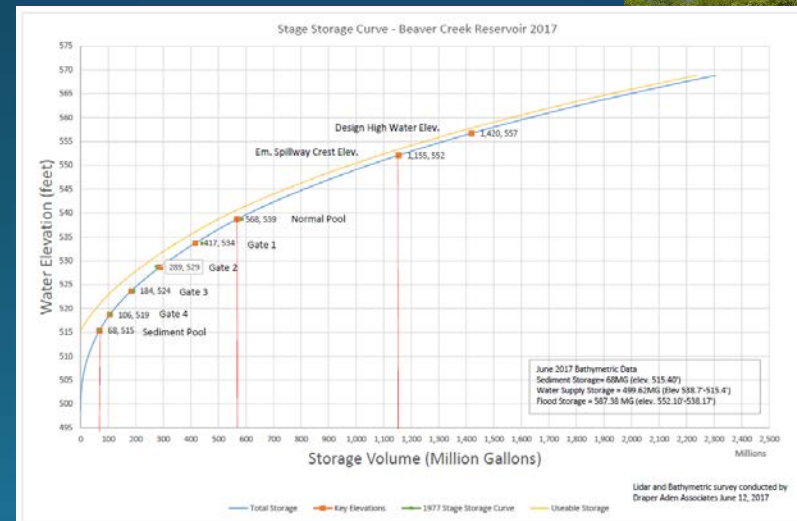
Task 2: Bathymetric Studies of South Rivanna & Ragged Mtn Reservoirs

by Draper Aden Engineering

- Studies will determine the updated volume, rate of siltation and stage storage curves for both reservoirs
- Data will be used to calculate the Safe Yield available in the urban water supply reservoirs

Scope of Work

- Aerial survey using Lidar system, panels on the ground
- Water survey (bathymetry) using Sonar system
- Field survey
- Calculations and drafting
- Finalize base maps and compute stage storage curves
- Completion by December 2018



Task 3: Assess Future Water Demand and Safe Yield

by Hazen & Sawyer Engineering

Scope of Work

- Review Available Records and Collect Data
- Develop Demand Forecasts over a 50-year planning horizon
- Evaluate Water Supply Capacity
- Develop a Report Documenting Demand Forecasts and Safe Yield Analyses
- Completion: June 2019
- Fees: not to exceed \$ 140,000

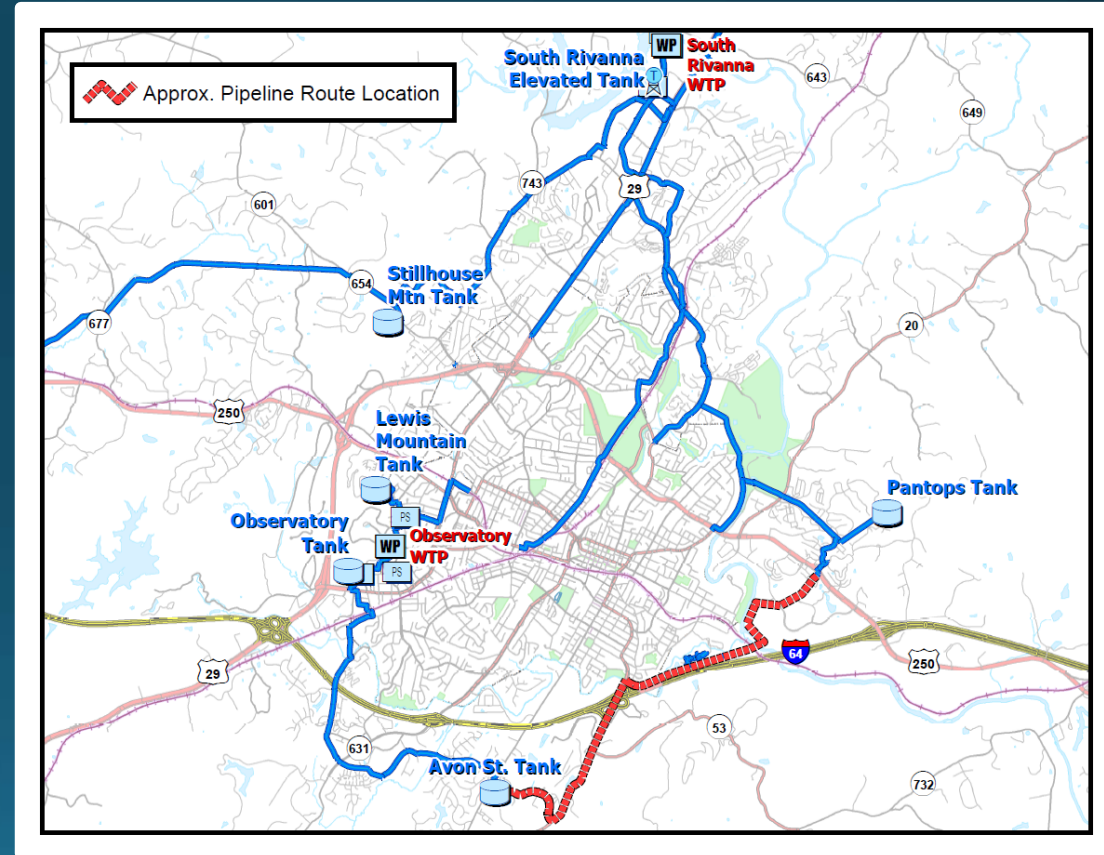


Task 4: Complete An Urban Finished Water Infrastructure Master Plan

By Baker Engineering

Scope of Work

- Collect existing water system operating data and reports
- Calibrate hydraulic water model using field testing data
- Develop criteria to evaluate the performance of the overall water system in conjunction with the City and ACSA
- Using the demand projections developed separately under the Urban Water Demand and Safe Yield Study, develop a matrix of hydraulic modeling scenarios for future planning of the system
- Evaluate modeled alternatives and develop a ranking of improvements with input from the City and ACSA
- Develop Finished Water Master Plan to include future CIP projects with estimated installation period and budgetary costs
- Completion: November 2019
- Fees: not to exceed \$230,000



Task 5: Meet with VDEQ

1. Hydrologics has also completed preliminary modeling of the basin-wide inflows to the SRR

- Indicates current correlation, using the Mechums River gage x 2.71 factor, could be updated to be more accurate.
- This update will be reviewed with VDEQ during the permit renewal cycle in 2023.



2. RWSA staff completed a field correlation of our release meter, located in the SRR south gate.



Questions?

Request approval of Work Authorizations

- | | |
|--|-----------|
| 1. Urban Water Demand and Safe Yield Study, Hazen & Sawyer Engineers | \$140,000 |
| 1. Urban Finished Water Master Plan, Baker Engineering | \$230,000 |

MEMORANDUM

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

**FROM: LONNIE WOOD, DIRECTOR OF FINANCE AND
ADMINISTRATION**

REVIEWED BY: BILL MAWYER, EXECUTIVE DIRECTOR

SUBJECT: SERIES 2018 BOND ISSUE

DATE: AUGUST 28, 2018

The Authority has reached a point on several projects that debt financing is needed to fund projects currently underway or about to begin. Most of these projects are in design or close to being bid. Several are under way as work-in-progress. Below are the project's cost and funding needs:

	<u>Project Costs</u>	<u>2018 Bond</u>
Obs. WTP Improvements	\$ 18,630,000	5,300,000
Raw Water Pipeline - Birdwood	7,000,000	7,000,000
Avon to Pantops Finished Water Line	13,200,000	3,075,000
SFR WTP Improvements	7,500,000	3,000,000
Beaver Creek Dam Improvements	14,930,000	3,953,000
Mixing Sys. & Painting Crozet WB	1,200,000	1,200,000
Crozet WTP Improvements	6,900,000	6,900,000
Crozet Finished WPS	2,600,000	2,600,000
Crozet Master Plan	300,000	300,000
Crozet Interceptor	625,000	444,000
Roof Replacement - MC	1,264,000	1,264,000
Crozet Flow EQ Tank	3,300,000	3,300,000
Total	\$ 77,449,000	\$ 38,336,000

Some of these projects will be fully funded with this bond issue and others will be partially funded. The timing of the projects and how it affects the bond is a factor. As a rule, we try to have all bond fund proceeds used or spent within two years. This is mainly due to spend down and yield restriction requirements for the arbitrage rebate rules per IRS regulations.

In summary, the funding sources of these particular projects would be as follows:

	Sources of Funding
2012A Bond	\$ 1,045,431
2015B Bond	314,601
Future Cash Reserves & Debt Funds	37,752,968
2018 Bond	<u>38,336,000</u>
 Total	 \$ 77,449,000

In July, the Authority applied for participation in the Virginia Resources Authority (VRA) 2018 Fall Pooled Loan/Bond Program to fund these projects. This program allows the Authority to participate with many other similar applicants in a single bond that is issued by the VRA. Effectively, the VRA buys Rivanna's bond within that program. The program allows for normal VRA issuance costs to be spread among all issuers and is administratively more efficient from a staffing standpoint. VRA has a strong rating and is backed by the moral obligation of the Commonwealth, which means the rates are favorable even with a 12.5 basis point of par added for annual administrative fees. Davenport & Company, the Authority's financial advisor, reviewed several scenarios comparing a stand-alone issue to using VRA, and the differences were very close considering the speculative nature. Staff elected to pursue the VRA pooled program after considering both options. The Authority has used this program in the past with the Series 2012A Bond and the 2015B Bond.

The needed net bond proceeds shown previously is \$38,336,000. To determine the size of the bond, several costs associated with the bond and projects are added to the bond for funding with the resulting proceeds. Interest paid during the construction period of the projects are required to be capitalized, and the regulations allow for the interest portion of the first several debt service payments to be financed within the bond proceeds. A summary of the total bond size is as follows:

<u>Total Proceeds Needed</u>	
Construction funds needed	\$ 38,336,000
Allowance for Discount Pricing	1,177,350
Capitalized Interest	1,516,650
Issuance costs and underwriter fees	<u>820,000</u>
Total Bond (not to exceed)	<u>\$ 41,850,000</u>

I want to stress the estimated nature of this summary. The bond issue and closing will not take place for over three months. Nearly all of these numbers will change some during that time as

interest rates and bond pricing change on a daily basis. Staff will need the flexibility to work within a not to exceed amount which is provided in the attached bond resolution.

Included with this memo are the following:

- Resolution authorizing the bond issue
- Thirtieth Supplemental Trust Agreement – Bank of New York/Mellon
- Financing Agreement between VRA and Rivanna Water & Sewer Authority

These documents are being presented as to form and will be modified in the amounts and other details as they are known at the time of closing after the bond pricing information is known. The Resolution allows for the Executive Director to accept the details of the bond within the parameters of the bond sale. The not-to-exceed amount of \$41.85 million was recommended by the financial advisors for purposes of flexibility of structuring the eventual bond sale.

On the day of pricing the Authority will only issue the amount of debt necessary to fund the projects as disclosed in this memo. Flexibility in the not-to-exceed parameters is necessary so that the Authority can secure the required funding under the most favorable terms possible within the interest rate environment at the time of sale. This flexibility is needed to effectively manage the bond pricing process with regards to premium and discount bond pricing, callable and non-callable bond options, and other investor preferences/requirements that will impact the Authority's bond pricing structure.

We expect to close on the Bond around November 14th, where the Chair, Secretary Treasurer, Executive Director, General Counsel and the Finance Director get together to execute the documents for the bond.

Board Action Requested:

It is requested that the Board adopt the resolution authorizing the issuance of the Series 2018 Revenue Bond in an amount not to exceed \$41,850,000 and authorize the Director of Finance & Administration and the Executive Director to take other necessary steps to fulfill the RWSA requirements of the attached Financial Agreement to properly close on or about November 14, 2018. Further, it is requested that the Board authorize the Finance Director to accept minor and non-substantial changes to the attached drafts of the bond documents, should they be necessary prior to closing, in consultation with the Authority's General Counsel.

Attachments:

Resolution authorizing the issuance of the bonds

Thirtieth Supplemental Agreement of Trust between Rivanna Water and Sewer Authority and the Bank of New York Mellon Trust Company, N.A.

Financing Agreement between the Virginia Resources Authority and the Rivanna Water and Sewer Authority

COVERING CERTIFICATE FOR RESOLUTION

The undersigned Executive Director of the Rivanna Water and Sewer Authority (the “Authority”), certifies as follows:

1. Attached hereto is a true, correct and complete copy of a resolution entitled “RESOLUTION AUTHORIZING THE ISSUANCE, SALE AND AWARD BY THE RIVANNA WATER AND SEWER AUTHORITY OF ITS TAXABLE REGIONAL WATER AND SEWER SYSTEM REVENUE BOND IN A PRINCIPAL AMOUNT NOT TO EXCEED \$41,850,000 AND PROVIDING FOR THE FORM, DETAILS AND PAYMENT THEREOF” (the “Resolution”), as adopted at a regular meeting of the members of the Authority held on August 28, 2018, by the affirmative roll-call vote of a majority of all members of the Authority.

2. Such meeting of the Authority was held at the time and place established by the Authority for its regular meetings.

3. The minutes of such meeting reflect the attendance of the members and their votes on the Resolution as follows:

Member	Attendance (Present/Absent)	Vote (Aye/Nay/Abstain)
Michael Gaffney		
Kathleen Galvin		
Lauren Hildebrand		
Mike Murphy		
Gary B. O’Connell		
Lizbeth A. Palmer		
Jeff Richardson		

4. The Resolution has not been repealed, revoked, rescinded or amended and is in full force and effect on the date hereof.

WITNESS my signature and the seal of the Rivanna Water and Sewer Authority, this ____ day of August, 2018.

(SEAL)

William I. Mawyer, Jr.
Executive Director
Rivanna Water and Sewer Authority

RESOLUTION AUTHORIZING THE ISSUANCE, SALE AND AWARD BY THE RIVANNA WATER AND SEWER AUTHORITY OF ITS TAXABLE REGIONAL WATER AND SEWER SYSTEM REVENUE BOND IN A PRINCIPAL AMOUNT NOT TO EXCEED \$41,850,000 AND PROVIDING FOR THE FORM, DETAILS AND PAYMENT THEREOF

WHEREAS, the Rivanna Water and Sewer Authority (the “Authority”) has entered into a Service Agreement dated June 12, 1973, as amended (the “Service Agreement”), by and between the Authority, the Albemarle County Service Authority (the “Service Authority”), the City of Charlottesville, Virginia (the “City”), and the County of Albemarle, Virginia (the “County”), providing for the acquisition by the Authority of certain existing water and wastewater facilities from the City and the Service Authority, the construction by the Authority of new facilities requested by the City and/or the Service Authority, and the financing, operation and maintenance by the Authority of all such facilities (collectively, the “System”);

WHEREAS, pursuant to the provisions of the Service Agreement and an Agreement of Trust dated as of October 1, 1979 (the “Master Trust Agreement”), between the Authority and The Bank of New York Mellon Trust Company, N.A. (the “Trustee”), the Authority desires to issue its Taxable Regional Water and Sewer System Revenue Bond, Series 2018, in a principal amount not to exceed \$41,850,000 (the “2018 Bond”), and use the proceeds to finance the acquisition, construction and equipping of capital improvements to the System, including, without limitation, (a) improvements to (i) the Observatory Water Treatment Plant, (ii) the Avon to Pantops Water Main and (iii) the South Rivanna Water Treatment Plant, (b) modification of the Beaver Creek Dam, (c) painting the Buck’s Elbow Ground Storage Tank and the Crozet Waterball Tank, (d) installation of an active mixing system at the Buck’s Elbow Ground Storage Tank, (e) expansion of the Crozet Water Treatment Plant, (f) construction of the Crozet Water Treatment Plant Finished Water Pump Station, (g) development of a Drinking Water Infrastructure Plan for the Crozet service area, (h) repairing manholes and pipelines that flow to the Crozet Interceptor, (i) construction of a Flow Equalization Tank for the Crozet service area, (j) roof replacements for the Moores Creek Advanced Water Resource Recovery Facility and (k) installation of a raw water pipeline in Birdwood (collectively, the “Supplemental Project”), together with related issuance expenses and certain capitalized interest on the Series 2018 Bond;

WHEREAS, the Authority has applied to the Virginia Resources Authority (“VRA”) for the purchase of the 2018 Bond, and VRA has indicated its willingness to purchase the 2018 Bond from the proceeds of one or more series of its Infrastructure and State Moral Obligation Revenue Bonds (Virginia Pooled Financing Program) (collectively, the “VRA Bonds”), in accordance with the terms of (a) a Local Bond Sale and Financing Agreement (the “Financing Agreement”), between VRA and the Authority, and (b) a Thirtieth Supplemental Agreement of Trust (the “Thirtieth Supplemental Agreement” and, together with the Master Trust Agreement, as previously supplemented and amended, the “Trust Agreement”), between the Authority and the Trustee, the forms of which have been made available to the Authority prior to this meeting;

WHEREAS, the Financing Agreement shall indicate that the sum of \$38,336,000 (plus an amount sufficient to fund capitalized interest through October 1, 2019, and to pay related costs of issuance) is the amount of proceeds requested for the Project from VRA or such other amount as

requested by the Authority in writing and approved by VRA prior to VRA's bond pricing (the "Proceeds Requested");

WHEREAS, VRA has advised the Authority that VRA's objective is to pay the Authority a purchase price for the 2018 Bond that in VRA's judgment reflects its market value (the "Purchase Price Objective") taking into consideration the Proceeds Requested and such factors as the purchase price received by VRA for the VRA Bonds, the issuance costs of the VRA Bonds (consisting of the underwriters' discount and other costs incurred by VRA) (collectively, the "VRA Costs") and other market conditions relating to the sale of the VRA Bonds;

WHEREAS, VRA's determination of the Purchase Price Objective may result in the 2018 Bond having a purchase price other than par and consequently (a) the Authority may have to issue the 2018 Bond in a principal amount that is greater than or less than the Proceeds Requested in order to receive an amount of proceeds substantially equal to the Proceeds Requested or (b) if the maximum authorized principal amount of the 2018 Bond set forth in Section 5 below does not exceed the Proceeds Requested by at least the amount of any VRA Costs and any original issue discount, the purchase price to be paid to the Authority, given the Purchase Price Objective and market conditions, will be less than the Proceeds Requested; and

WHEREAS, the Financing Agreement shall provide that the terms of the 2018 Bond may not exceed the parameters set forth below in Section 5;

BE IT RESOLVED BY RIVANNA WATER AND SEWER AUTHORITY:

1. It is hereby found and determined that it is in the best interests of the Authority and its customers for the Authority (a) to promote the increased quality of drinking water and meet regulatory expectations, (b) to promote the interest of efficient water quality management for the upper Rivanna River Basin, (c) to ensure a reliable supply of potable water for the City and the County and their citizens and (d) otherwise to further the purposes of the Virginia Water and Waste Authorities Act (Chapter 51, Title 15.2 of the Code of Virginia 1950, as amended), all by undertaking the issuance of the 2018 Bond and using the proceeds thereof to finance the Project, to fund certain capitalized interest and to pay the related issuance costs. Accordingly, the Authority authorizes the issuance and sale of the 2018 Bond to VRA in accordance with the terms of this resolution and the Financing Agreement and as an "Additional Bond" in accordance with the terms of the Trust Agreement. It is further determined that the Project will be part of the System as contemplated by the Service Agreement and the Trust Agreement.

2. The Chair and Vice-Chair of the Authority, either of whom may act, are authorized to execute and deliver the Thirtieth Supplemental Agreement. The Thirtieth Supplemental Agreement shall be in substantially the form made available prior to this meeting, which is approved, with such completions, omissions, insertions and changes not inconsistent with this resolution as may be approved by the Chair or Vice-Chair, whose approval shall be evidenced conclusively by the execution and delivery thereof.

3. The Chair and the Vice-Chair of the Authority, either of whom may act, are authorized to execute and deliver the Financing Agreement. The Financing Agreement shall be in substantially the form made available prior to this meeting, which is approved, with such

completions, omissions, insertions and changes not inconsistent with this resolution as may be approved by the Chair or Vice-Chair, whose approval shall be evidenced conclusively by the execution and delivery thereof. For purposes of this resolution, all capitalized terms used but not otherwise defined herein shall have the same meaning as set forth in the Financing Agreement.

4. The 2018 Bond shall be payable solely from Revenues, certain reserves or proceeds of insurance and secured on a parity as to such pledge with the Authority's outstanding bonds and any Additional Bonds issued pursuant to the Trust Agreement. The 2018 Bond shall be a limited obligation of the Authority, and nothing in the 2018 Bond, the Trust Agreement or the Financing Agreement shall be deemed to create or constitute a pledge of the faith and credit of the Commonwealth of Virginia or any political subdivision thereof, including the Authority, the Service Authority, the City and the County.

5. The 2018 Bond shall be issued as a single, registered bond, designated "Taxable Regional Water and Sewer System Revenue Bond, Series 2018," or such other designation as the Chair or Vice-Chair shall make, shall be dated the date that is 30 days prior to the closing date of the VRA Bonds, shall be numbered R-1, shall be in a principal amount not to exceed \$41,850,000 and shall mature no later than December 31, 2048. The Authority authorizes the issuance and sale of the 2018 Bond on terms as shall be determined by VRA subject to the Purchase Price Objective and market conditions described in the recitals hereof; provided, however, that the 2018 Bond (i) shall have a "true" interest cost not to exceed 4.75% (exclusive of "Supplemental Interest" as provided in the Financing Agreement), (ii) shall be sold to VRA at a price that is substantially equal to the Proceeds Requested and (iii) shall be subject to prepayment upon the terms set forth in the Financing Agreement. Subject to the preceding terms, the Authority further authorizes the Executive Director to accept the final terms presented by VRA, including (x) the final principal amount of the 2018 Bond and (y) the amortization schedule (including the principal installment dates and amounts) for the 2018 Bond.

If the limitation on the maximum principal amount of the 2018 Bond set forth in this Section 5 restricts VRA's ability to generate the Proceeds Requested, taking into account the VRA Costs, the Purchase Price Objective and market conditions, the Executive Director is authorized to accept a purchase price for the 2018 Bond at an amount less than the Proceeds Requested. The actions of the Executive Director in determining the final terms of the 2018 Bond shall be conclusive, and no further action shall be necessary on the part of the Authority.

As set forth in the Financing Agreement, the Authority agrees to pay such "Supplemental Interest" and other charges as provided therein, including such amounts as may be necessary to maintain or replenish the VRA Reserve. The principal of and premium, if any, and interest on the 2018 Bond shall be payable in lawful money of the United States of America.

The 2018 Bond shall be substantially in the form attached as an exhibit to the Thirtieth Supplemental Agreement.

6. The Chair, the Vice-Chair and the Secretary-Treasurer of the Authority are hereby authorized and directed to have the 2018 Bond prepared and executed pursuant to the Trust Agreement, to deliver it to the Trustee for authentication and to cause the 2018 Bond so executed and authenticated to be delivered to, or at the direction of, VRA upon payment therefor.

7. In accordance with Section 503(b) of the Trust Agreement, the following matters are stated:

(a) The amounts required to be on deposit at all times in the Bond Fund are as determined pursuant to Section 707 of the Trust Agreement.

(b) The costs of each purpose for which the 2018 Bond is issued are estimated as follows:

Purpose	Cost
Observatory Water Treatment Plant Improvements	\$5,300,000
Avon to Pantops Water Main Improvements	3,075,000
South Rivanna Water Treatment Plant Improvements	3,000,000
Beaver Creek Dam Modification	3,953,000
Buck's Elbow & Crozet Tank Painting/Installation of Active Mixing System	1,200,000
Crozet Water Treatment Plant Expansion	6,900,000
Crozet Water Treatment Plant Finished Water Pump Station Construction	2,600,000
Drinking Water Infrastructure Plan for Crozet Service Area	300,000
Crozet Interceptor Manhole and Pipeline Repairs	444,000
Flow Equalization Tank for Crozet Service Area	3,300,000
Roof Replacements – Moores Creek AWRRF	1,264,000
Birdwood Raw Water Pipeline	<u>7,000,000</u>
Total	\$38,336,000

(c) The expenses incidental to the issuance of the 2018 Bond are estimated not to exceed \$300,000 (excluding the VRA Costs).

(d) No deposit to the Debt Service Reserve Fund will be made with respect to the 2018 Bond.

(e) Capitalized interest through October 1, 2019 (currently estimated to be \$1,516,643), is expected to be financed from proceeds of the 2018 Bond.

8. The officers of the Authority are authorized and directed to execute and deliver all certificates, instruments and documents, including a nonarbitrage certificate and tax compliance agreement (the "Tax Compliance Agreement"), and to take such further action as they may consider necessary or desirable in connection with the issuance and sale of the 2018 Bond pursuant to this resolution, the Financing Agreement, the Trust Agreement and the Thirtieth Supplemental Agreement.

9. The Authority covenants that it shall not take or omit to take any action the taking or omission of which will cause the VRA Bonds to be "arbitrage bonds" within the meaning of Section 148 of the Internal Revenue Code of 1986, as amended, and regulations issued pursuant thereto (the "Code"), or otherwise cause interest on the VRA Bonds to be includable in the gross income of the registered owner thereof under existing law. Without limiting the generality of the foregoing, the Authority shall comply with any provision of the Tax Compliance Agreement that may require the Authority at any time to rebate to the United States any part of the earnings derived

from the investment of the gross proceeds of the 2018 Bond, unless the Authority receives an opinion of nationally recognized bond counsel that such compliance is not required or is no longer required to prevent interest on the VRA Bonds from being included in the gross income for federal income tax purposes of the registered owners thereof under existing law. The Authority shall pay any such required rebate from legally available funds.

10. The Authority covenants that it shall not permit the proceeds of the 2018 Bond or the facilities financed therewith to be used in any manner that would result in (a) 5% or more of such proceeds or facilities being used in a trade or business carried on by any person other than a governmental unit, as provided in Section 141(b) of the Code, (b) 5% or more of such proceeds or facilities being used with respect to any output facility (other than a facility for the furnishing of water), within the meaning of Section 141(b)(4) of the Code, or (c) 5% or more of such proceeds being used directly or indirectly to make or finance loans to any persons other than a governmental unit, as provided in Section 141(c) of the Code; provided, however, that if the Authority receives an opinion of nationally recognized bond counsel that any such covenants need not be complied with to prevent the interest on the VRA Bonds from being includable in the gross income for federal income tax purposes of the registered owners thereof under existing law, the Authority need not comply with such covenants.

11. The Authority authorizes and consents to the inclusion of information with respect to the Authority contained in VRA's Preliminary Official Statement and VRA's Official Statement in final form, both prepared in connection with the sale of the VRA Bonds.

12. The Authority has heretofore received and reviewed the Information Statement (the "Information Statement") describing the State Non-Arbitrage Program of the Commonwealth of Virginia ("SNAP") and the Contract Creating the State Non-Arbitrage Program Pool (the "Contract"), and the Authority has determined to authorize the Chair or Vice-Chair, if and as necessary, to utilize SNAP in connection with the investment of the proceeds of the 2018 Bond. The Authority acknowledges the Treasury Board of the Commonwealth of Virginia is not, and shall not be, in any way liable to the Authority in connection with SNAP, except as otherwise provided in the Contract.

13. All other actions of the officers of the Authority in conformity with the purposes and intent of this resolution and in furtherance of the issuance and sale of the 2018 Bond are ratified and approved.

14. The Secretary-Treasurer of the Authority is authorized and directed to arrange for a certified copy of this resolution to be filed with reasonable dispatch in the office of the Clerk of the Circuit Court of Albemarle County, Virginia.

15. This resolution shall take effect immediately.

THIRTIETH SUPPLEMENTAL AGREEMENT OF TRUST

between

RIVANNA WATER AND SEWER AUTHORITY

and

**THE BANK OF NEW YORK MELLON TRUST COMPANY, N.A.,
as Trustee**

Dated as of October [___], 2018

**Authorizing the Issuance of
Taxable Regional Water and Sewer System Revenue Bond
Series 2018**

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THIS THIRTIETH SUPPLEMENTAL AGREEMENT OF TRUST dated as of October [___], 2018 (this “Supplemental Agreement”), by and between **RIVANNA WATER AND SEWER AUTHORITY**, a public body politic and corporate and political subdivision of the Commonwealth of Virginia (the “Authority”), and **THE BANK OF NEW YORK MELLON TRUST COMPANY, N.A.**, a national banking association, as successor trustee to NationsBank of Virginia, N.A., as successor to Sovran Bank, N.A., as successor to Virginia National Bank, as trustee (in such capacity, together with any successor in such capacity, herein called the “Trustee”);

W I T N E S S E T H:

WHEREAS, the Authority and the Trustee have entered into an Agreement of Trust dated as of October 1, 1979 (the “Master Trust Agreement”), as previously supplemented and amended from time to time (the Master Trust Agreement and the supplemental agreements collectively referred to herein as the “Trust Agreement”), pursuant to which the Authority has issued its Taxable Regional Water and Sewer System Revenue Bond, Series 2005A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2009A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2010A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011B; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011D; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011E; its Taxable Regional Water and Sewer System Revenue and Refunding Bond, Series 2012A; its Regional Water and Sewer System Revenue Bonds, Series 2012B; its Taxable Regional Water and Sewer System Revenue Bond, Series 2014A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2015A; its Taxable Regional Water and Sewer System Revenue and Refunding Bond, Series 2015B, and its Regional Water and Sewer System Revenue Bond, Series 2016 (the outstanding principal amounts of such bonds collectively referred to herein as the “Outstanding Bonds”) [confirm listed bonds remain outstanding], to finance and refinance certain facilities for a regional water and sewer system (the “System”) to serve on a wholesale basis the City of Charlottesville, Virginia, and the Albemarle County Service Authority;

WHEREAS, the Authority is not in default under the Trust Agreement or in payment of the principal of or interest on the Outstanding Bonds;

WHEREAS, within the limitations of and in compliance with the Trust Agreement, the Authority is authorized to issue Additional Bonds (as defined in the Master Trust Agreement), secured on a parity with the Outstanding Bonds to the extent provided in the Trust Agreement, to finance or refinance the cost of improvements, extensions and additions to the System;

WHEREAS, the Authority has determined to issue its Taxable Regional Water and Sewer System Revenue Bond, Series 2018, in the principal amount of \$[_____] (the “Series 2018 Bond”), and to use the proceeds thereof to finance the acquisition, construction and equipping of capital improvements to the System, including, without limitation, (a) improvements to (i) the Observatory Water Treatment Plant, (ii) the Avon to Pantops Water Main and (iii) the South Rivanna Water Treatment Plant, (b) modification of the Beaver Creek Dam, (c) painting the Buck’s Elbow Ground Storage Tank and the Crozet Waterball Tank, (d) installation of an active mixing system at the Buck’s Elbow Ground Storage Tank, (e) expansion

of the Crozet Water Treatment Plant, (f) construction of the Crozet Water Treatment Plant Finished Water Pump Station, (g) development of a Drinking Water Infrastructure Plan for the Crozet service area, (h) repairing manholes and pipelines that flow to the Crozet Interceptor, (i) construction of a Flow Equalization Tank for the Crozet service area, (j) roof replacements for the Moores Creek Advanced Water Resource Recovery Facility and (k) installation of a raw water pipeline in Birdwood (collectively, the “Supplemental Project”), together with related issuance expenses [and certain capitalized interest on the Series 2018 Bond];

WHEREAS, the Authority has entered into a Local Bond Sale and Financing Agreement dated as of September 21, 2018, with the Virginia Resources Authority (“VRA”) for the sale of the Series 2018 Bond to, and the purchase of the same by, VRA;

WHEREAS, the Authority has taken all necessary action to make the Series 2018 Bond, when authenticated by the Trustee and issued by the Authority, a valid and binding limited obligation of the Authority and to constitute this Supplemental Agreement a valid and binding agreement authorizing and providing for the details of the Series 2018 Bond; and

WHEREAS, the Authority has determined that it is desirable to make certain amendments to the Master Trust Agreement to provide for the payment of the principal of, premium, if any, and interest on the Series 2018 Bond;

NOW, THEREFORE, THIS THIRTIETH SUPPLEMENTAL AGREEMENT OF TRUST WITNESSETH that the Authority does covenant and agree with the Trustee and with the respective holders, from time to time, of the Outstanding Bonds and the Series 2018 Bond, as follows:

ARTICLE I SUPPLEMENTAL AGREEMENT

Section 30-101. Authorization of Supplemental Agreement.

This Supplemental Agreement is authorized and executed by the Authority and delivered to the Trustee pursuant to and in accordance with Articles V and XIII of the Master Trust Agreement. All covenants, conditions and agreements of the Trust Agreement shall apply with full force and effect to the Series 2018 Bond and to the holder thereof, except as otherwise provided herein.

Section 30-102. Definitions.

Except as otherwise defined herein, terms defined in the Master Trust Agreement are used in this Supplemental Agreement with the same meanings assigned to them in the Master Trust Agreement. In addition, the following terms shall have the following meanings:

“2018 Financing Agreement” shall mean the Local Bond Sale and Financing Agreement dated as of September 21, 2018, between the Authority and VRA.

“Bond Counsel” shall mean counsel nationally recognized on the subject of municipal bonds.

“Cost of the Supplemental Project” shall have the same meaning assigned to the term “Cost of the Project” in Section 603 of the Master Trust Agreement.

“Local Account” shall have the meaning assigned to such term in the 2018 Financing Agreement.

“Series 2018 Bond” shall mean the \$[_____] Taxable Regional Water and Sewer System Revenue Bond, Series 2018, to be issued pursuant to the terms of this Supplemental Agreement.

“Supplemental Agreement” shall mean this Thirtieth Supplemental Agreement of Trust between the Authority and the Trustee, which supplements and amends the Trust Agreement.

“Supplemental Project” shall have the meaning set forth in the recitals hereto.

“VRA” shall mean the Virginia Resources Authority.

“VRA Trustee” shall have the meaning assigned to such term in the 2018 Financing Agreement.

Section 30-103. Reference to Articles and Sections.

Unless otherwise indicated, all references herein to particular articles or sections are references to articles or sections of this Supplemental Agreement.

ARTICLE II

AUTHORIZATION, DETAILS AND FORM OF SERIES 2018 BOND

Section 30-201. Authorization of Series 2018 Bond.

There is authorized to be issued as an Additional Bond pursuant to Article V of the Master Trust Agreement a revenue bond of the Authority in the principal amount of \$[_____] , which shall be designated “Taxable Regional Water and Sewer System Revenue Bond, Series 2018,” to provide funds to finance the Cost of the Supplemental Project (including capitalized interest and related costs of issuance).

Section 30-202. Details of Series 2018 Bond.

The Series 2018 Bond shall be dated October [___], 2018, shall be issued as a single, registered bond, shall be numbered R-1 and shall be in the principal amount of \$[_____]. The Series 2018 Bond shall bear interest at rates per year calculated on the basis of a 360-day year of twelve 30-day months, payable semiannually on April 1 and October 1, beginning April 1, 2019, and shall mature in installments on October 1 in years and amounts at such rates, as follows:

Installment Date (October 1)	Installment Amount	Interest Rate
2019		

2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048

Section 30-203. Payment Provisions of Series 2018 Bond.

(a) The Series 2018 Bond shall be payable solely from revenues, and nothing in the 2018 Financing Agreement, the Series 2018 Bond or this Supplemental Agreement shall be deemed to create or constitute an indebtedness or pledge of the faith and credit of the Commonwealth of Virginia (the “Commonwealth”) or of any county, city, town or other political subdivision of the Commonwealth, including the Authority, the City of Charlottesville, Virginia, Albemarle County, Virginia, and the Albemarle County Service Authority. All payments due on the Series 2018 Bond shall be payable as provided in the 2018 Financing Agreement in lawful money of the United States of America. As set forth in the 2018 Financing Agreement, the Authority agrees to pay “Supplemental Interest” and other charges as provided therein. Payments shall be made, at the option of the registered owner, (i) by check or draft mailed to the registered owner at its address as it appears on the registration books kept for that purpose by the Trustee on the 15th day of the month preceding the payment date or (ii) by wire transfer pursuant to the most recent wire instructions received by the Trustee from such registered owner, except that the final payment is payable upon presentation and surrender of the Series 2018 Bond at the

office of the Trustee. The Authority intends that amounts constituting interest on the Series 2018 Bond will be included in the gross income of the holder thereof for federal income tax purposes.

(b) Except as otherwise provided herein, the Series 2018 Bond shall be payable, executed, authenticated, registrable, exchangeable and secured, all as set forth in the Master Trust Agreement.

Section 30-204. Form of Series 2018 Bond.

The Series 2018 Bond shall be in substantially the form set forth in Exhibit A, with such appropriate variations, omissions and insertions as are permitted or required by the Master Trust Agreement and this Supplemental Agreement. The terms and provisions of the Series 2018 Bond that are set forth in Exhibit A shall be deemed to be incorporated into this Supplemental Agreement as though fully set forth herein.

Section 30-205. Delivery of Series 2018 Bond.

The Trustee shall authenticate and deliver the Series 2018 Bond when there have been filed with or delivered to it all items required by Section 503 of the Master Trust Agreement.

ARTICLE III

PREPAYMENT OF SERIES 2018 BOND

Section 30-301. Prepayment of Series 2018 Bond.

The Series 2018 Bond shall be subject to prepayment as set forth in Section 6.2 of the 2018 Financing Agreement. The optional redemption and notice provisions set forth in Sections 401 and 402 of the Master Trust Agreement shall not apply to the Series 2018 Bond.

ARTICLE IV

PROCEEDS OF SERIES 2018 BOND

Section 30-401. Use of Proceeds of Series 2018 Bond.

The net proceeds of the Series 2018 Bond (\$[____]) shall be held in the Local Account to be disbursed in accordance with Section 4.3 of the 2018 Financing Agreement to be used in the manner prescribed by Section 504 of the Master Trust Agreement to pay (i) the Cost of the Supplemental Project (\$[____]) (including costs related to the issuance of the Series 2018 Bond (approximately \$[____]) and capitalized interest on the Series 2018 Bond through [____], 20__) (approximately \$ [____])). The Trustee hereunder shall be provided copies of any monthly reports and other statements provided to the Authority by VRA or the VRA Trustee with respect to the disbursements made from the Local Account. Any balance remaining in the Local Account upon completion of the Supplemental Project shall be transferred in accordance with the provisions of the 2018 Financing Agreement and in a manner consistent with the provisions of Section 605 of the Master Trust Agreement.

ARTICLE V

SECURITY FOR SERIES 2018 BOND

Section 30-501. Security for Series 2018 Bond.

(a) The Series 2018 Bond shall be issued pursuant to the Master Trust Agreement and this Supplemental Agreement and shall be equally and ratably secured under the Trust Agreement with the Outstanding Bonds and any Additional Bonds issued pursuant to Article V of the Master Trust Agreement, without preference, priority or distinction of any Bonds over any other Bonds, as provided in the Master Trust Agreement.

(b) The existing Debt Service Reserve Fund shall not secure the Series 2018 Bond. No debt service reserve fund or account is currently established or funded in connection with the issuance of the Series 2018 Bond.

ARTICLE VI

AMENDMENTS TO MASTER TRUST AGREEMENT EFFECTIVE IMMEDIATELY

Section 30-601. Effective Date of Amendments.

Pursuant to Section 1301(e)(2) of the Master Trust Agreement, the amendments provided in this article shall be effective upon the execution of this Supplemental Agreement.

Section 30-602. Amendment to Section 705 of the Master Trust Agreement.

Section 705 of the Master Trust Agreement is hereby amended and restated to read as follows (changes being reflected in bold):

Section 705. Establishment of Funds. The following funds are hereby established:

(a) Operating Fund, to be held by the Authority;

(b) Bond Fund, in which there are established a Series 2005A Debt Service Account, a Series 2009A Debt Service Account, a Series 2010A Debt Service Account, a Series 2011A Debt Service Account, a Series 2011B Debt Service Account, a Series 2011D Debt Service Account, a Series 2011E Debt Service Account, a Series 2014A Debt Service Account, a Series 2015A Debt Service Account, a Series 2015B Debt Service Account, **a Series 2018 Debt Service Account**, an Interest Account, a Principal Account and a Sinking Fund Account, all to be held by the Trustee;

(c) Debt Service Reserve Fund, to be held by the Trustee;

(d) Facilities Lease Fund, to be held by the Authority;

(e) Improvement Fund, to be held by the Authority; and

(f) Rate Stabilization Fund (Urban Area Wastewater Facilities), to be held by the Authority.

Section 30-603. Amendment to Section 707 of the Master Trust Agreement.

Section 707 of the Master Trust Agreement is hereby amended and restated to read as follows (changes being reflected in bold):

Section 707. Bond Fund. The Authority shall transfer from available moneys in the Operating Fund to the Trustee for deposit in the Bond Fund such amounts as shall be necessary to make the following deposits in the following order:

(a) first, in the Series 2005A Debt Service Account the next finance payment, if any, as required by Section 6.1 of the 2005 Financing Agreement between the Authority and VRA dated as of November 1, 2005, due on the Series 2005A Bond, within the next six succeeding months;

(b) second, in the Series 2009A Debt Service Account the next finance payment, if any, as required by Section 6.1 of the 2009 Financing Agreement due on the Series 2009A Bond, within the next six succeeding months;

(c) third, in the Series 2010A Debt Service Account the next finance payment, if any, as required by Section 6.1 of the 2010 Financing Agreement due on the Series 2010A Bond, within the next six succeeding months;

(d) fourth, in the Series 2011A Debt Service Account the next finance payment, if any, as required by Section 6.1 of the 2011 Financing Agreement due on the Series 2011A Bond, within the next six succeeding months;

(e) fifth, in the Series 2011B Debt Service Account the next finance payment, if any, as required by Section 6.1 of the 2011 Financing Agreement due on the Series 2011B Bond, within the next six succeeding months;

(f) sixth, in the Series 2011D Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2011 Financing Agreement due on the Series 2011D Bond, within the next six succeeding months;

(g) seventh, in the Series 2011E Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2011 Financing Agreement due on the Series 2011E Bond, within the next six succeeding months;

(h) eighth, in the Series 2014A Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2014A Financing Agreement due on the Series 2014A Bond, within the next six succeeding months;

(i) ninth, in the Series 2015A Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2015 Financing Agreement due on the Series 2015A Bond, within the next six succeeding months;

(j) tenth, in the Series 2015B Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2015B Financing Agreement due on the Series 2015B Bond, within the next six succeeding months;

(k) eleventh, in the Series 2018 Debt Service Account, the next finance payment, if any, as required by Section 6.1 of the 2018 Financing Agreement due on the Series 2018 Bond, within the next six succeeding months;

(l) twelfth, in the Interest Account, such amount, if any, as may be required to make the total amount on deposit therein equal to the amount of interest which will become due on the Bonds, *other than* the Series 2005A Bond, the Series 2009A Bond, the Series 2010A Bond, the Series 2011A Bond, the Series 2011B Bond, the Series 2011D Bond, the Series 2011E Bond, the Series 2014A Bond, the Series 2015A, the Series 2015B Bond **or the Series 2018 Bond**, within the next succeeding six months;

(m) thirteenth, in the Principal Account, such amount, if any, as may be required to make the total amount on deposit therein equal to the amount of principal of the Bonds, *other than* the Series 2005A Bond, the Series 2009A Bond, the Series 2010A Bond, the Series 2011A Bond, the Series 2011B Bond, the Series 2011D Bond, the Series 2011E Bond, the Series 2014A Bond, the Series 2015A Bond, the Series 2015B Bond **or the Series 2018 Bond**, maturing within the next succeeding 12 months; and

(n) fourteenth, in the Sinking Fund Account, such amount, if any, as may be required to make the total amount on deposit therein equal to the amount of any sinking fund installment due within the next succeeding 12 months with respect to any Additional Bonds which are issued as term bonds.

Notwithstanding the foregoing, if an Event of Default occurs as described in Sections 1101(a) or 1101(b) and so long as such Event of Default shall continue, the transfers set forth in Section 707(a) through **(n)** shall not be made. The Trustee shall determine what moneys are on deposit in all the accounts in the Bond Fund. The Trustee shall then allocate among the accounts any moneys on deposit in the Operating Fund available for transfer into the Bond Fund, any moneys drawn out of the Debt Service Reserve Fund and any other available moneys so that all bondholders are paid ratably, taking into account such available moneys and moneys on deposit in all the accounts in the Bond Fund.

The Trustee shall provide for the redemption of any Additional Bonds which may be issued as term bonds in accordance with the schedule in the supplement to this agreement authorizing their issuance; provided, however, that on or before the sixtieth day next preceding any such sinking fund payment date, the Authority may:

(i) pay to the Trustee for deposit in the Sinking Fund Account on or before such sixtieth day such amount as the Authority may determine, accompanied by a certificate signed by an Authorized Representative of the Authority directing the Trustee to apply such amount to the purchase of Bonds required to be redeemed on such sinking fund payment date, and the Trustee shall thereupon use all reasonable efforts to expend

such funds as nearly as may be practicable in the purchase of such Bonds, with all unmatured coupons, if any, attached, at a price not exceeding the principal amount thereof plus accrued interest to such sinking fund redemption date; or

(ii) deliver to the Trustee for cancellation such Bonds required to be redeemed on such sinking fund payment date, in any aggregate principal amount desired with all unmatured coupons, if any, attached; or

(iii) instruct the Trustee to apply a credit against the Authority's sinking fund redemption obligation for any Bonds which have been issued as term bonds which previously have been redeemed (other than through the operation of the sinking fund) and canceled by the Trustee but not theretofore applied as a credit against any sinking fund redemption obligation.

Each Bond so purchased, delivered or previously redeemed shall be credited by the Trustee at 100% of the principal amount thereof against the obligation of the Authority on such sinking fund redemption date and shall reduce accordingly the amount to be on deposit in the Sinking Fund Account. Any excess over such obligation shall be credited against future sinking fund redemption obligations in chronological order, and the principal amount of such Bonds to be redeemed by operation of the sinking fund and the amount to be on deposit in the Sinking Fund Account shall be accordingly reduced. Any funds received by the Trustee pursuant to subsection (i) of the previous paragraph but not expended as provided therein for the purchase of Bonds within seven days after said sixtieth day shall be retained in the Sinking Fund Account and shall thereafter be used only for a credit against future deposits to the Sinking Fund Account or, upon the direction of an Authorized Representative of the Authority, for transfer to the Interest Account to be used as a credit against transfers to be made thereto.

The Trustee shall pay the principal of and interest on the Bonds (*other than* the Series 2005A Bond, the Series 2009A Bond, the Series 2010A Bond, the Series 2011A Bond, the Series 2011B Bond, the Series 2011D Bond, the Series 2011E Bond, the Series 2014A Bond, the Series 2015A Bond, the Series 2015B Bond **and the Series 2018 Bond**) from the Principal Account and the Interest Account, respectively, as the same become due. The Trustee shall pay the finance payment on the Series 2005A Bond from the Series 2005A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2009A Bond from the Series 2009A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2010A Bond from the Series 2010A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2011A Bond from the Series 2011A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2011B Bond from the Series 2011B Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2011D Bond from the Series 2011D Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2011E Bond from the Series 2011E Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2014A Bond from the Series 2014A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series

2015A Bond from the Series 2015A Debt Service Account as the same becomes due. The Trustee shall pay the finance payment on the Series 2015B Bond from the Series 2015B Debt Service Account as the same becomes due. **The Trustee shall pay the finance payment on the Series 2018 Bond from the Series 2018 Debt Service Account as the same becomes due.** In the event the balances in the accounts in the Bond Fund on any interest, principal or finance payment date (whether at maturity or by mandatory sinking fund redemption) are insufficient for the purposes thereof, the Trustee shall transfer to such Accounts such amounts as may be necessary therefor (1) first from any rate stabilization fund created with respect to such series of Bonds, then (2) in the case of the Series 2005A Bond, the Series 2009A Bond, the Series 2010A Bond, the Series 2011A Bond, the Series 2011B Bond, the Series 2011D Bond and the Series 2011E Bond, from the Debt Service Reserve Fund, then (3) from the Improvement Fund and then (4) from the Facilities Lease Fund. In the event the balance in any account in the Bond Fund on any interest, principal or finance payment date (whether at maturity or by mandatory sinking fund redemption) exceeds the amounts required by this section, such excess shall be transferred to any other account in the Bond Fund the balance in which is insufficient for the purposes thereof in the following order of priority: Series 2005A Debt Service Account, Series 2009A Debt Service Account, Series 2010A Debt Service Account, Series 2011A Debt Service Account, Series 2011B Debt Service Account, Series 2011D Debt Service Account, Series 2011E Debt Service Account, Series 2014A Debt Service Account, Series 2015A Debt Service Account, Series 2015B Debt Service Account, **Series 2018 Debt Service Account**, Interest Account, Principal Account and Sinking Fund Account. If there is no insufficiency in any account in the Bond Fund, such excess shall be transferred, if the Debt Service Reserve Fund does not then hold the Required Reserve, to the Debt Service Reserve Fund and otherwise shall be held in the account containing such excess to be credited against future deposits to such account.

ARTICLE VII

MISCELLANEOUS

Section 30-701. Limitation of Rights.

With the exception of the rights herein expressly conferred, nothing expressed or mentioned in or to be implied from this Supplemental Agreement is intended or shall be construed to give any person other than the parties hereto and the holder of the Series 2018 Bond any legal or equitable right, remedy or claim under or in respect to this Supplemental Agreement or any covenant, condition and agreement herein contained; this Supplemental Agreement and all of the covenants, conditions and agreements hereof being intended to be and being for the sole and exclusive benefit of the parties hereto and the holder of the Series 2018 Bond as herein provided.

Section 30-702. Successors and Assigns.

This Supplemental Agreement shall be binding upon, inure to the benefit of and be enforceable by the parties hereto and their respective successors and assigns.

Section 30-703. Severability.

If any provision of this Supplemental Agreement shall be held invalid by any court of competent jurisdiction, such holding shall not invalidate any other provision hereof.

Section 30-704. Applicable Law.

This Supplemental Agreement shall be governed by the applicable laws of the Commonwealth.

Section 30-705. Counterparts.

This Supplemental Agreement may be executed in several counterparts, each of which shall be an original and all of which together shall constitute one and the same instrument.

[Remainder of this page intentionally left blank.]

IN WITNESS WHEREOF, the Authority and the Trustee have caused this Thirtieth Supplemental Agreement of Trust to be executed in their respective corporate names by their duly authorized officers, all as of the date first above written.

RIVANNA WATER AND SEWER AUTHORITY

By _____
[____], [Vice]-Chair

**THE BANK OF NEW YORK MELLON TRUST
COMPANY, N.A., as Trustee**

By _____
[____], Vice President

FORM OF SERIES 2018 BOND

Interest on this bond is not excludable from the gross income of the registered owner hereof for federal income tax purposes.

R-1

October [___], 2018

UNITED STATES OF AMERICA

COMMONWEALTH OF VIRGINIA

Rivanna Water and Sewer Authority

Taxable Regional Water and Sewer System Revenue Bond

Series 2018

Rivanna Water and Sewer Authority (the “Authority”), a public body politic and corporate and political subdivision of the Commonwealth of Virginia (the “Commonwealth”) duly created pursuant to the Virginia Water and Waste Authorities Act, Chapter 51, Title 15.2, Code of Virginia of 1950, as amended (the “Act”), for value received, acknowledges itself indebted and promises to pay to the Virginia Resources Authority, or its registered assigns or legal representative (“VRA”), the principal sum of [_____] (\$[____]). Principal of this bond shall be payable in annual installments in the amounts and on the dates set forth in Schedule I attached hereto. Interest on this bond shall be payable on each April 1 and October 1, commencing April 1, 2019, computed on the basis of a 360-day year of twelve 30-day months at the rates set forth in Schedule I.

If any installment of principal of and interest on this bond is not paid to the registered owner of this bond within ten days after its due date, the Authority shall pay to VRA a late payment charge in an amount equal to five percent (5%) of the overdue installment.

Subject to the provisions of the Local Bond Sale and Financing Agreement dated as of September 21, 2018 (the “Financing Agreement”), between VRA and the Authority, so long as this bond is held by or for the account of VRA or its registered assigns or legal representative, interest is payable by (i) check or draft mailed to the registered owner of this bond at the address that appears on the 15th day of the month preceding each interest payment date on the registration books kept by The Bank of New York Mellon Trust Company, N.A., as successor trustee (the “Trustee”), or (ii) wire transfer pursuant to the most recent wire instructions received by the Trustee from such registered owner, except that the final payment is payable upon presentation and surrender of this bond at the office of the Trustee. Principal of and premium, if any, and interest on this bond shall be payable in lawful money of the United States of America. In case the payment date on this bond shall not be a Business Day (as defined below), then payment of principal, premium, if any, and interest need not be made on such date, but may be made on the next succeeding Business Day, and, if made on such next succeeding Business Day, no

additional interest shall accrue for the period after such payment date. “Business Day” means any day on which commercial banking institutions generally are open for business in New York, New York, and Richmond, Virginia.

This bond is issued under an Agreement of Trust dated as of October 1, 1979 (the “Master Trust Agreement”), between the Authority and the Trustee, as supplemented and amended from time to time, and as further supplemented and amended by a Thirtieth Supplemental Agreement of Trust dated as of October [___], 2018 (collectively, the “Trust Agreement”), and is secured equally and ratably on a parity with the outstanding balance of the Authority’s Taxable Regional Water and Sewer System Revenue Bond, Series 2005A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2009A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2010A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011B; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011D; its Taxable Regional Water and Sewer System Revenue Bond, Series 2011E; its Taxable Regional Water and Sewer System Revenue and Refunding Bond, Series 2012A; its Regional Water and Sewer System Revenue Bonds, Series 2012B; its Taxable Regional Water and Sewer System Revenue Bond, Series 2014A; its Taxable Regional Water and Sewer System Revenue Bond, Series 2015A; its Taxable Regional Water and Sewer System Revenue and Refunding Bond, Series 2015B; and its Regional Water and Sewer System Revenue Bond, Series 2016 (collectively, the “Prior Bonds”) [confirm], to the extent provided in the Trust Agreement and the Financing Agreement. Reference is made to the Trust Agreement for a description of the provisions, among others, with respect to the nature and extent of the security, the rights, duties and obligations of the Authority and the Trustee, the rights of the registered owner of this bond and the terms upon which this bond is issued and secured.

Additional bonds secured on a parity with this bond and the Prior Bonds may be issued on the terms provided in the Trust Agreement. This bond is authorized and issued pursuant to the Act and the Trust Agreement to finance the acquisition, construction and equipping of capital improvements to the System[and certain capitalized interest hereon] and to pay related costs of issuance. The Authority’s obligations under this bond shall terminate when all amounts due and to become due pursuant to this bond, the Financing Agreement and the Trust Agreement have been paid in full.

This bond is a limited obligation of the Authority and [(except to the extent payment with respect to this bond shall be made from the proceeds from the sale of this bond or the income, if any, derived from the investment thereof)] are payable solely from certain revenues to be derived from the ownership or operation of the System (as defined in the Trust Agreement), which serves, on a wholesale basis, the City of Charlottesville, Virginia, and the Albemarle County Service Authority, as the same may from time to time exist, certain pledged reserves, income from investments pursuant to the Trust Agreement and proceeds of insurance, which revenues and other moneys have been pledged pursuant to the Trust Agreement to secure payment thereof. This bond shall not be deemed to constitute a pledge of the faith and credit of the Commonwealth or any political subdivision thereof, including the Authority, the City of Charlottesville, Virginia, Albemarle County, Virginia, and the Albemarle County Service Authority (collectively, the “Political Subdivisions”).

Neither the Commonwealth nor any political subdivision thereof, including the Political Subdivisions, shall be obligated to pay the principal of this bond or other costs incident thereto except from the revenues pledged therefor, and neither the faith and credit nor the taxing power of the Commonwealth or any political subdivision thereof, including the Political Subdivisions, is pledged to the payment of the principal of or interest on this bond or other costs incident thereto. The Authority has no taxing power.

If any failure of the Authority to pay all or any portion of any required payment of the principal of or premium, if any, or interest on this bond results in a withdrawal from any VRA Reserve (as defined in the Financing Agreement), the interest rates applicable to this bond shall be increased to interest rates sufficient to reimburse the VRA Reserve for any foregone investment earnings and/or pay any interest, fees or penalties assessed as a result of the drawing on the VRA Reserve. The increment of interest payable pursuant to the increase in rates shall be referred to as "Supplemental Interest." The term "interest" as used in this bond shall include Supplemental Interest, when and if payable. The Authority's obligation to pay Supplemental Interest shall commence on the date of VRA's withdrawal of funds from the VRA Reserve occasioned by the Authority's failure to pay a required payment or portion thereof as described above (the "Supplemental Interest Commencement Date"). The Authority's obligation to pay Supplemental Interest shall terminate on the date on which the Authority remedies such failure to pay by making all payments required but outstanding since the date of such failure to pay (the "Supplemental Interest Termination Date"). From the Supplemental Interest Commencement Date to the Supplemental Interest Termination Date, Supplemental Interest shall be due and payable on the regularly scheduled interest payment dates provided for in this bond. As soon as reasonably possible after the Supplemental Interest Commencement Date and before the next regularly scheduled interest payment date provided for in this bond, VRA shall deliver to the Authority and the Trustee a certificate as to the increase in interest rates and the amount of Supplemental Interest. The certificate shall set forth in reasonable detail the basis for the increase in interest rates and the manner of calculation of the increase and the amount of Supplemental Interest. Such certificate shall be conclusive (absent manifest error) as to the interest rate increase and amount of Supplemental Interest set forth therein. In determining the interest rate increase and the amount of Supplemental Interest, VRA may use any reasonable averaging and attribution methods.

This bond is subject to prepayment to the extent and under the terms set forth in the Trust Agreement and the Financing Agreement. The optional redemption and notice provisions set forth in Sections 401 and 402 of the Master Trust Agreement shall not apply to this bond.

This bond is issued as a registered bond and may be transferred only in accordance with the provisions with respect thereto as provided in the Trust Agreement and the Financing Agreement.

The registered owner of this bond shall have no right to enforce the provisions of the Trust Agreement, to institute action to enforce the covenants therein, to take any action with respect to any Event of Default under the Trust Agreement or to institute, appear in or defend any suit or other proceeding with respect thereto, except as provided in the Trust Agreement. Modifications or alterations of the Trust Agreement, or of any supplement thereto, may be made only to the extent and in the circumstances permitted by the Trust Agreement.

Upon surrender of this bond at the corporate trust office of the Trustee in Pittsburgh, Pennsylvania, together with an assignment duly executed by the registered owner or his duly authorized attorney or legal representative in such form as shall be satisfactory to the Trustee, the Authority shall execute, and the Trustee shall authenticate and deliver in exchange, a new bond or bonds in the manner and subject to the limitations and conditions provided in the Trust Agreement, having an equal aggregate principal amount, in authorized denominations, of the same series, form and maturity, bearing interest at the same rate, and registered in names as requested by the then registered owner hereof or his duly authorized attorney or legal representative. Any such exchange shall be at the expense of the Authority, except that the Trustee may charge the person requesting such exchange the amount of any tax or other governmental charge required to be paid with respect thereto.

All acts, conditions and things required to happen, exist or be performed precedent to and in connection with the issuance of this bond have happened, exist and have been performed.

This bond shall not be valid until the Trustee shall have executed the Certificate of Authentication appearing hereon and inserted the date of authentication hereon.

[Remainder of Page Intentionally Left Blank]

IN WITNESS WHEREOF, the Rivanna Water and Sewer Authority has caused this bond to be signed by its [Vice-]Chair, its seal to be affixed hereto and attested by its Secretary-Treasurer, and this bond to be dated the date first above written.

RIVANNA WATER AND SEWER AUTHORITY

(SEAL)

By _____
[Vice-]Chair

ATTEST:

Secretary-Treasurer

CERTIFICATE OF AUTHENTICATION

Date Authenticated: November __, 2018

This bond is the Series 2018 Bond described in the within-mentioned Trust Agreement.

**THE BANK OF NEW YORK
MELLON TRUST COMPANY, N.A.**

By _____
Authorized Signature

ASSIGNMENT

FOR VALUE RECEIVED the undersigned sell(s), assign(s) and transfer(s) unto

_(please print or typewrite name and address including postal zip code of Transferee)

PLEASE INSERT SOCIAL SECURITY OR OTHER
IDENTIFYING NUMBER OF TRANSFEREE

: :
: :
: :

the within bond and all rights thereunder, irrevocably constituting and appointing

_____,
Attorney, to transfer said bond on the books kept for the registration thereof, with full power of
substitution in the premises.

Dated: _____

Signature Guaranteed

NOTICE: Signature(s) must be
guaranteed by an Eligible Guarantor
Institution such as a Commercial
Bank, Trust Company, Securities
Broker/Dealer, Credit Union, or
Savings Association who is a member
of a medallion program approved by
The Securities Transfer Association, Inc.
Inc.

(Signature of Registered Owner)

NOTICE: The signature above must
correspond with the name of the
registered owner as it appears on the
front of this bond in every particular,
without alteration or enlargement
or any change whatsoever.

TRANSFER OF BOND

The transfer of this bond may be registered by the registered owner or its duly authorized attorney or legal representative upon presentation hereof to the Registrar who shall make note of such transfer in books kept by the Registrar for that purpose and in the registration blank below.

<u>Date of Registration</u>	<u>Name of Registered Owner</u>	<u>Signature of Registrar</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SCHEDULE I

Installment Date (October 1)	Installment Amount	Interest Rate
2019		
2020		
2021		
2022		
2023		
2024		
2025		
2026		
2027		
2028		
2029		
2030		
2031		
2032		
2033		
2034		
2035		
2036		
2037		
2038		
2039		
2040		
2041		
2042		
2043		
2044		
2045		
2046		
2047		
2048		

LOCAL BOND SALE AND FINANCING AGREEMENT

between

VIRGINIA RESOURCES AUTHORITY

and

RIVANNA WATER AND SEWER AUTHORITY

Dated as of September 21, 2018

**Virginia Resources Authority
Infrastructure and State Moral Obligation Revenue Bonds
(Virginia Pooled Financing Program)
Series 2018C**

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LOCAL BOND SALE AND FINANCING AGREEMENT

This **LOCAL BOND SALE AND FINANCING AGREEMENT** is dated as of March 30, 2018, and is between the **VIRGINIA RESOURCES AUTHORITY**, a public body corporate and a political subdivision of the Commonwealth of Virginia ("VRA"), and the **RIVANNA WATER AND SEWER AUTHORITY**, a public body corporate and political subdivision of the Commonwealth of Virginia (the "Local Government").

A. VRA intends to issue its Related Series of VRA Bonds, as hereinafter defined, and to use a portion of the proceeds thereof to acquire from the Local Government the Local Bond, as hereinafter defined.

B. VRA and the Local Government wish to set forth herein certain terms, conditions and provisions related to the purchase of the Local Bond, the application of the proceeds thereof, the payment of the debt service thereon and the security therefor, and the use and maintenance of the Related Financed Property, as hereinafter defined.

NOW, THEREFORE, VRA and the Local Government agree as follows:

ARTICLE I DEFINITIONS

Section 1.1 Definitions. Each capitalized term contained in this Agreement has the meaning set forth below:

"2018C Acquisition Fund" has the meaning set forth in the Related Supplemental Series Indenture.

"Act" means the Virginia Resources Authority Act, Chapter 21, Title 62.1 of the Code of Virginia of 1950, as amended.

"Agreement" means this Local Bond Sale and Financing Agreement dated the date first written above, between VRA and the Local Government, as modified, altered, amended or supplemented in accordance with the terms hereof.

"Annual Budget" means the budget of the System for each Fiscal Year.

"Business Day" means any day on which commercial banking institutions are generally open for business in New York, New York and Richmond, Virginia.

"Closing Date" means November 14, 2018 or such other date as may be determined by VRA.

"Consulting Engineer" has the meaning set forth in the Local Master Indenture, and for the purposes of this Agreement, such term shall include, at the discretion of the Local Government, the Local Engineer.

"Effective Date" means September 21, 2018, which is the deadline for the Local Government to provide an executed copy of this Agreement to VRA.

"Event of Default" has the meaning set forth in Section 10.1.

"Existing Parity Bonds" has the meaning set forth in Section 2.2(n).

"Financing Parameters" means the parameters established by the governing body of the Local Government regarding the terms and conditions of the Local Bond, which may include a maximum par amount, maximum "true" interest cost or targeted savings.

"Fiscal Year" has the meaning set forth in the Local Master Indenture.

"Government Obligations" means direct obligations of, or obligations the payment of the principal of and interest on which is unconditionally guaranteed by, the United States of America.

"Local Account" means the local account established for the Local Bond within the 2018C Acquisition Fund.

"Local Authorization" means the resolution adopted on [____], 2018 by a majority of the members of the governing body of the Local Government approving (i) the transactions contemplated by and authorizing the execution and delivery of the Local Bond Documents and (ii) the execution, issuance and sale of the Local Bond subject to the Financing Parameters.

"Local Bond" means the Local Government's Regional Water and Sewer System Revenue Bond, Series 2018, issued in the original principal amount set forth in Schedule 1.1, as such bond may be amended or modified.

"Local Bond Documents" means this Agreement and the Local Tax Document.

"Local Engineer" means an officer or employee of the Local Government so designated in writing by a Local Representative, which officer or employee (i) is licensed as a professional engineer in Virginia, (ii) has recognized standing in the field of water and sewer engineering and licensed as professional engineers in Virginia that the Local Government designates in writing, subject to VRA's reasonable approval and (iii) is subject to VRA's reasonable approval.

"Local Government" means the Rivanna Water and Sewer Authority.

"Local Master Indenture" means the Agreement of Trust dated as of October 1, 1979, between the Local Government and the Local Trustee, as previously amended and supplemented, and as further amended and supplemented by the Thirtieth Supplemental Agreement of Trust dated as of October [___], 2018, between the Local Government and the Local Trustee, as amended and supplemented in accordance with its terms.

"Local Representative" means (i) the chair or vice chair of the governing body, (ii) the chief executive officer of the Local Government and (iii) any other official or employee of the Local Government authorized by resolution of the governing body of the Local Government to perform the act or sign the document in question.

"Local Tax Document" means the Nonarbitrage Certificate and Tax Compliance Agreement dated the Closing Date, between the Local Government and VRA, as modified, altered, amended and supplemented.

"Local Trustee" means The Bank of New York Mellon Trust Company, N.A. (as successor to NationsBank, National Association, as successor to Sovran Bank, N.A., as successor to Virginia National Bank), and its successors serving in such capacity, as trustee under the Local Master Indenture.

"Master Indenture" means the Master Indenture of Trust dated as of December 1, 2003, between VRA and the Trustee, as modified, altered, amended and supplemented in accordance with its terms.

"Net Revenues Available for Debt Service" means the Revenues less amounts necessary to pay Operation and Maintenance Expenses.

"Operation and Maintenance Expenses" means the costs of operating and maintaining the System determined under generally accepted accounting principles, exclusive of (i) interest on any debt payable from Revenues, (ii) depreciation and other items not requiring the expenditure of cash, (iii) any amounts expended for capital replacements, repairs and maintenance not recurring either annually or biannually, depending on the customary practice of performing operation and maintenance, or reserves therefor, and (iv) reserves for administration, operation and maintenance occurring in the normal course of business.

"Outside Engineer" means a firm of independent consulting engineers with recognized standing in the field of water and sewer engineering and licensed as professional engineers in Virginia that the Local Government designates in writing, subject to VRA's reasonable approval.

"Parity Bonds" means any of the Local Government's "Bonds" issued under the Local Master Indenture.

"Parity Debt" means any of the Local Government's Parity Bonds, including the Local Bond.

"Proceeds Requested" means the greater of \$41,850,000 or such other maximum amount of proceeds generated by the maximum par amount indicated in the Financing Parameters, together with an amount to pay related costs of issuance and capitalized interest for up to 24 months, or such other amount requested in writing by the Local Government and approved by VRA prior to the Sale Date.

"Project" means the project described in Exhibit B.

"Project Budget" means the budget for the Project set forth in Schedule 1.1.

"Project Costs" means the costs of the Project to the extent such costs are included in the definition of "cost" set forth in Section 62.1-199 of the Act, and includes the refunding of obligations of VRA or the Local Government issued to finance or refinance "costs" set forth in Section 62.1-199 of the Act.

"Purchase Price" has the meaning set forth in Schedule 1.1 and represents the amount received by the Local Government from the sale of the Local Bond to VRA. The Purchase Price of the Local Bond will be determined by adding to or subtracting from the par amount of the Local Bond the Local Government's share of the net original issue premium or discount on the Related Series of VRA Bonds and by subtracting from the par amount of the Local Bond the Local Government's share of VRA's expenses as set forth in Section 3.2 and the Local Government's share of the deposit on the Closing Date to any applicable VRA Reserve. It is acknowledged that the Purchase Price does not include any accrued interest on the Local Bond from its dated date to the Closing Date.

"Qualified Independent Consultant" means an independent professional consultant having the skill and experience necessary to provide the particular certificate, report or approval required by the provision of this Agreement in which such requirement appears, including without limitation an Outside Engineer and an independent certified public accountant or firm of independent certified public accountants; provided, however, all Qualified Independent Consultants are subject to the reasonable approval of VRA.

"Registrar" means the officer or employee of the Local Government designated under the Local Authorization to maintain the registration books for the Local Bond.

"Related Financed Property" means the land, building, equipment and other property, the acquisition, construction, renovation, or equipping of which was financed by the Local Bond as part of the Project.

"Related Portion of VRA Bonds" means the portion of the Related Series of VRA Bonds allocable to the Local Bond (as determined by VRA), including any bonds issued by VRA to refund such Related Series of VRA Bonds in whole or in part.

"Related Series of VRA Bonds" means the Virginia Resources Authority Infrastructure and State Moral Obligation Revenue Bonds (Virginia Pooled Financing Program), Series 2018C (or such other series of Infrastructure and State Moral Obligation Revenue Bonds (Virginia Pooled Financing Program that is specified in Schedule 1.1), in the original aggregate principal amount set forth in Schedule 1.1, and, unless the Local Government receives notice to the contrary from VRA, any bonds issued by VRA to refund the Related Series of VRA Bonds in whole or in part.

"Related Supplemental Series Indenture" means the Forty-Third Supplemental Series Indenture of Trust dated as of November 1, 2018, between VRA and the Trustee, as modified, altered, amended and supplemented in accordance with its terms and those of the Master Indenture.

"Revenue Fund" has the meaning set forth in the Master Indenture.

"Revenues" means (i) all rates, fees, rentals, charges and other income properly allocable to the System under generally accepted accounting principles or resulting from the Local Government's ownership or operation of the System and all rights to receive the same, whether now existing or hereafter coming into existence, exclusive of user and other deposits subject to refund until such deposits have become the Local Government's property, (ii) the proceeds of any insurance covering business interruption loss relating to the System, (iii) interest on any money or securities related to the System held by or on behalf of the Local Government, and (iv) any other income from other sources now or hereafter pledged or specifically made available by or on behalf of the Local Government to or for the payment of Operation and Maintenance Expenses or debt service on Parity Debt.

"Sale Date" means October 30, 2018, or such other date specified in Schedule 1.1.

"Service Agreement" means the Service Agreement dated June 12, 1973, among the Local Government, the City of Charlottesville, Virginia, the Albemarle County Service Authority and the Board of County Supervisors acting for and on behalf of Albemarle County, as supplemented and amended from time to time.

"Subordinate Debt" means obligations of the Local Government secured by a pledge of Revenues expressly made subordinate to the pledge securing the Local Bond and any other Parity Bonds, and any obligations to make deposits related to reserve funds, rebate funds and similar funds or accounts established for the benefit of the Local Bond or any other Parity Bonds.

"Supplemental Interest" has the meaning set forth in Section 6.1.

"System" has the meaning set forth in the Local Master Indenture.

"Trustee" means U.S. Bank National Association, Richmond, Virginia, as trustee under the Master Indenture and the Related Supplemental Series Indenture, or its successors serving in such capacity.

"Virginia SNAP" means the Commonwealth of Virginia State Non-Arbitrage Program.

"VRA" means the Virginia Resources Authority, a public body corporate and a political subdivision of the Commonwealth of Virginia.

"VRA Bonds" means the Related Series of VRA Bonds and any additional bonds issued under the Master Indenture.

"VRA Reserve" means any one or more of the Capital Reserve Fund, the Infrastructure Debt Service Reserve Fund, the Operating Reserve Fund, a CRF Credit Facility or an Infrastructure Revenue DSRF Facility, each as defined in the Master Indenture.

Section 1.2 Rules of Construction. The following rules apply to the construction of this Agreement unless the context requires otherwise:

(a) Singular words connote the plural number as well as the singular and vice versa.

(b) Words importing the redemption or calling for redemption of the Local Bond do not refer to or connote the payment of the Local Bond at its stated maturity.

(c) All references in this Agreement to particular Articles, Sections or Exhibits are references to Articles, Sections or Exhibits of this Agreement unless otherwise indicated.

(d) The headings and table of contents as used in this Agreement are solely for convenience of reference and do not constitute a part of this Agreement and do not affect its meaning, construction or effect.

ARTICLE II REPRESENTATIONS

Section 2.1 Representations by VRA. VRA represents to the Local Government as follows:

(a) VRA is a duly created and validly existing public body corporate and political subdivision of the Commonwealth of Virginia vested with the rights and powers conferred upon it under the Act.

(b) VRA has full right, power and authority to (i) issue, sell and deliver the Related Series of VRA Bonds, (ii) direct the Trustee to use a portion of the proceeds of the Related Series of VRA Bonds to purchase the Local Bond from the Local Government as contemplated under the Related Supplemental Series Indenture and this Agreement and (iii) carry out and consummate all other transactions contemplated by this Agreement.

(c) VRA has duly authorized, executed and delivered this Agreement, and this Agreement constitutes a legal, valid and binding obligation of VRA enforceable against VRA in accordance with its terms.

Section 2.2 Representations by Local Government. The Local Government represents to VRA as follows:

(a) The Local Government is a duly created and validly existing Virginia "local government" (as defined in Section 62.1-199 of the Act) and is vested with the rights and powers conferred upon it by Virginia law.

(b) The Local Government has full right, power and authority to (i) adopt the Local Authorization and execute and deliver the Local Bond Documents and all related documents, (ii) issue, sell and deliver its Local Bond to the Trustee, (iii) own and operate the System, (iv) undertake the Project and (v) carry out and consummate all of the transactions contemplated by the Local Authorization, the Local Bond, the Local Bond Documents, and the Service Agreement.

(c) The Local Authorization authorized the execution and delivery of this Agreement, and this Agreement is in substantially the same form as presented to the Local Government's governing body at its meeting at which the Local Authorization was adopted. The

Local Authorization was filed in the Circuit Court of the County of Albermale, Virginia, on [____], 2018.

(d) The Local Government has obtained all governmental permits, licenses, registrations, certificates, authorizations and approvals required to have been obtained as of the Effective Date for the Local Government's (i) adoption of the Local Authorization, (ii) execution and delivery of the Local Bond Documents and the Local Bond, (iii) performance of its obligations under the Local Bond Documents, the Local Bond, and the Service Agreement, (iv) the undertaking of the Project and (v) the operation and use of the System. The Local Government knows of no reason why any such required governmental permits, licenses, registrations, certificates, authorizations or approvals not required to be obtained by the Effective Date cannot be obtained as required in the future.

(e) The Local Government has executed and delivered this Agreement, and this Agreement constitutes a legal, valid and binding obligation of the Local Government enforceable against the Local Government in accordance with its terms.

(f) When executed and delivered in accordance with the Local Authorization and this Agreement, the Local Bond will have been executed and delivered by duly authorized officials of the Local Government and will constitute a legal, valid and binding limited obligation of the Local Government enforceable against the Local Government in accordance with its terms.

(g) The issuance of the Local Bond and the execution and delivery of the Local Bond Documents and the performance by the Local Government of its obligations thereunder and under the Service Agreement are within the powers of the Local Government and will not conflict with, or constitute a breach or result in a violation of, (i) to the best of the Local Government's knowledge, any federal or Virginia constitutional or statutory provision, including the Local Government's charter or articles of incorporation, if any, (ii) any agreement or other instrument to which the Local Government is a party or by which it is bound or (iii) any order, rule, regulation, decree or ordinance of any court, government or governmental authority having jurisdiction over the Local Government or its property.

(h) The Local Government is not in default in the payment of the principal of or interest on any of its indebtedness for borrowed money and is not in default under any instrument under and subject to which any indebtedness for borrowed money has been incurred. No event or condition has happened or existed, or is happening or existing, under the provisions of any such instrument, including but not limited to this Agreement, which constitutes, or which, with notice or lapse of time, or both, would constitute an event of default thereunder.

(i) The Local Government (i) to the best of the Local Government's knowledge, is not in violation of any existing law, rule or regulation applicable to it in any way that would have a material adverse effect on its financial condition or its ability to perform its obligations under the Local Bond, the Local Bond Documents, or the Service Agreement and (ii) is not in default under any indenture, mortgage, deed of trust, lien, lease, contract, note, order, judgment, decree or other agreement, instrument or restriction of any kind to which the Local Government is a party or by which it is bound or to which any of its assets is subject that

would have a material adverse effect on its financial condition or its ability to perform its obligations under the Local Bond and the Local Bond Documents. The Local Government's execution and delivery of the Local Bond and the Local Bond Documents and its compliance with the terms and conditions thereof will not conflict with or result in a breach of or constitute a default under any of the foregoing.

(j) The Local Government reasonably expects that, unless otherwise permitted by the terms of the Local Bond Documents or approved by VRA, the Local Government will own, operate and control the System at all times during the term of the Local Bond.

(k) Except as set forth in Exhibit C, there are not pending nor, to the best of the Local Government's knowledge, threatened against the Local Government, any actions, suits, proceedings or investigations of a legal, equitable, regulatory, administrative or legislative nature (i) affecting the creation, organization or existence of the Local Government or the title of its officers to their respective offices, (ii) seeking to prohibit, restrain or enjoin the approval, execution, delivery or performance of the Local Authorization, the Local Bond Documents, the Service Agreement or the issuance or delivery of the Local Bond, (iii) in any way contesting or affecting the validity or enforceability of the Local Bond, the Local Authorization, the Local Bond Documents, the Service Agreement or any agreement or instrument relating to any of the foregoing, (iv) in which a judgment, order or resolution may have a material adverse effect on the Local Government or its business, assets, condition (financial or otherwise), operations or prospects or on its ability to perform its obligations under the Local Authorization, the Local Bond Documents, the Local Bond, the Service Agreement or (v) affecting the Project.

(l) The financial statements, applications and other information that the Local Government furnished to VRA in connection with this Agreement fairly and accurately portray the Local Government's financial condition, as of their dates, and there has been no material adverse change in the financial condition of the Local Government since the date of the financial statements provided to VRA in connection with this Agreement.

(m) Nothing that would constitute an Event of Default hereunder has occurred and is continuing, and no event or condition exists that with the passage of time or the giving of notice, or both, would constitute an Event of Default hereunder.

(n) A list of all Parity Debt that is outstanding on the date of this Agreement is attached as Exhibit J (the "Existing Parity Bonds").

(o) Except for the Existing Parity Bonds, there is no indebtedness of the Local Government secured by a pledge of Revenues prior to or on a parity with the lien of the pledge of Revenues that secures the Local Bond.

Section 2.3 Representations Remade as of the Sale Date. (a) It shall be a condition precedent of VRA's obligation to sell the Related Series of VRA Bonds that the Local Government's representations and warranties set forth in Section 2.2 be true and accurate in all respects on the Sale Date.

(b) If prior to the Sale Date, any representation or warranty set forth in Section 2.2 becomes untrue or inaccurate, then the Local Government shall notify VRA within one Business Day of becoming aware of such facts, and VRA, in its sole and absolute discretion, shall determine whether to sell VRA Bonds on behalf of the Local Government, which series of VRA Bonds (if any) to sell on behalf of the Local Government and any additional conditions precedent to the sale of such VRA Bonds or the purchase of the Local Bond.

ARTICLE III PURCHASE OF THE LOCAL BOND

Section 3.1 Purchase of the Local Bond. (a) Subject to the terms and conditions and in reliance upon the representations, warranties and agreements set forth or incorporated herein, VRA shall purchase, solely from the proceeds of the Related Series of VRA Bonds, all, but not less than all, of the Local Bond from the Local Government, and the Local Government shall, subject to the Financing Parameters, sell and deliver to VRA the Local Bond for the Purchase Price. The Local Government acknowledges that the Purchase Price is determined by VRA, is subject to VRA's Purchase Price Objective (as defined below) and market conditions as described below, and is expected to be substantially equal to the Proceeds Requested. The Local Government shall issue the Local Bond pursuant to the Local Authorization and in substantially the form of Exhibit A to this Agreement. As a condition of VRA entering into this Agreement, the Local Government shall deliver to VRA a copy of the Local Authorization as adopted prior to the date hereof.

(b) The Local Government acknowledges that VRA has advised the Local Government that its objective is to pay the Local Government the Purchase Price for its Local Bond which in VRA's judgment reflects the market value of the Local Bond ("Purchase Price Objective"), taking into consideration the Financing Parameters, the purchase price received by VRA for the Related Series of VRA Bonds, the underwriters' discount and other issuance costs of the Related Series of VRA Bonds and other market conditions relating to the sale of the Related Series of VRA Bonds. The Local Government further acknowledges that VRA has advised it that such factors may result in the Local Bond having a value other than par and that in order to receive an amount of proceeds that is substantially equal to the Proceeds Requested, the Local Government may need to issue the Local Bond with a par amount that is greater or less than the Proceeds Requested. The Local Government shall not issue the Local Bond if doing so would violate any Financing Parameter. The Local Government shall issue the Local Bond at a par amount that provides, to the fullest extent practicable given VRA's Purchase Price Objective, a Purchase Price at least equal to the Proceeds Requested, all in accordance with the Local Authorization. The Local Government acknowledges that the Purchase Price will be less than the Proceeds Requested if any Financing Parameter prevents VRA from generating a Purchase Price substantially equal to the Proceeds Requested, based upon VRA's Purchase Price Objective.

Section 3.2 Issuance Expenses. VRA shall pay, or cause to be paid, from the proceeds of the Related Series of VRA Bonds all expenses incident to the performance of VRA's obligations under and the fulfillment of the conditions imposed by this Agreement in connection with the issuance, sale and delivery of the Related Series of VRA Bonds and the purchase of the Local Bond on the Closing Date, including, but not limited to: (i) the cost, if any, of preparing and delivering the Related Series of VRA Bonds; (ii) the cost of preparing, printing and

delivering the Preliminary Official Statement and the Official Statement for the Related Series of VRA Bonds and any amendment or supplement thereto; (iii) the fees and expenses of the financial advisor(s) and bond counsel to VRA; and (iv) all other costs and expenses incurred by VRA. The Local Government shall pay all expenses of the Local Government incident to the issuance, sale and delivery of the Local Bond, including, but not limited to the fees and disbursements of the financial advisor, counsel and bond counsel to the Local Government from the Purchase Price or other funds of the Local Government.

Section 3.3 Schedule 1.1. VRA shall complete Schedule 1.1, which shall set forth, among other things, the principal amount, interest rates, payment schedule and Purchase Price with respect to the Local Bond and the principal amount of the Related Series of VRA Bonds on or after the Sale Date. VRA shall deliver the completed Schedule 1.1 to the Local Government and shall attach Schedule 1.1 to this Agreement. Upon delivery to the Local Government, the completed Schedule 1.1 shall become a part of this Agreement the same as if it were a part hereof on the Effective Date.

Section 3.4 Conditions Precedent to Purchase of the Local Bond. VRA shall not be required to cause the Trustee to purchase the Local Bond unless:

(a) VRA has received the following, all in form and substance satisfactory to VRA:

(1) Certified copies of the Local Authorization and all other ordinances and resolutions of the Local Government relating to the Local Bond Documents and the Local Bond, if any.

(2) A certificate of the appropriate officials of the Local Government dated the Closing Date as to the matters set forth in Section 2.2 and Section 2.3 (to the extent applicable), including appropriate certifications regarding the Local Bond Documents, and such other matters as VRA may reasonably require.

(3) Evidence that the Local Government has performed and satisfied all of the terms and conditions contained in this Agreement to be performed and satisfied by it as of such date.

(4) An opinion of counsel to the Local Government in substantially the form attached as Exhibit F.

(5) An opinion of bond counsel to the Local Government in form and substance reasonably satisfactory to VRA.

(6) Evidence that the Local Government has complied with the insurance provisions set forth in Section 910 of the Local Master Indenture as of the Closing Date.

(7) The executed Local Bond and original executed counterparts of the Local Tax Document.

(8) A certificate of the Consulting Engineer giving the Consulting Engineer's estimate of the construction portion of the total Project Costs to be financed with the proceeds of the Local Bond, which estimate must be in an amount and otherwise compatible with the financing plan described in the Project Budget.

(9) A certificate of the Consulting Engineer (i) to the effect that the Purchase Price and funds available from the other sources specified in the Project Budget will be sufficient to pay all of the estimated Project Costs and (ii) specifying the date the Local Government is expected to complete the Project.

(10) A certificate of a Consulting Engineer or a Qualified Independent Consultant, including supporting documentation, to the effect that during the first two complete Fiscal Years following the estimated completion date of the Project, the projected Net Revenues Available for Debt Service will satisfy the Local Government's rate covenant under Section 5.2(a). In providing this certificate, the Consulting Engineer or Qualified Independent Consultant may take into consideration future System rate increases, provided that such rate increases have been duly approved by the Local Government's governing body and any other person or entity required to give approval for the rate increase to become effective. In addition, the Consulting Engineer or Qualified Independent Consultant may take into consideration additional future revenues to be derived under existing contractual arrangements entered into by the Local Government and from reasonable estimates of growth in the Local Government's consumer base.

(11) A certificate of the Consulting Engineer to the effect that (i) all governmental permits, licenses, registrations, certificates, authorizations and approvals for the undertaking of the Project and the operation and use of the System required to have been obtained as of the Closing Date have been obtained and (ii) the Consulting Engineer knows of no reason why any such required governmental permits, licenses, registrations, certificates, authorizations and approvals for the undertaking of the Project and the operation and use of the System cannot be obtained as required in the future.

(12) Evidence that the Local Government is in compliance with the construction contract provisions set forth in Section 7.13 with respect to any existing contracts as of the Closing Date.

(13) Evidence that the Local Government has satisfied all conditions precedent to the issuance of the Local Bond as a "Parity Bond" under the financing documents for the Existing Parity Bonds.

(14) Such other documentation, certificates and opinions as VRA may reasonably require as set forth in Schedule 1.1.

(b) The initial purchasers of the Related Series of VRA Bonds have paid in full and VRA has accepted the purchase price for the Related Series of VRA Bonds on the Closing Date. It is understood that the sole source of funds to pay the Purchase Price is a portion of the proceeds of the Related Series of VRA Bonds.

ARTICLE IV USE OF PURCHASE PRICE

Section 4.1 Deposit of Purchase Price; Investment of Amounts in Local Account.

(a) On the Closing Date, VRA shall cause the Trustee to deposit the Purchase Price into the Local Account and to apply the Purchase Price and the earnings thereon as set forth in the Related Supplemental Series Indenture, this Agreement, the Local Master Indenture, and the Local Tax Document.

(b) The Local Government acknowledges and consents to the investment of the Purchase Price and the earnings thereon allocable to pay the Local Government's related costs of issuance, if any, in Virginia SNAP.

Section 4.2 Agreement to Accomplish Project. (a) The Local Government shall cause the Project to be acquired, constructed, expanded, renovated, equipped or financed as described in Exhibit B and in accordance with the Project Budget, this Agreement, the Local Tax Document and the plans, specifications and designs prepared by the Consulting Engineer and approved by the Local Government. The Local Government shall use its best efforts to complete, or cause to be completed, the Project by the date set forth in the certificate delivered under Section 3.4(a)(9). The Local Government shall obtain the approval of all applicable regulatory agencies of all plans, specifications and designs for the Project. The Local Government shall maintain complete and accurate books and records of the Project Costs and permit VRA or the Trustee through their representatives to inspect such books and records at any reasonable time.

(b) Upon completion of the Project, the Local Government shall promptly deliver to VRA and the Trustee a certificate signed by a Local Representative and by the Consulting Engineer stating (i) that the Project has been completed substantially in accordance with this Article and in substantial compliance with all material applicable laws, ordinances, rules and regulations, (ii) the date of such completion and (iii) that all certificates of occupancy or other material permits then necessary for the use, occupancy and operation of the Related Financed Property have been issued or obtained. Such certificate shall be accompanied by a copy of the final requisition submitted to the Trustee pursuant to Section 4.3, including Schedule 1 thereto.

(c) If upon completion of the Project and payment of all related costs of issuance, there is a balance remaining in the Local Account, the Trustee, at the written direction of the Local Government, shall apply any remaining balance to pay or reimburse the Local Government for previously-paid interest on the Local Bond or in such other manner that is permitted under the Act and will not, in the opinion of a nationally-recognized bond counsel delivered to VRA and the Trustee, have an adverse effect on the tax status of the Related Series of VRA Bonds.

Section 4.3 Disbursement of Purchase Price and Earnings. Except as provided in Section 4.2(c), the Local Government shall apply the amounts in the Local Account solely and exclusively to the payment or reimbursement of the Local Government for the Project Costs. Not more frequently than once per calendar month, the Trustee shall disburse amounts from the

Local Account to the Local Government or as directed by the Local Government upon the Trustee's receipt of the following:

(a) A requisition (upon which the Trustee and VRA shall be entitled to rely) signed by a Local Representative and containing all information called for by, and otherwise being in the form of, Exhibit D (including the Schedules thereto).

(b) Receipts, vouchers, statements, bills of sale or other evidence of payment of the related Project Costs.

(c) If any requisition includes an item for payment for labor or to contractors, builders or materialmen:

(1) a certificate, signed by a Local Engineer, stating that such work was actually performed or such materials, supplies or equipment were actually furnished or installed in or about the construction of the Project; and

(2) a certificate, signed by a Local Representative (that may rely on representations of counsel or a title insurance agency reasonably acceptable to VRA), stating that no notice of any lien, right to lien or attachment upon, or claim affecting the right to receive payment of, any of the money payable under the requisition to any of the persons, firms or corporations named in it has been received, or if any notice of any such lien, attachment or claim has been received, such lien, attachment or claim has been released or discharged or will be released or discharged upon payment of the requisition.

(d) If any requisition includes an item for payment of the cost of acquisition of any lands or easements, rights or interests in or relating to lands, there shall also be attached to such requisition:

(1) a certificate, signed by a Local Engineer, stating that such lands, easements, rights or interests are being acquired and are necessary or convenient for the construction of the Project; and

(2) a certificate, signed by a Local Representative (that may rely on representations of counsel or a title insurance agency reasonably acceptable to VRA), stating that upon payment therefor the Local Government will have title in fee simple to, or easements, rights or interests sufficient for the purposes of, the Project over and through the subject lands.

Following VRA's approval of each such requisition and accompanying invoice(s) and certificate(s), which approval will not unreasonably be withheld, the Trustee shall pay the requisition from the Local Account in accordance with the instructions in such requisition.

The Local Government agrees that any amounts disbursed to it or for its account from the Local Account will be (i) immediately applied to reimburse the Local Government for Project Costs it has already paid or (ii) actually spent to pay Project Costs not later than five banking days after receipt.

Section 4.4 No Sufficiency Warranty by VRA; Local Government Required to Complete Project. VRA makes no warranty, either express or implied, that the Purchase Price will be sufficient to pay all or any particular portion of the Project Costs. If the Purchase Price is not sufficient to pay in full the cost of the Project, the Local Government shall complete the Project at its own expense and shall not be entitled to any reimbursement therefor from VRA or any abatement, diminution or postponement of its payments under the Local Bond or this Agreement.

ARTICLE V PLEDGE AND SECURITY

Section 5.1 Pledge. As set forth in Section 712 of the Local Master Indenture, all Revenues derived from the ownership or operation of the System and all moneys in the funds established by the Local Master Indenture and enumerated in Section 712 are trust funds and are pledged to the payment of the Bonds issued under and as defined in the Local Master Indenture, including the principal of and interest on the Local Bond and the payment and performance of the Local Government's obligations under this Agreement.

Section 5.2 Rate Covenant. (a) The Local Government shall fix and collect rates, fees and other charges for the use of and for services furnished or to be furnished by the System, and will from time to time revise such rates, fees and other charges to the extent required to satisfy the revenue covenant in Section 702 of the Local Master Indenture.

(b) If, for any reason, the Net Revenues Available for Debt Service are insufficient to satisfy the covenant set forth in subsection (a), the Local Government shall within 90 days adjust and increase its rates, fees and other charges or reduce its Operating Expenses so as to provide sufficient Net Revenues Available for Debt Service to satisfy such requirement.

(c) On or before the last day of each Fiscal Year, the Local Government shall review the adequacy of its rates, fees and other charges for the next Fiscal Year, and, if such review indicates the Local Government's rates, fees and other charges will be insufficient to satisfy the rate covenant in subsection (a), the Local Government shall promptly take appropriate action to increase its rates, fees and other charges or reduce its Operating Expenses to cure any deficiency.

Section 5.3 Annual Budget of the System. Not less than 15 days before the first day of each Fiscal Year, the Local Government shall submit to its governing body and to VRA a copy of a preliminary annual budget, containing all information called for by, and otherwise being in the form of, Exhibit I to this Agreement, for such Fiscal Year setting forth a schedule of the rates, fees and other charges to be imposed by the Local Government, the Revenues estimated to be generated thereby and the expenditures anticipated by the Local Government for operations, maintenance, repairs, replacements, improvements, debt service and other purposes. The Local Government shall adopt, prior to the first day of each Fiscal Year, a budget for such Fiscal Year. The Local Government shall ensure that the adopted budget contains the information required to be included in the preliminary budget. Such budget as approved by the Local Government's governing body is referred to in this Agreement as the Annual Budget. The Local Government may at any time during any Fiscal Year amend the Annual Budget for such

Fiscal Year so long as such amendment does not result in an Event of Default. The Local Government shall promptly submit to VRA, in an electronic format, a copy of the Annual Budget and any amendments thereto.

Section 5.4 Qualified Independent Consultant's Report. (a) If at the end of any Fiscal Year, the Local Government is not in compliance with the rate covenant made by the Local Government in Section 5.2(a), within 210 days after the end of such Fiscal Year, the Local Government shall obtain a report from the Qualified Independent Consultant. The Local Government shall ensure that the report gives advice and makes recommendations as to the proper maintenance, repair, replacement and operation of the System for the next ensuing Fiscal Year and estimating the costs thereof as to the rates, fees, and other charges which should be established by the Local Government to satisfy the rate covenant in Section 5.2(a). The Local Government shall promptly furnish a copy of such report to VRA and, subject to Section 5.4(b), take measures to implement the recommendations of the Qualified Independent Consultant within 90 days of obtaining such report.

(b) If the Local Government determines that the Qualified Independent Consultant's recommendations are impractical or inappropriate, the Local Government may in lieu thereof adopt other procedures which the Local Government believes will bring it into compliance with the rate covenant made by the Local Government in Section 5.2(a) when such measures have been implemented and become fully effective. Such alternative plan shall be filed with VRA not later than 30 days after receipt of the Qualified Independent Consultant's report along with a detailed explanation of the Local Government's reason for rejecting the Qualified Independent Consultant's recommendations. Notwithstanding anything herein to the contrary, VRA reserves the right, in its sole discretion, to reject such alternate procedures and, to the extent permitted by law, require the Local Government to comply with the Qualified Independent Consultant's recommendations.

Section 5.5 Limitation on Amendments to Certain Documents. After the Sale Date, the Service Agreement shall not be terminated, permitted to lapse or amended in whole or in part without the prior written consent of the Local Trustee, Local Government, the City of Charlottesville, Virginia, the Albemarle County Service Authority and the Board of County Supervisors acting for and on behalf of Albemarle County. Any such consent shall be given in accordance with the Local Authorization and Local Master Indenture.

ARTICLE VI PAYMENT AND REDEMPTION OF LOCAL BOND

Section 6.1 Payment of Local Bond and Related Amounts. (a) Until the principal of and premium, if any, and interest on the Local Bond and all other amounts payable under this Agreement have been paid in full, the Local Government shall pay from the Revenues to the Trustee or VRA, as applicable, the following amounts:

(1) to the Trustee, the amounts required by the Local Bond on such dates and in such manner as provided for in the Local Bond – the term "interest," as used in the Local Bond and this Agreement, includes Supplemental Interest, when and if payable;

(2) to the Trustee, on VRA's demand, or to VRA, any amounts payable under the Local Tax Document, including without limitation the costs of any rebate calculation agent;

(3) to VRA, on its demand, a late payment penalty in an amount equal to 5.0% of the payment on the Local Bond not paid within 10 days after its due date;

(4) to the Trustee, the Local Government's share (as determined by VRA) of the annual fees and expenses of the Trustee, less the Local Government's share of the net earnings on the Revenue Fund, Infrastructure Revenue Debt Service Fund and Moral Obligation Debt Service Fund established under the Master Indenture (as determined by VRA), and the Local Government shall pay such amounts no later than 15 days after VRA or the Trustee sends to the Local Government a written bill for them; and

(5) to VRA, to the extent permitted by law, the reasonable costs and expenses, including reasonable attorneys' fees, if any, incurred by VRA in connection with (i) an Event of Default or default by the Local Government under this Agreement (ii) any amendment to or discretionary action that VRA undertakes at the request of the Local Government under this Agreement, any other document related to the Related Series of VRA Bonds or the Local Bond or (iii) any claim, lawsuit or other challenge to the Local Bond, the VRA Bonds or this Agreement that arises, at least in part, out of the Local Government's authorization of its issuance of the Local Bond, and the Local Government shall pay such amounts no later than 15 days after VRA or the Trustee sends to the Local Government a written bill for them.

(b) If any failure of the Local Government to pay all or any portion of any required payment of the principal of or premium, if any, or interest on the Local Bond results in a withdrawal from or a drawing on any VRA Reserve, the interest rates applicable to the Local Bond shall be increased to interest rates sufficient to reimburse the VRA Reserve for any foregone investment earnings on the funds withdrawn therefrom and pay any interest, fees or penalties assessed as a result of the withdrawal from or drawing on the VRA Reserve. The increment of interest payable pursuant to the increase in rates shall be referred to as "Supplemental Interest." The Local Government's obligation to pay Supplemental Interest shall commence on the date of the withdrawal or drawing of funds from the VRA Reserve occasioned by the Local Government's failure to pay a required payment or portion thereof as described above (the "Supplemental Interest Commencement Date"). The Local Government's obligation to pay Supplemental Interest shall terminate on the date on which the Local Government makes all payments required but outstanding since the date of the initial failure to pay (the "Supplemental Interest Termination Date"). From the Supplemental Interest Commencement Date to the Supplemental Interest Termination Date, Supplemental Interest shall be due and payable on the regularly scheduled interest payment dates provided for in the Local Bond. As soon as reasonably possible after the Supplemental Interest Commencement Date and before the next regularly scheduled interest payment date provided for in the Local Bond, VRA shall deliver to the Local Government a certificate as to the increase in interest rates and the amount of Supplemental Interest. The certificate shall set forth in reasonable detail the basis for the increase in interest rates and the manner of calculation of the increase and the amount of Supplemental Interest. Such certificate shall be conclusive (absent manifest error) as to the

interest rate increase and amount of Supplemental Interest set forth therein. In determining the interest rate increase and the amount of Supplemental Interest, VRA may use any reasonable averaging and attribution methods.

(c) The Local Government shall pay the amounts described above and make payments as scheduled under the Local Bond despite any amount being withdrawn from or drawn on a VRA Reserve pursuant to the Master Indenture.

Section 6.2 Defeasance and Redemption of Local Bond. (a) The Local Government shall not defease or redeem the Local Bond (in whole or in part), except as provided in this Section 6.2.

(b) The Local Government shall satisfy the following conditions prior to the defeasance and redemption of the Local Bond:

(1) The Local Government shall provide to VRA not less than 60 days' prior written notice of the deposit of the funds described in (2), (3) and (4) below.

(2) The Local Government shall deposit with the Trustee an amount sufficient for VRA to establish an escrow of cash and non-callable, non-prepayable Government Obligations the principal of and interest on which will be sufficient (without reinvestment) to cause the defeasance under Article XII of the Master Indenture of the portion of the Related Portion of VRA Bonds corresponding to the portion of the Local Bond to be defeased or prepaid (the "Allocated Portion"). The defeasance of the Allocated Portion may be either to maturity or an earlier redemption date as determined by the Local Government.

(3) The Local Government shall deposit with VRA cash in an amount sufficient, as determined by VRA, to pay for a verification report required for the defeasance of the Allocated Portion under Article XII of the Master Indenture, any costs incurred by VRA in connection with the redemption, refunding and defeasance of the Allocated Portion, all amounts overdue or then due on the Local Bond (including, without limitation, any Supplemental Interest) and all amounts overdue, due or to become due under Section 6.1(a) of this Agreement.

(4) The Local Government shall deposit with VRA cash in an amount equal to the present value of interest that would be paid on the principal of the Allocated Portion at a rate equal to 0.125%, payable semiannually, to the maturity dates of the Allocated Portion or, if earlier, the redemption date or dates of the Allocated Portion. Present value shall be determined by using a discount rate equal to the true interest cost of the Related Portion of VRA Bonds.

(c) VRA will determine which Related Portion of VRA Bonds will be designated as the Allocated Portion and the amounts to be deposited under subsection (b)(2) and (3) above using such reasonable allocation and estimation methods as may be selected by VRA, and VRA's determinations shall be conclusive (absent manifest error).

(d) The Local Government acknowledges that no funds in any VRA Reserve will be available to the Local Government for the defeasance or redemption of the Local Bond.

Section 6.3 Payments and Rights Assigned. The Local Government hereby consents to VRA's assignment to the Trustee of VRA's rights under this Agreement and the Local Bond. The Local Government also hereby acknowledges and consents to the reservation by VRA of the right and license to enjoy and enforce VRA's rights under the Local Bond and this Agreement so long as no Event of Default (as defined in the Master Indenture) with respect to the Related Series of VRA Bonds has occurred and is continuing. Even though VRA will be the registered owner of the Local Bond, the Local Government shall pay directly to the Trustee all amounts payable by the Local Government under the Local Bond and this Agreement (except for those amounts specifically indicated as payable to VRA under Section 6.1 or Section 11.8, which the Local Government shall pay directly to VRA).

Section 6.4 Obligations Absolute and Unconditional. The obligation of the Local Government to make the payments required by the Local Bond and this Agreement from the sources pledged therefor shall be absolute and unconditional. The Local Government shall pay all such amounts without abatement, diminution or deduction (whether for taxes or otherwise) regardless of any cause or circumstance whatsoever including, without limitation, any defense, set-off, recoupment or counterclaim that the Local Government may have or assert against VRA, the Trustee or any other person.

ARTICLE VII OPERATION AND USE COVENANTS

Section 7.1 Maintenance. At its own cost and expense the Local Government shall operate the System in a proper, sound and economical manner in compliance with all legal requirements and shall maintain the System in good repair and operating condition and from time to time shall make all necessary repairs, renewals and replacements.

Section 7.2 Additions and Modifications. At its own expense the Local Government from time to time may make any renewals, replacements, additions, modifications or improvements to the System that the Local Government deems desirable, provided that any such renewal, replacement, addition, modification or improvement does not (i) materially reduce the value of the System or (ii) negatively affect the structural or operational integrity of any part of the System. The Local Government shall ensure that all such renewals, replacements, additions, modifications or improvements comply with all applicable federal, state and local laws, rules, regulations, orders, permits, authorizations and requirements. All such renewals, replacements, additions, modifications and improvements shall become part of the System.

Section 7.3 Permits. After the Sale Date, the Service Agreement shall not be terminated, permitted to lapse or amended in whole or in part without the prior written consent of the Local Trustee, Local Government, the City of Charlottesville, Virginia, the Albemarle County Service Authority and the Board of County Supervisors acting for and on behalf of Albemarle County. Any such consent shall be given in accordance with the Local Authorization and Local Master Indenture.

Section 7.4 Use. The Local Government shall comply with all lawful requirements of any governmental authority regarding the System, whether now existing or subsequently enacted, whether foreseen or unforeseen or whether involving any change in governmental policy or requiring structural, operational or other changes to the System, irrespective of the cost of making the same.

Section 7.5 Inspection and Local Government's Books and Records. The Local Government shall permit VRA, the Trustee and their duly authorized representatives and agents such reasonable rights of access to the System as may be necessary to determine whether the Local Government is in compliance with the requirements of this Agreement, and the Local Government shall permit such parties, at all reasonable times and upon reasonable prior notice to the Local Government, to examine and copy the Local Government's books and records that relate to the System.

Section 7.6 Ownership. The Local Government shall not construct, reconstruct or install any part of the System on (i) lands other than those which the Local Government owns or can acquire title to or a perpetual easement over, in either case sufficient for the Local Government's purposes or (ii) lands in which the Local Government has acquired a right or interest less than a fee simple or perpetual easement, unless (1) such part of the System is lawfully located in a public street or highway or (2) the Local Government provides a written opinion of counsel or a report of a Qualified Independent Consultant, either of which in a form reasonably acceptable to VRA, that indicates that the lands and the Local Government's right or interest therein is sufficient for the Local Government's purposes.

Section 7.7 Sale or Encumbrance. No part of the System shall be sold, exchanged, leased, mortgaged, encumbered or otherwise disposed of except as provided in Section 907 of the Local Master Indenture.

Section 7.8 Collection of Revenues. The Local Government shall use its best efforts to collect all rates, fees and other charges due to it, including, without limitation, the perfection of liens on premises served by the System for the amount of all delinquent rates, fees and other charges where such action is permitted by law, the Local Master Indenture and the Service Agreement. The Local Government shall, to the full extent permitted by law, discontinue and shut off, or cause to be discontinued and shut off, services and facilities of the System, and use its best efforts to cause to be shut off water service furnished otherwise than through the System, to customers of the System who are delinquent beyond any customary grace periods in the payment of rates, fees and other charges due to the Local Government.

Section 7.9 Intentionally Omitted.

Section 7.10 Intentionally Omitted.

Section 7.11 Intentionally Omitted.

Section 7.12 Lawful Charges. The Local Government shall pay when due all taxes, fees, assessments, levies and other governmental charges of any kind whatsoever (collectively, the "Governmental Charges") which are (i) assessed, levied or imposed against the System or the Local Government's interest in it, or (ii) incurred in the operation, maintenance, use and

occupancy of the System. The Local Government shall pay or cause to be discharged, or shall make adequate provision to pay or discharge, all lawful claims and demands for labor, materials, supplies or other objects which, if unpaid, might by law become a lien upon all or any part of the System or the Revenues (collectively, the "Mechanics' Charges"). The Local Government, however, after giving VRA 10 days' notice of its intention to do so, at its own expense and in its own name, may contest in good faith any Governmental Charges or Mechanics' Charges. If such a contest occurs, the Local Government may permit the same to remain unpaid during the period of the contest and any subsequent appeal unless, in VRA's reasonable opinion, such action may impair the lien on Revenues granted by this Agreement, in which event, such Governmental Charges or Mechanics' Charges promptly shall be satisfied or secured by posting with the Trustee or an appropriate court a bond in form and amount satisfactory to VRA. Upon request, the Local Government shall furnish to VRA proof of payment of all Governmental Charges and Mechanics' Charges the Local Government is required to pay under this Agreement.

Section 7.13 Construction Contractors. (a) Except as provided in (b) below, the Local Government shall cause each general construction contractor who is employed in the accomplishment of the Project (or a portion thereof), to furnish a performance bond and a payment bond each in an amount equal to 100% of the particular contract price. Such bonds must list the Local Government, VRA and the Trustee as beneficiaries. Neither VRA nor the Trustee shall make any claims or exercise any rights under such bonds unless and until an Event of Default occurs. The Local Government shall cause each contractor to maintain during the construction period covered by the particular construction contract builder's risk insurance, workmen's compensation insurance, public liability insurance, property damage insurance and vehicle liability insurance in amounts and on terms satisfactory to the Consulting Engineer.

(b) For any general construction contractor who is employed in the accomplishment of the Project (or a portion thereof), and who is responding to bids issued prior to the date of this Agreement or who has otherwise entered into a contract or other agreement with the Local Government prior to the date of this Agreement, the provisions of (a) above shall not be required. However, to the extent payment and performance bonds are obtained, the Local Government shall apply proceeds thereof in accordance with Section 4.2.

Section 7.14 Engineering Services. The Local Government shall retain or employ a Consulting Engineer as provided in Section 906 of the Local Master Indenture.

ARTICLE VIII INSURANCE, DAMAGE AND DESTRUCTION

Section 8.1 Insurance. The Local Government shall maintain or cause to be maintained the insurance coverages required by Section 910 of the Local Master Indenture.

Neither VRA nor the Trustee shall have any responsibility or obligation with respect to (i) the procurement or maintenance of insurance or the amounts or the provisions with respect to policies of insurance or (ii) the application of the proceeds of insurance.

The Local Government shall provide annually to VRA a certificate or certificates of the respective insurers evidencing the fact that the insurance required by this Section is in force and effect.

Section 8.2 Requirements of Policies. The Local Government shall maintain all insurance required by Section 8.1 with generally recognized responsible insurance companies selected by the Local Government and reasonably acceptable to VRA. Such insurance may be written with deductible amounts comparable to those on similar policies carried by other utility systems of like size and character to the System. If the Local Government does not maintain such insurance with an insurer licensed to do business in Virginia or placed under the requirements of the Virginia Surplus Lines Insurance Law, Chapter 48, Title 38.2, Code of Virginia of 1950, as amended, or any successor statute, the Local Government shall provide evidence reasonably satisfactory to VRA that such insurance is enforceable under Virginia law.

Section 8.3 Notice of Damage, Destruction or Condemnation. In case of (i) any damage to or destruction of any material part of the System, (ii) a taking of all or any part of the System or any right in it under the exercise of the power of eminent domain, (iii) any loss of the System because of failure of title or (iv) the commencement of any proceedings or negotiations which might result in such a taking or loss, the Local Government shall notify VRA in writing within ten Business Days of the occurrence describing generally the nature and extent of such damage, destruction, taking, loss, proceedings or negotiations.

Section 8.4 Damage and Destruction. If all or any part of the System is destroyed or damaged by fire or other casualty, and the Local Government shall not have exercised its option, if such option is available, to redeem the outstanding Local Bond pursuant to Section 6.2, the Local Government shall restore promptly the property damaged or destroyed to substantially the same condition as before such damage or destruction, with such alterations and additions as the Local Government may determine and which will not impair the capacity or character of the System for the purposes for which it then is being used or is intended to be used. The Local Government may apply so much as may be necessary of the net proceeds of insurance received on account of any such damage or destruction to payment of the cost of such restoration, either on completion or as the work progresses. If such net proceeds are not sufficient to pay in full the cost of such restoration, the Local Government shall pay so much of the cost as may be in excess of such net proceeds.

Section 8.5 Condemnation and Loss of Title. If title to or the temporary use of all or any part of the System shall be taken under the exercise of the power of eminent domain or lost because of failure of title, and the Local Government shall not have exercised its option, if such option is available, to redeem the outstanding Local Bond pursuant to Section 6.2, the Local Government shall cause the net proceeds from any such condemnation award or from any title insurance to be applied to the restoration of the System to substantially its condition before the exercise of such power of eminent domain or failure of title. If such net proceeds are not sufficient to pay in full the cost of such restoration, the Local Government shall pay so much of the cost as may be in excess of such net proceeds.

ARTICLE IX SPECIAL COVENANTS

Section 9.1 Tax Covenants. The Local Government shall not directly or indirectly use or permit the use of any of the proceeds of the Local Bond or any other of its funds, in such manner as would, or enter into, or allow any other person or entity to enter into, any arrangement, formal or informal, that would, or take or omit to take any other action that would, cause interest on any of the Related Series of VRA Bonds to be includable in gross income for federal income tax purposes or to become a specific item of tax preference for purposes of the federal alternative minimum tax imposed on individuals and corporations. Insofar as the Local Tax Document imposes duties and responsibilities on the Local Government, including the payment of any arbitrage rebate in respect of the Related Series of VRA Bonds, as of the Closing Date they are specifically incorporated by reference into this Agreement. The Local Government also consents to the calculation of any "rebate amount" to be paid with respect to the Related Portion of VRA Bonds by a rebate calculation service selected by VRA.

Section 9.2 Maintenance of Existence. The Local Government shall maintain its existence as a public body corporate and politic and political subdivision of the Commonwealth of Virginia under Virginia law, and shall not dissolve or otherwise dispose of all or substantially all of its assets or consolidate or merge with or into another entity without VRA's prior written consent, which consent will not be unreasonably withheld.

Section 9.3 Financial Records and Statements. The Local Government shall maintain proper books of record and account in which proper entries shall be made in accordance with generally accepted government accounting standards, consistently applied, of all its business and affairs. The Local Government shall have an annual audit of the financial condition of the Local Government (and at the reasonable request of VRA, of the System) made in accordance with Section 911 of the Local Master Indenture; provided, however, that such annual audit shall be prepared within one hundred and eighty (180) days after the end of each Fiscal Year. The annual audit shall include a supplemental schedule demonstrating whether the Local Government satisfied the rate covenant set forth in Section 5.2. The Local Government shall furnish to VRA, in an electronic format, a copy of such report immediately after it is accepted by the Local Government. Such report shall include statements in reasonable detail, certified by such accountant, reflecting the Local Government's financial position as of the end of such Fiscal Year and the results of the Local Government's operations and changes in the financial position thereof for the Fiscal Year. The Local Government agrees to file, or to cause the Trustee to file, with VRA each of the documents required to be filed with the Local Trustee pursuant to the Local Master Indenture at the time each such document is required to be filed with the Local Trustee.

Section 9.4 Certification as to No Default and Tax Compliance. The Local Government shall deliver to VRA, within 180 days after the close of each Fiscal Year, a certification in substantially the form attached as Exhibit G and signed by a Local Representative.

Section 9.5 Notice of Issuance of Additional Bonds of Local Government. The Local Government agrees to notify VRA before the issuance of any Additional Bonds as defined in the Local Master Indenture. Notwithstanding anything else in this Agreement to the contrary,

the Local Government may not issue Additional Bonds or any other obligations or indebtedness to refund or refinance some or all of the Local Bond without VRA's prior written consent.

Section 9.6 Further Assurances. The Local Government shall to the fullest extent permitted by law pass, make, do, execute, acknowledge and deliver such further resolutions, acts, deeds, conveyances, assignments, transfers and assurances as may be necessary or desirable for the better assuring, conveying, granting, assigning and confirming the rights and collateral, if any, assigned or pledged by this Agreement, or as may be required to carry out the purposes of this Agreement. The Local Government shall at all times, to the fullest extent permitted by law, defend, preserve and protect the pledges made under this Agreement and all rights of VRA under this Agreement against all claims and demands of all persons, including without limitation the payment of certain costs of VRA as described in Section 6.1(a)(5).

Section 9.7 Assignment by Local Government. The Local Government shall not assign its rights and obligations under the Local Bond or this Agreement, or both, without the prior written consent of VRA.

Section 9.8 Continuing Disclosure. (a) For purposes of this Section 9.7, the following terms and phrases have the following meanings:

"Annual Financial Information" with respect to any Fiscal Year for the Local Government means the following:

(i) the financial statements (consisting of at least a balance sheet and a statement of revenues and expenses) of the System ,which financial statements must be (A) prepared annually in accordance with generally accepted accounting principles in effect from time to time consistently applied (provided that nothing in this clause (A) will prohibit the Local Government after the date of this Agreement from changing such other principles so as to comply with generally accepted accounting principles as then in effect or to comply with a change in applicable law) and (B) audited by an independent certified public accountant or firm of such accountants in accordance with generally accepted auditing standards as in effect from time to time (provided that if audited financial statements are not available for filing when required by this Section or the Rule (as defined herein), unaudited financial statements will be filed and audited financial statements will be filed as soon as possible thereafter); and

(ii) operating data of the type set forth in Exhibit E.

"Dissemination Agent" means any person, reasonably acceptable to VRA, whom the Local Government contracts in writing to perform its obligations as provided in subsection (i) of this Section.

"Make Public" or "Made Public" has the meaning set forth in subsection (c) of this Section.

"Material Local Government" means the Local Government if the aggregate outstanding principal amount of the Local Bond and any other of the Local Government's local

bonds purchased with proceeds of the VRA Bonds represent 15% or more of the outstanding aggregate principal amount of the local bonds purchased with proceeds of the VRA Bonds.

"Rule" means Rule 15c2-12, as it may be amended from time to time, under the Securities Exchange Act of 1934 and any similar rules of the SEC relating to disclosure requirements in the offering and sale of municipal securities, all as in effect from time to time.

"SEC" means the U.S. Securities and Exchange Commission.

(b) The Local Government shall Make Public or cause to be Made Public:

(1) Within seven months after the end of the Local Government's Fiscal Year (commencing with the Fiscal Year in which the Closing Date occurs), Annual Financial Information for such Fiscal Year as of the end of which the Local Government constitutes a Material Local Government. Annual Financial Information may be set forth in the documents Made Public or may be included in a document Made Public by specific reference to any document available to the public on the internet website of the Municipal Securities Rulemaking Board ("MSRB") or filed with the SEC. If the document referred to is a final official statement, then it must be available from the MSRB.

(2) In a timely manner, notice of any failure by the Local Government to Make Public or cause to be Made Public Annual Financial Information pursuant to the terms of part (1) of this subsection.

(c) For purposes of this Section, information and notices shall be deemed to have been "Made Public" if transmitted to VRA, to the Trustee and to the MSRB in an electronic format as prescribed by the MSRB.

(d) The Local Government shall also notify VRA of the occurrence of any of the following events that may from time to time occur with respect to the Local Bond, such notice to be given in a timely manner not in excess of five Business Days after the occurrence of the event:

- (1) principal and interest payment delinquencies;
- (2) non-payment related defaults;
- (3) unscheduled draws on debt service reserves reflecting financial difficulties;
- (4) unscheduled draws on any credit enhancement maintained with respect to the Local Bond reflecting financial difficulties;
- (5) substitution of credit or liquidity providers, or their failure to perform;
- (6) adverse tax opinions, the issuance by the Internal Revenue Service of proposed or final determinations of taxability, Notices of Proposed Issue (IRS Form

5701 – TEB) or other notices or determinations with respect to the Local Bond that could affect the tax status of the Related Series of VRA Bonds, or other events with respect to the Local Bond that could affect the tax status of the Related Series of VRA Bonds;

- (7) modifications to rights of holders;
- (8) bond calls and tender offers;
- (9) defeasances;
- (10) release, substitution, or sale of property securing repayment of the Local Bond;
- (11) rating changes;
- (12) bankruptcy, insolvency, receivership or similar event of the Local Government;
- (13) the consummation of a merger, consolidation, or acquisition involving the Local Government or the sale of all or substantially all of the assets of the Local Government, other than in the ordinary course of business, the entry into a definitive agreement to undertake such an action or the termination of a definitive agreement relating to any such action, other than pursuant to its terms;
- (14) appointment of a successor or additional trustee for the Local Bond, if any, or the change of name of a trustee; and
- (15) the failure of the Local Government on or before the date required by this Agreement to provide Annual Financial Information to the persons and in the manner required by this Agreement.

(e) Additionally, upon request of VRA, the Local Government shall certify in writing that it has made all filings and disclosures under this Section or any similar undertaking pursuant to the Rule.

(f) Notwithstanding anything in this Agreement to the contrary, the Local Government need not comply with the provisions of subsections (a) through (d) above unless and until VRA has notified the Local Government that it satisfied the objective criteria for a Material Local Government as of the end of VRA's immediately preceding fiscal year.

(g) (1) If the Local Government fails to comply with any covenant or obligation set forth in this Section, any holder (within the meaning of the Rule) of VRA Bonds then Outstanding may, by notice to the Local Government, proceed to protect and enforce its rights and the rights of the other holders by an action for specific performance of the Local Government's covenants or obligations set forth in this Section.

(2) Notwithstanding anything herein to the contrary, any failure of the Local Government to comply with any disclosure obligation specified in this Agreement

(i) shall not be deemed to constitute an Event of Default under this Agreement and (ii) shall not give rise to any right or remedy other than that described in part (1) of this subsection.

(h) The Local Government may from time to time disclose certain information and data in addition to that required under this Section. Notwithstanding anything in this Agreement to the contrary, the Local Government shall not incur any obligation to continue to provide, or to update, such additional information or data.

(i) The Local Government may, from time to time, appoint or engage a Dissemination Agent to assist it in carrying out its obligation to cause to be Made Public the information described in this Section and may discharge any such Dissemination Agent, with or without appointing a successor Dissemination Agent. It is not necessary for purposes of this Article that the Dissemination Agent have any agency relationship with the Local Government for purposes of state law.

(j) All documents Made Public under this Section shall be accompanied by identifying information as prescribed by the MSRB.

Section 9.9 Other Indebtedness. The Local Government shall pay when due all amounts required by any other indebtedness of the Local Government and perform all of its obligations in connection with all other indebtedness of the Local Government.

Section 9.10 Additional Indebtedness. The Local Government shall not incur any indebtedness or issue any bonds, notes or other evidences of indebtedness secured by a pledge of Revenues, except Parity Debt or Subordinate Debt issued in accordance with the terms and conditions of the Local Master Indenture.

Section 9.11 Litigation; Material Change. The Local Government shall promptly notify VRA of (i) the existence and status of any litigation that general counsel to the Local Government determines is not reasonably certain to have a favorable outcome and which individually or in the aggregate could have a material adverse effect on the financial condition or operations of the System or its ability to perform its payment and other obligations under this Agreement or the Local Bond or (ii) any change in any material fact or circumstance represented or warranted in this Agreement.

ARTICLE X DEFAULTS AND REMEDIES

Section 10.1 Events of Default. Each of the following events is an "Event of Default":

(a) The failure to pay any installment of principal of or premium, if any, on the Local Bond when due (whether at maturity, by mandatory or optional redemption, by acceleration or otherwise).

(b) The failure to pay any installment of interest (including Supplemental Interest) on the Local Bond when due.

(c) The failure to make any other payment or deposit required by this Agreement within 15 days after its due date.

(d) The Local Government's failure to perform or observe any of the other covenants, agreements or conditions of the Local Bond or this Agreement and the continuation of such failure for a period of 60 days after written notice specifying such failure and requesting that it be cured is given to the Local Government by VRA, or, in the case of any such failure which cannot with diligence be cured within such 60-day period, the Local Government's failure to proceed promptly to commence to cure the failure and thereafter to prosecute the curing of the failure with diligence.

(e) Any warranty, representation or other statement by or on behalf of the Local Government contained in this Agreement or in any instrument furnished in compliance with or in reference to this Agreement or in connection with the issuance and sale of the Local Bond is false and misleading in any material respect.

(f) Any bankruptcy, insolvency or other similar proceeding shall be instituted by or against the Local Government under any federal or state bankruptcy or insolvency law and, if instituted against the Local Government, is not dismissed within 60 days after filing.

(g) Any proceeding shall be instituted, with the Local Government's consent or acquiescence, for the purpose of effecting a composition between the Local Government and its creditors or for the purpose of adjusting such creditors' claims under any federal or state statute now or hereafter enacted, if such claims are under any circumstances payable from the Revenues.

(h) An order or decree shall be entered, with the Local Government's consent or acquiescence, appointing a receiver or receivers of the System or any part of it or of the Revenues, or if such order or decree, having been entered without the Local Government's consent or acquiescence, shall not be vacated or discharged or stayed on appeal within 60 days after its entry.

(i) The occurrence of an Event of Default under and as defined by the Local Master Indenture or under the terms of any Subordinate Debt, the Prior Bonds, Existing Parity Bonds or Parity Bonds and the failure to cure such default or obtain a waiver thereof within any period of time permitted thereunder.

Section 10.2 Intentionally Omitted.

Section 10.3 Other Remedies. Upon the occurrence and continuation of an Event of Default, and subject to Article XI of the Local Master Indenture, VRA may proceed to protect and enforce its rights by mandamus or other action, suit or proceeding at law or in equity for specific performance of any agreement contained in the Local Bond, this Agreement or the Local Master Indenture. No remedy conferred by this Agreement upon or reserved to the registered owners of the Local Bond is intended to be exclusive of any other remedy, but each such remedy shall be cumulative and shall be in addition to any other remedy given to VRA under this Agreement or the Local Master Indenture or now or hereafter existing at law or in equity or by statute.

Section 10.4 Delay and Waiver. No delay or omission to exercise any right or power accruing upon any default or Event of Default shall impair any such right or power or shall be construed to be a waiver of any such default or Event of Default or acquiescence in it, and every such right and power may be exercised from time to time and as often as may be deemed expedient. No waiver of any default or Event of Default under this Agreement shall extend to or shall affect any subsequent default or Event of Default or shall impair any rights or remedies consequent to it.

ARTICLE XI MISCELLANEOUS

Section 11.1 Intentionally Omitted.

Section 11.2 Successors and Assigns. This Agreement shall be binding upon, inure to the benefit of and be enforceable by the parties and their respective successors and assigns.

Section 11.3 Amendments. VRA and the Local Government shall have the right to amend from time to time any of this Agreement's terms and conditions, provided that all amendments shall be in writing and shall be signed by or on behalf of VRA and the Local Government.

Section 11.4 Limitation of Local Government's Liability. Notwithstanding anything in the Local Bond or this Agreement to the contrary, the Local Government's obligations hereunder and under the Local Bond are not its general obligations, but are limited obligations payable solely from the Revenues which are specifically pledged for such purpose. Neither the Local Bond nor this Agreement shall be deemed to create or constitute a debt or a pledge of the faith and credit of the Local Government and the Local Government shall not be obligated to pay the principal of or premium, if any, or interest on the Local Bond or other costs incident to them except from the Revenues and other funds pledged for such purpose. In the absence of fraud or intentional misconduct, no present or future director, official, officer, employee or agent of the Local Government shall be liable personally to VRA in respect of this Agreement or the Local Bond or for any other action taken by such individual pursuant to or in connection with the financing provided for in this Agreement or the Local Bond.

Section 11.5 Applicable Law. This Agreement shall be governed by Virginia law.

Section 11.6 Severability. If any clause, provision or section of this Agreement shall be held illegal or invalid by any court, the illegality or invalidity of such clause, provision or section shall not affect the remainder of this Agreement which shall be construed and enforced as if such illegal or invalid clause, provision or section had not been contained in this Agreement. If any agreement or obligation contained in this Agreement is held to be in violation of law, then such agreement or obligation shall be deemed to be the agreement or obligation of VRA and the Local Government, as the case may be, only to the extent permitted by law.

Section 11.7 Notices. Unless otherwise provided for herein, all demands, notices, approvals, consents, requests, opinions and other communications under the Local Bond or this Agreement shall be in writing and shall be deemed to have been given when delivered in person or mailed by first class registered or certified mail, postage prepaid, addressed (a) if to the Local

Government, at the address specified for notices on the signature page; (b) if to VRA, at 1111 East Main Street, Suite 1920, Richmond, Virginia 23219, Attention: Executive Director; or (c) if to the Trustee, at 1021 East Cary Street, 18th Floor, Richmond, Virginia 23219, Attention: Corporate Trust Department. A duplicate copy of each demand, notice, approval, consent, request, opinion or other communication given by any party named in this Section shall also be given to each of the other parties named. VRA, the Local Government and the Trustee may designate, by notice given hereunder, any further or different addresses to which subsequent demands, notices, approvals, consents, requests, opinions or other communications shall be sent or persons to whose attention the same shall be directed.

Section 11.8 Right to Cure Default. If the Local Government fails to make any payment or to perform any act required by it under the Local Bond or this Agreement, VRA or the Trustee, without prior notice to or demand upon the Local Government and without waiving or releasing any obligation or default, may (but shall be under no obligation to) make such payment or perform such act. All amounts so paid by VRA or the Trustee and all costs, fees and expenses so incurred shall be payable by the Local Government as an additional obligation under this Agreement, together with interest thereon at the rate of 15% per year until paid. The Local Government's obligation under this Section shall survive the payment of the Local Bond.

Section 11.9 Term of Agreement. This Agreement is effective as of the Effective Date. Except as otherwise specified, the Local Government's obligations under the Local Bond and this Agreement shall expire upon payment in full of the Local Bond and all other amounts payable by the Local Government under this Agreement.

Section 11.10 Counterparts. This Agreement may be executed in any number of counterparts, each of which shall be an original and all of which together shall constitute but one and the same instrument.

[Signature Pages Follow]

WITNESS the following signatures, all duly authorized.

VIRGINIA RESOURCES AUTHORITY

By: _____
Stephanie L. Hamlett, Executive Director

**RIVANNA WATER AND SEWER
AUTHORITY**

By: _____

Name: Maurice Jones

Title: Vice-Chair

Address for Notices:

695 Moores Creek Lane
Charlottesville, Virginia 22902
Attention: Executive Director

[Signature Page of Local Bond Sale and Financing Agreement –
Rivanna Water and Sewer Authority]

The Trustee, by the execution hereof, accepts the duties imposed on it by this Agreement.

U.S. BANK NATIONAL ASSOCIATION, as
Trustee

By: _____
Patricia A. Welling, Vice President

EXHIBIT A

FORM OF LOCAL BOND

[To be provided by Local Government]

EXHIBIT B

DESCRIPTION OF THE PROJECT

The acquisition, construction and equipping of capital improvements to the System, including, without limitation, (a) improvements to (i) the Observatory Water Treatment Plant, (ii) the Avon to Pantops Water Main and (iii) the South Rivanna Water Treatment Plant, (b) modification of the Beaver Creek Dam, (c) painting the Buck's Elbow Ground Storage Tank and the Crozet Waterball Tank, (d) installation of an active mixing system at the Buck's Elbow Ground Storage Tank, (e) expansion of the Crozet Water Treatment Plant, (f) construction of the Crozet Water Treatment Plant Finished Water Pump Station, (g) development of a Drinking Water Infrastructure Plan for the Crozet service area, (h) repairing manholes and pipelines that flow to the Crozet Interceptor, (i) construction of a Flow Equalization Tank for the Crozet service area, (j) roof replacements for the Moores Creek Advanced Water Resource Recovery Facility and (k) installation of a raw water pipeline in Birdwood, together with related issuance expenses and certain capitalized interest on the Local Bond.

EXHIBIT C

**PENDING OR THREATENED ACTIONS, SUITS, PROCEEDINGS, OR
INVESTIGATIONS**

[To be provided by the Local Government]

EXHIBIT D
FORM OF REQUISITION

Requisition No.

Date: _____, 2018

U.S. Bank National Association, as Trustee
Attention: Corporate Trust Department
1021 East Cary Street
18th Floor
Richmond, Virginia 23219

Virginia Resources Authority
1111 East Main Street
Suite 1920
Richmond, Virginia 23219
Attention: Executive Director

This Requisition, including Schedule 1 and Schedule 2 hereto, is submitted in connection with the Local Bond Sale and Financing Agreement dated as of September 21, 2018 (the "Financing Agreement") between the Virginia Resources Authority and the Rivanna Water and Sewer Authority (the "Local Government"). Unless otherwise defined in this Requisition, each capitalized term used herein has the meaning given it under Article I of the Financing Agreement. The undersigned Local Representative hereby requests payment of the following amounts from the Local Account established for the Local Government in the 2018C Acquisition Fund established under the Forty-Third Supplemental Series Indenture.

Payee (including wiring instructions if receiving electronic payment):

Address:

Amount to be paid:

Purpose (in reasonable detail) for which obligations(s) to be paid were incurred:

Attached on Schedule 2 are the wire instructions for this requisition, and also attached hereto is an invoice (or invoices) relating to the items for which payment is requested.

The undersigned certifies that (i) the amounts requested by this Requisition will be applied in accordance with the Local Tax Document and solely and exclusively to the payment, or the reimbursement of the Local Government for its payment, of Project Costs of the construction portion of the Project, (ii) no notice of any lien, right to lien or attachment upon, or claim affecting the right to receive payment of, any of the money payable under this Requisition to any of the persons, firms or corporations named in it has been received, or if any notice of any such lien, attachment or claim has been received, such lien, attachment or claim has been released or discharged or will be released or discharged upon payment of the Requisition, and (iii) this Requisition contains no items representing payment on account of any retained percentage entitled to be retained at this date.

If this Requisition includes payments for labor or to contractors, builders or materialmen, the attached Certificate of Consulting Engineer must be completed. If this Requisition includes payments for any lands or easements, rights or interest in or relating to lands, the attached Certificate of the Consulting Engineer must be completed and there must be attached to this Requisition a certificate signed by a Local Representative stating that upon payment therefor the Local Government will have title in fee simple to, or easements, rights or interests sufficient for the purposes of the construction portion of the Project over or through such lands..

The Local Government has agreed in the Financing Agreement that any amounts it receives pursuant to this Requisition will be (i) immediately applied to reimburse the Local Government for Project Costs it has already paid or (ii) actually spent to pay Project Costs not later than five banking days after receipt.

Local Representative

SCHEDULE 1

Form to Accompany Requisition

Requisition # _____
Recipient: Rivanna Water and Sewer Authority – VRA 2018C
Local Representative: _____
Title: _____
Date: _____

<u>Cost Category</u>	<u>Total Project Cost</u>	<u>Previous Disbursements</u>	<u>Disbursement This Period</u>	<u>Disbursements to Date</u>	<u>Remaining Balance</u>
	\$	\$	\$	\$	\$
TOTALS	\$	\$	\$	\$	\$

SCHEDULE 2

Wire Instructions for Requisition

[To be provided by the Local Government]

CERTIFICATE OF CONSULTING ENGINEER

The undersigned Consulting Engineer for the Local Government hereby certifies that (i) insofar as the amounts covered by this Requisition include payments for labor or to contractors, builders or materialmen, such work was actually performed or such materials, supplies or equipment were actually furnished or installed in or about the Project, and (ii) insofar as the amounts covered by the Requisition include payments for land or easements, rights or interests in or relating to lands, such lands, easements, rights or interests are being acquired and are necessary or convenient for the construction portion of the Project.

Date: _____, 20__

Consulting Engineer

EXHIBIT E
OPERATING DATA

Description of Local Government. A description of the Local Government including a summary description of the System.

Debt. A description of the terms of the Local Government's outstanding debt including a historical summary of outstanding debt and a summary of annual debt service on outstanding debt as of the end of the preceding fiscal year. The annual disclosure should also include (to the extent not shown in the latest audited financial statements) a description of contingent obligations as well as pension plans administered by the Local Government and any unfunded pension liabilities.

Financial Information and Operating Data. Financial information for the System as of the end of the preceding fiscal year, including a description of revenues and expenditures, largest users, a summary of rates, fees and other charges of the System, and a historical summary of debt service coverage.

EXHIBIT F

FORM OF OPINION OF COUNSEL TO THE LOCAL GOVERNMENT

[Print on the Letterhead of Counsel for the Local Government]

November 14, 2018

Rivanna Water and Sewer Authority
Charlottesville, Virginia

The Bank of New York Mellon Trust
Company, N.A., as Trustee
Pittsburgh, Pennsylvania

Hunton Andrews Kurth LLP
Richmond, Virginia

Virginia Resources Authority
Richmond, Virginia

**Rivanna Water and Sewer Authority
Regional Water and Sewer System Revenue Bond
Series 2018C**

Ladies and Gentlemen:

We have served as general counsel to Rivanna Water and Sewer Authority (the “Authority”) in connection with the issuance and sale by the Authority of its \$[_____] Regional Water and Sewer System Revenue Bond, Series 2018C (the “Bond”).

As counsel to the Authority, we have examined, among other things, the following:

(a) The Virginia Water and Waste Authorities Act, Chapter 51, Title 15.2, Code of Virginia of 1950, as amended (the “Act”).

(b) The Authority’s Articles of Incorporation and By-Laws.

(c) Resolutions adopted by the Board of Directors of the Authority authorizing the execution of a Service Agreement between the Authority, the City of Charlottesville, Albemarle County Service Authority and the Board of County Supervisors of Albemarle County, acting for and on behalf of Albemarle County, dated as of June 12, 1973, as amended by Amendment No. 1 to Service Agreement dated October 27, 2015 and supplemented by (i) Joint Resolution adopted in January, 1983 (as such resolution was clarified by Resolution of the Albemarle County Service Authority dated March 17, 1983, and by Resolution of the Charlottesville City Council dated May 2, 1983, and modified by Joint Resolution adopted in December, 1983); (ii) Working Agreement on Urban Area Wholesale Flow Allocation and Billing Methodology dated January 24, 1983; (iii) Agreement dated October 26, 1987; (iv) Agreement dated June 29, 1990; (v) Memorandum dated December 15, 1993; (vi) Agreement dated December 1, 2003; (vii) Ragged Mountain Dam Project Agreement dated as of January 1, 2012; (viii) Water Cost Allocation

Agreement dated as of January 1, 2012; and (ix) Wastewater Projects Cost Allocation Agreement dated April 22, 2014 (as so amended and supplemented, the “Service Agreement”).

(d) A resolution adopted by the Board of Directors of the Authority on [____], 2018 (the “Resolution”), authorizing, among other things, the execution and delivery of:

(i) a Thirtieth Supplemental Agreement of Trust dated as of October [___], 2018 (the “Thirtieth Supplemental Agreement”), between the Authority and The Bank of New York Mellon Trust Company, N.A., New York, New York, as successor trustee (the “Trustee”), providing for the security and form of the Bond as an additional bond pursuant to an Agreement of Trust between the Authority and the Trustee dated as of October 1, 1979, as previously supplemented and amended (together with the Thirtieth Supplemental Agreement, the “Trust Agreement”), to provide funds to be used, together with other available funds, to finance the acquisition, construction and equipping of improvements to the Authority’s regional water and sewer system (the “System”); and

(ii) a Local Bond Sale and Financing Agreement dated as of September 21, 2018 (the “Financing Agreement”), between the Authority and the Virginia Resources Authority.

(e) Executed counterparts of the Financing Agreement, the Service Agreement and the Trust Agreement.

As to questions of fact material to this opinion, we have relied upon representations of the Authority contained in the Trust Agreement and the Financing Agreement, certifications of public officials furnished to us, and certifications and representations contained in certificates of the Authority and others delivered at the closing. We have assumed that all signatures on documents, certificates, and instruments examined by us are genuine, all documents, certificates, and instruments submitted to us as originals are authentic, and all documents, certificates, and instruments submitted to us as copies conform to the originals. In addition, we have assumed that all documents, certificates, and instruments relating to this financing have been duly authorized, executed, and delivered by all parties other than the Authority, and we have further assumed the due organization, existence, and powers of such other parties.

Whenever the phrase “to the best of our knowledge” is used herein, it refers to the actual knowledge of the attorneys of this firm involved in the representation of the Authority for the purposes of this transaction.

Based on the foregoing and such other information and documents as we consider necessary for rendering this opinion, we are of the opinion that:

1. The Authority was created pursuant to the Act, is validly existing and in good standing under the Act, and pursuant to the Act, has all necessary power and authority to (a) operate the System, (b) fix, charge and collect rates, fees and other charges for the use of the System, and (c) enter into and perform its obligations under the Financing Agreement, the Service Agreement and the Trust Agreement and to issue and sell the Bond. To the best of our

knowledge, the Authority has not instituted any dissolution proceedings pursuant to Section 15.2-5109 of the Act.

2 The Financing Agreement, the Service Agreement and the Trust Agreement have been duly authorized, executed and delivered by the Authority, and assuming their due authorization, execution and delivery by the other parties to them, are in full force and effect and constitute valid and legally binding limited obligations of the Authority, enforceable against the Authority in accordance with their terms.

3. The Bond has been duly authorized, executed and delivered by the Authority.

4. The enforceability of the obligations of the Authority with respect to the documents described above is subject to the provisions of bankruptcy, insolvency, reorganization, moratorium and similar laws, now or hereafter in effect, relating to or affecting the enforcement of creditors' rights generally. The enforceability of the obligations is also subject to usual equitable principles which may limit the specific enforcement of certain remedies.

5. The authorization, execution and delivery of the Bond, the Financing Agreement, the Service Agreement and the Trust Agreement and compliance with their provisions are within the powers of the Authority under the Act and do not and will not conflict with or constitute a violation of, breach of or default under (a) the Articles of Incorporation or By-Laws of the Authority, (b) any federal or Virginia constitutional provision or any other provision of Virginia law, including, but not limited to, the Act, or, (c) to the best of our knowledge (i) any agreement or other instrument to which the Authority is a party or by which the Authority is bound, or (ii) any order, rule or regulation of any court or governmental agency or body having jurisdiction over the Authority or any of its properties.

6. There is no litigation at law or in equity or any proceeding before any governmental agency pending or, to the best of our knowledge, threatened (a) with respect to (i) the organization or existence of the Authority, (ii) its authority to execute and deliver the Bond, the Financing Agreement, the Service Agreement or the Trust Agreement, (iii) the validity or enforceability of any of such instruments or the transactions contemplated by them, (iv) the title of the officers who executed such instruments, (v) any authority or proceedings relating to the execution and delivery of any of such instruments by the Authority, (vi) the ability of the Authority to fix, charge and collect charges under the Act and as provided in the Financing Agreement, the Service Agreement and the Trust Agreement, or (vii) the ability of the Authority to undertake the Project (as defined in the Financing Agreement) or (b), except as disclosed in Section 2.2(k) of the Financing Agreement, in which a judgment, order or resolution would reasonably be expected to have a material adverse effect on the Authority or its business, assets, condition (financial or otherwise), operations or prospects or its ability to perform its obligations under the Financing Agreement, the Trust Agreement or the Bond.

7. To the best of our knowledge, there have been obtained all consents, approvals, authorizations and orders of governmental or regulatory authorities, if any, which are required to

be obtained by the Authority as conditions precedent to the execution and delivery of the Financing Agreement, the Service Agreement and the Trust Agreement.

Very truly yours,

EXHIBIT G

FORM OF CERTIFICATION AS TO NO DEFAULT AND TAX COMPLIANCE

[DATE]

[Insert Name]

Compliance & Financial Analyst
Virginia Resources Authority
1111 East Main Street, Suite 1920
Richmond, VA 23219

Dear [Mr./Ms.] _____:

In accordance with Section 9.4 of the Local Bond Sale and Financing Agreement dated as of September 21, 2018 (the "Financing Agreement") between Virginia Resources Authority and the Rivanna Water and Sewer Authority (the "Local Government"), I hereby certify that, during the fiscal year that ended June 30, _____, and through the date of this letter:

1. [No event or condition has happened or existed, or is happening or existing, which constitutes, or which, with notice or lapse of time, or both, would constitute, an Event of Default as defined in Section 10.1 of the Financing Agreement.] [If an Event of Default has occurred, please specify the nature and period of such Event of Default and what action the Local Government has taken, is taking or proposes to take to rectify it].
2. [The ownership and status of all or a portion of the Related Financed Property has not changed since the Closing Date.] [If untrue, please describe.]
3. [Neither the Related Financed Property nor any portion thereof is being used by a Nongovernmental Person pursuant to a lease, an incentive payment contract or a take-or-pay or other output-type contract.] [If untrue, please describe.]
4. [Neither the Related Financed Property nor any portion or function thereof is being used pursuant to or is otherwise subject to a Service Contract that does not satisfy the requirements of Revenue Procedure 2017-13.] [If untrue, please describe.]
5. [Other than as may be described in paragraphs 2, 3 and 4 above, neither the Related Financed Property nor any portion or function thereof nor any portion of the Proceeds is being used for a Private Business Use.] [If untrue, please describe.]
6. [The Local Government has not used or permitted the use of any Proceeds of the Local Bond directly or indirectly to make a loan to an ultimate borrower other than itself within the meaning of Section 4.3 of the Local Tax Document.] [If untrue, please describe.]

7. [Other than any amounts described in the Local Tax Document (as defined in the Financing Agreement), between VRA and the Local Government and amounts that may constitute or be on deposit in a Bona Fide Debt Service Fund, there neither have been nor are now any monies, securities, obligations, annuity contracts, residential rental property, AMT Bonds, investment-type property, Sinking Funds, Pledged Funds, or other Replacement Proceeds accumulated or held or pledged as security by the Local Government or any other Substantial Beneficiary of the Local Bond as security for or the direct or indirect source of the payment of the principal of or interest on the Local Bond.] [If untrue, please describe.]
8. [The Local Government is in compliance with the recordkeeping requirements of Section 4.9 of the Local Tax Document.] [If untrue, please describe.]
9. [Other than as may be described above, the Local Government is not in default of any of its obligations under the Local Tax Document.] [If untrue, please describe.]
10. Unless otherwise defined herein, each capitalized term used herein has the meaning set forth in the Local Tax Document.

Sincerely,

[Insert Name]
Local Representative

EXHIBIT H
DESCRIPTION OF SPECIAL USE ARRANGEMENTS

[To be provided by Local Government]

EXHIBIT I
FORM OF ANNUAL BUDGET

[DATE]

Compliance and Financial Analyst
Virginia Resources Authority
1111 East Main Street, Suite 1920
Richmond, VA 23219

Ladies and Gentlemen:

Pursuant to the Financing Agreement[s] between Virginia Resources Authority and the Rivanna Water and Sewer Authority, dated as of [add dates of all outstanding Financing Agreements], a copy of the fiscal year [20xx] annual budget is enclosed. Such annual budget provides for the satisfaction of the rate covenant as demonstrated below.

Revenues	Operation & Maintenance Expenses	Net Revenues Available for Debt Service (Revenues – O&M Expenses)	Debt Service	*Coverage (Net Revenues Available for Debt Service/Debt Service)
-----------------	---	---	---------------------	---

Unless otherwise defined herein, the capitalized terms used in this Certificate shall have the meanings set forth in the Financing Agreement.

Very truly yours,

By: _____

Its: _____

EXHIBIT J

EXISTING PARITY BONDS

[To be provided by Local Government]

SCHEDULE 1.1

ADDITIONAL CONDITIONS PRECEDENT TO PURCHASE OF LOCAL BOND:

[To be provided]

**ADDITIONAL CONDITIONS PRECEDENT TO FIRST REQUISITION OF PROCEEDS
OF LOCAL BOND:**

[To be provided]

PROJECT BUDGET

INTEREST RATES AND PAYMENT SCHEDULE FOR LOCAL BOND