RIVANNA
WATER & SEWER AUTHORITY

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

A regular meeting of the Rivanna Water & Sewer Authority (RWSA) Board of Directors was held on Tuesday, April 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. Mark Brownlee, Ms. Victoria Fort, Mr. Tom Freeman, Ms. Bethany Houchens, Mr. Bill Mawyer, Ms. Katie McIlwee, Mr. Philip McKalips, Mr. Bill Morris, Mr. David Rhodes, Mr. Scott Schiller, Ms. Michelle Simpson, Ms. Andrea Terry, Mr. David Tungate, Ms. Jennifer Whitaker, and Mr. Lonnie Wood.

Also Present: Mr. Kurt Krueger, RWSA counsel.

1. CALL TO ORDER

Mr. Gaffney called the regular meeting of the Board of Directors of the Rivanna Water and Sewer Authority at 2:26 p.m.

2. MINUTES OF PREVIOUS BOARD MEETINGS

a. Minutes of Regular Board Meeting on March 27, 2018

Ms. Galvin moved to approve the minutes of March 27, 2018. Mr. Richardson seconded the motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the vote.

3. RECOGNITION

Government Finance Officers Association's Certificate of Achievement for Excellence in Financial Reporting awarded to the RWSA for its 2017 comprehensive annual financial report (CAFR)- Resolution of Appreciation

The Board considered the following resolution of appreciation to commendthe Authority's Finance Department and its Director of Finance and Administration, Lonnie Wood, as read into the record. Dr. Palmer moved to adopt the resolution as presented. Mr. Richardson seconded the motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the vote.

WHEREAS, March 23, 2018, the Certificate of Achievement for Excellence in Financial Reporting has been awarded to Rivanna Water & Sewer Authority by the Government of Finance Officers Association of the United States and Canada (GFOA) for its comprehensive annual financial report (CAFR).

WHEREAS, the Certificate of Achievement is the highest form of recognition in the area of governmental accounting and financial reporting, and its attainment represents a significant accomplishment by a government and its management.

WHEREAS, the Award of Financial Reporting Achievement has been awarded to the Finance Department and Lonnie Wood, Director of Finance and Administration for preparing the award-winning CAFR.

WHEREAS, the CAFR has been judged by an impartial panel to meet the high standards of the program, which includes demonstrating a constructive "spirit of full disclosure" to clearly communicate its financial story and motivate potential users and user groups to read the CAFR.

NOW, THEREFORE, BE IT RESOLVED, the Rivanna Water & Sewer Authority Board of Directors recognizes and commends the Finance Department and Lonnie Wood for their professional dedication and personal diligence, and orders that this Resolution of Appreciation be entered upon the permanent minutes of the Rivanna Water & Sewer Authority.

4. EXECUTIVE DIRECTOR'S REPORT

Mr. Mawyer reported that the RWSA has as one of its strategic plan goals "workforce development" and was pleased to announce that David Tungate had been selected as Director of Operations for the Rivanna Water and Sewer Authority. Mr. Mawyer stated that in this position, Mr. Tungate would manage the water, wastewater, and laboratory departments. Mr. Mawyer noted that Mr. Tungate had been the Water Manager for the past six years, managing all five water treatment plants.

Mr. Mawyer reported that the RWSA also had a "communications and collaboration" strategic plan goal, and Ms. McIlwee had developed a new page on the website that talked about resources in the community. He stated that Rivanna had provided a number of presentations and tours of the wastewater and water facilities for groups including Piedmont Virginia Community College and the UVA sustainability class, and had also given a presentation to Greene County High School students. Mr. Mawyer stated that Western Albemarle High School had an environmental studies program, and students had visited Moores Creek for a wastewater tour and would be visiting the Crozet Water Treatment Plant for a tour.

Mr. Mawyer stated that Rivanna would be celebrating completion of the granular activated carbon project during National Drinking Water Week May 6-12, and a press release had been issued earlier in the day. He noted that they would celebrate on May 8 at 10 a.m. at the South Rivanna Water Treatment Plant; on May 9 at 10 a.m. at the Crozet Water Treatment Plant; and on May 16 at the Scottsville Water Treatment Plant. He noted that the RWSA had also extended invitations to the RWSA Board, elected officials, the media, and the general public. He stated that on May 17 at 12 p.m. at Riverview Park in the City of Charlottesville, they would celebrate completion of the odor control project.

Mr. Mawyer reported that under water supply, which is a strategic plan "operational optimization" goal, four of five reservoirs were full – with Ragged Mountain at about 95% full – and rain was currently falling. He stated that they had been filling Ragged Mountain from Sugar Hollow since January 22 and it was still not full. Mr. Mawyer referenced state drought conditions maps that showed Central Virginia still being in a moderate drought, with precipitation in the top left of the map in a watch stage – which was worse than it was in March. He stated that groundwater levels were now in watch stage, improving from the previous month's warning stage. Mr. Mawyer stated that reservoir levels as well as stream flow were both at a good stage.

Mr. Mawyer reported that he, Mr. Gaffney, and Rivanna staff had met with the UVA Foundation in March to continue coordination efforts on the South Fork Rivanna to Ragged Mountain Reservoir pipeline and the approximate one-mile crossing on Birdwood Golf Course. Mr. Mawyer noted that UVA was planning an upgrade and rebuild of the golf course, and Rivanna was coordinating with their staff to ensure the pipe could be installed before UVA's work. He noted that there was an engineering services authorization to be considered later in the consent agenda to allow Rivanna to proceed with the final design work.

Mr. Mawyer reported that Rivanna had mailed approximately 140 letters to property owners along the route of the South Fork Rivanna to Ragged Mountain Water Line on the path where the pipe will likely be located, and this was approved in the FY18 CIP. Mr. Mawyer stated that staff had prepared a one-page summary that was included in the Board packets, as several Board members had suggested that they have the document as a summary of the history, details, and benefits of the project. He noted that they also included a map with pipeline location possibilities.

Ms. Whitaker repeated that staff had recently sent approximately 140 letters to landowners in the pipeline path, reaching out to 200 tax map parcel numbers. She stated that as of the beginning of April, Rivanna had received acknowledgement from 90 property owners – with permission to survey granted from 45 of them. She commented that there was a lot of interest among the landowners, and there was a process in-house to answer their questions and provide information. Ms. Whitaker stated that one frequently asked questions was, "Where is the route?" She stated that this conversation led staff to create the map, which included many pages.

Ms. Whitaker explained that the proposed route ran from the South Rivanna Reservoir to West Rio Road turning in to Hydraulic Road – and on the other end of the project, they had to get to the Ragged Mountain Reservoir, with a route along Reservoir Road through the Birdwood Golf

Course. She stated that the middle area was the heart of the route selection alternatives, and this was the area that was yielding the most calls, as people there were very interested in what was going to happen. She referenced the area near the South Rivanna Reservoir along Woodburn Road, stating that Rivanna hoped to be either in the road or parallel to it, and she referenced another map reflecting the area from Woodburn Road out to Rio Road West. Ms. Whitaker noted on the map the circles representing individual property owners who each received a letter.

Ms. Whitaker stated that for Rio Road and Hydraulic Road, Rivanna had been coordinating with VDOT and has determined that they can likely be in the road right of way through the corridor – which was a very positive development.

Mr. Richardson asked what was meant by being in the road, and whether that meant the road right of way.

Ms. Whitaker confirmed that it could be either the right of way or the road itself.

Mr. Richardson asked what would drive that, and if VDOT would make that determination.

Ms. Whitaker responded that it would be VDOT and the ability to do traffic control, as well as what real estate was available. She noted that in some roads, there may be two or three utilities already there, and in some locations such as Rio Road and Hydraulic Road, there was already a bike lane present that could be utilized – which would help with traffic control. Ms. Whitaker stated that VDOT has the right of way and was working with Rivanna to help find a way through.

Ms. Whitaker referenced a map showing the area around Albemarle High School, where the routing alternatives analysis became more complex. She explained that at this point, they had the opportunity to go north or to keep traveling further to the south and proceed through the Georgetown Road, Terrell Road, Montview subdivision, Colthurst subdivision corridor.

Dr. Palmer asked why the pipeline switched sides on Rio Road, which looked like Hydraulic Road crossing over to go to the east side.

Ms. Whitaker explained that she did not know the answer offhand, but Rivanna's consultants had been working with VDOT, looking at utility mapping and where there may be opportunities and possibilities – as well as doing some survey work where there was the ability to do it from the right of way. She stated that there may be a conflicting utility or a desire on VDOT's part to move it to the other side, and indicated that she would find out more information for the Board.

Ms. Whitaker referenced Georgetown Green and stated that one alternative was to go up Lambs Road and go behind the Albemarle High School complex property; one alternative was to come further south and weave between the baseball field and Georgetown Green; another alternative was to come down and catch Georgetown Road, with a number of options to weave further west and ultimately ending up at Barracks Road. She noted that there was also an alternative to come down Westminster Road through Canterbury Hills, and another alternative weaving its way around the Colonnades property. She stated that the UVA Foundation owned several of the

properties in this vicinity, and Rivanna had been discussing those properties, the University's designs and further plans, and how Rivanna might be able to work with them.

Mr. Richardson asked how those conversations were going, as it made sense to knock out as much as possible with one property owner in terms of linear feat – and this seemed to be the best use of time and the least amount of disruption.

Ms. Whitaker responded that Rivanna staff was in discussions with UVA Foundation, and the immediate focus was Birdwood. She stated that as part of that conversation, Rivanna extended the topics and provided UVA Foundation with maps so they could contemplate what did and did not fit into their plans.

Mr. Mawyer commented that Rivanna would like to take the path of least resistance, with large tracts owned by fewer owners – particularly government owners, the School Board, UVA, or the UVA Foundation – being more attractive places to go than the middle of the street or someone's private property.

Mr. O'Connell noted that these were all choices and alternatives, but ultimately there would be a single route, and the map provided by Rivanna gives the impression that it would be everywhere.

Ms. Galvin agreed that it was important for the public to understand that the map represented multiple options at once.

Ms. Whitaker responded that it didn't show in the mapping very well, but the idea was to provide a single route from the South Rivanna Reservoir to the Ragged Mountain Reservoir – a single pipeline, three feet in diameter, nine miles long, buried at a minimum of four feet deep to the top of the pipe, meaning a total depth of seven to eight feet when considering the pipe depth. She emphasized that the idea was to achieve a single route through the entire corridor, and based on the conversation to date there were some fairly obvious route choices to the north and south – but the questions come with the middle ground.

Mr. O'Connell pointed out that the map shows 12-15 options and they needed to get to 1.

Ms. Whitaker confirmed this.

Mr. O'Connell asked how much of the west end as shown was University property, noting the piece from Ragged Mountain and the pathway across the golf course?

Ms. Whitaker explained that Birdwood was bordered by Foxhaven Farm, which was at a turn point as shown, and the area used for dam construction was just south of the line and was also Foundation property. She stated that the Foundation owned a good chunk of property along Reservoir Road, and as they proceeded north of Ivy Road, the Foundation owned about four or five parcels near St. Anne's Belfield. Ms. Whitaker stated that the immediate conversation was about the golf course, but future discussions would entail siting work for the southern pump station and how the pipeline would get through. She added that UVA Foundation seemed to be a very willing partner to date.

Dr. Palmer asked if it would be helpful to the public if something in the header of the map document stated "alternative routes" or some language to clarify that these were just options.

Ms. Whitaker agreed, stating that the legend references alternative routes.

Ms. Galvin commented that even the dashed lines blur together, and the text says, "alternative route," singular, not plural, would be helpful.

Ms. Whitaker mentioned that the maps were available in detail on the website and there was also a good description of the whole project, but she would modify the maps to make the information clearer for the public.

Mr. O'Connell asked if the map that went to property owners was just a single page, black and white view.

Mr. Mawyer responded that it was in color.

Ms. Whitaker noted that it was just one line, adding that the maps were intended to help people understand how their properties related to the alignment – with some fairly significant discussions underway with those property owners, particularly around Georgetown Road.

Mr. O'Connell stated that some of those properties were on the original Route 29 Western Bypass route, but he was not clear where they were.

Ms. Whitaker clarified that there was just one parcel, and it was actually a VDOT parcel.

Dr. Palmer commented that those people were under the shadow of the Western Bypass for 37 years and their property values were destroyed.

Ms. Whitaker emphasized that this was an underground pipeline, and the surface impacts would be limited to no permanent construction, with easements intended to be kept open from a vegetative standpoint. She stated that someone had asked her why the map looked so jagged and why the roads weren't followed exclusively, and she explained that they wanted to follow the property boundaries to minimize impacts on the individual property owners and residual use.

Dr. Palmer asked if there was something in writing to indicate what could be grown on those easements.

Ms. Whitaker responded that they did have a right-of-way policy, and it permitted shrubs as well as small trees only on the outer edges of the easements, with tree growth discouraged for the inner 10 feet on top of the pipeline. She noted that they tried to use species that were less likely to send deep roots towards the pipeline.

Mr. O'Connell asked if two easements were being pursued – one during construction and one permanent – and asked what the widths were.

Ms. Whitaker responded that they were generally planning to use a 40-foot-wide permanent easement, and depending on the geometry of the lot and what was adjacent nearby, there would be an additional 10 feet on each side.

Dr. Palmer commented that since they widened Rio Road, there were some houses within 60 feet of the road and probably closer.

Ms. Whitaker stated that Rivanna's conversations with VDOT have focused on minimizing those impacts.

Mr. Mawyer explained that the letters sent to landowners asked for permission to come on the property and do surveying but did not ask them to sell. He stated that they may need a permit or construction easement if the property was partially in VDOT right of way and partially on private property. He mentioned that Georgetown was a logical location but was a narrow road, with traffic conflicts likely in that location in the event of major pipe construction.

5. ITEMS FROM THE PUBLIC

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

Mr. John Martin of Free Union stated that he had been regularly attending meetings of the Economic Development Authority over the last several years. Mr. Martin stated that the previous week's EDA meeting included Roger Johnson, the new economic development director for Albemarle County, and that meeting included discussion of a June business appreciation function and the associated guest list. Mr. Martin suggested that it would be useful to EDA Board members and the public to have a joint meeting of both Rivanna boards to discuss water and solid waste in one conversation with EDA Board members. He stated that this should include discussions of the capacity of the system, the status of the water supply system, and the status of solid waste management.

Ms. Galvin commented that there was also a Charlottesville Economic Development Authority and other advisory groups.

Mr. Martin stated that he envisioned this to be an informational meeting to help avoid future misconceptions and misunderstandings and to connect people with water and solid waste contacts.

Mr. Ed Guida of Shepherd's Ridge Road addressed the Board and stated that he was a recent County resident and customer of RWSA. Mr. Guida stated that he was an engineer and former project manager for a large corporation, noting that he was present to give a dissenting opinion on the waterline for Ragged Mountain. He stated that this was a very complex project, and from what he has been able to glean, he was not convinced that it was necessary to spend $100 million now on the project. Mr. Guida commented that he was skeptical of the timing of this expense and from the information he has read, he was not certain that all the assumptions that have gone into this were correct. He suggested that Rivanna have an independent expert tear apart the

assumptions underlying the need for the project at this time, which would help determine if all the plans were appropriate.

City resident Dede Smith addressed the Board and stated that she would appreciate a discussion of the role of the South Fork Rivanna Reservoir now that Ragged Mountain is functioning, and how much of urban ratepayer funds would be invested in a reservoir that may no longer be needed. Ms. Smith stated that she would also like them to contemplate any plans or discussions of what would ultimately happen to the South Fork Reservoir, as it would continue to deteriorate. She stated that there was acknowledgement in the Board's reports that the treatment of it actually contributed to its degradation, and it currently served as the raw water source for the South Fork Treatment Plant, so its deteriorating condition was relevant as opposed to a free-flowing river. Ms. Smith emphasized that it was important from a governmental point of view to provide transparency about any conflicts of interest pertaining to ownership of land in and around the reservoir.

6. RESPONSES TO PUBLIC COMMENTS

Mr. Mawyer stated that Mr. Martin had spoken with him prior to the meeting, and Rivanna would be glad to participate in the meetings as suggested.

Ms. Galvin commented that the challenge of making long-range plans involving infrastructure investments was that they had to be considered many years in advance and based on projections of growth, as well as projections of future debt service payments. She stated that elected officials terms were cyclical and ended every four years – but projects sometimes went beyond those terms – so to make any progress in infrastructure investment, there needed to be continuity in planning. Ms. Galvin stated that when commitments were made to begin executing plans, they should be adhered to. She stated that she was concerned about the debt service picture nationally, given recent changes in the tax structure, and the idea of postponing capital investments until later was problematic to her as it could entail higher debt service costs. Ms. Galvin emphasized that they currently have a plan that had been fully researched for years and discussed in the public arena, and they needed to consider that it would only get more expensive to build infrastructure.

Dr. Palmer stated that expecting a completion date in 2035 was certainly not rushing into a project, and a lot could certainly happen between now and then.

7. CONSENT AGENDA

a. Staff Report on Finance

b. Staff Report on Ongoing Projects

c. Staff Report on Operations

d. Engineering Services – South Rivanna Reservoir To Ragged Mountain Reservoir Water Line Right-Of-Way – Birdwood Golf Course Water Main

Mr. O'Connell moved to approve the Consent Agenda as presented. Mr. Richardson seconded the motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the vote.

Mr. O'Connell asked staff if in future months, they could address in their financials the monthly report on the wastewater deficit, as they were getting close to the end of the fiscal year.

8. OTHER BUSINESS

a. Strategic Plan Implementation – Katie McIlwee, Communication Manager, Executive Coordinator and Goal Team Leader

Joint Session with Rivanna Solid Waste Authority - the RSWA reconvened its meeting at 3:02 p.m.

Ms. McIlwee reported that in January, Raftelis Consultants brought the goal teams together for implementation workshops, and she provided the Board with a reminder of the goal teams and their leaders. She explained that at the workshops, each goal team reviewed the strategies and identified the two highest priorities, then developed tactics on how to implement those strategies. Ms. McIlwee noted that considerations were the impact of the strategy, the timing, the sequencing, the ease of implementation, and realization that this was just the first year in a five-year strategic plan.

Ms. McIlwee reported that from six goals and 21 total strategies, they developed 78 tactics. She explained that to achieve success, they needed to prioritize doable, short-term tactics that could be built upon and celebrated in the first year as successful. She stated that they also needed to develop structured reporting and accountability for the tactics, foster organizational involvement, and sustain organizational commitment in order to succeed with the goals. Ms. McIlwee referenced the top 12 strategies developed by the goal teams, realizing that there were 21 total, with the focus on those with the highest priorities throughout the first year.

Ms. McIlwee stated that the workforce development team established a strategy to "develop a comprehensive staffing, classification, and compensation plan," and "conduct a training needs assessment and enhance the training program." She explained that some of their tactics were to implement approved pay-grade schedules, develop a master staffing plan, complete a compensation study (which has been completed), and continue an annual review of staffing needs. Ms. McIlwee stated that the group wants to develop a 12-month training calendar, partner with PVCC to develop a leadership training program, and enhance employee development plans. She noted that for all of these tactics, the group has tactic leaders to track the process.

Ms. McIlwee reported that as an example of operational optimization, the group established a strategy to "continually evaluate, prioritize, and improve key businesses and operational processes" and "protect our workforce and the public through continually growing a culture of safety." She mentioned that they had developed tactics to achieve those strategies. Ms. McIlwee stated that communications and collaboration established a strategy to "create and maintain internal communication platforms" and "create and implement a comprehensive public outreach plan."

Ms. McIlwee reported that the next steps were to begin active implementation and most goal teams had already gotten underway, with a more formalized process now being used. She stated that with Raftelis' help, they would establish a digital strategy model that would help track numbers and progress percentages, with a quarterly progress update to be provided to the Board on each tactic.

Dr. Palmer asked what "increase internal environmental engagement" meant.

Ms. Terry explained that they felt because they had so many departments and so many different pieces of environmental stewardship underway, they needed to start internally and ensure that every employee knew what other employees did – and how each department impacted the environment. She stated that in their goal group meeting, they determined that not everyone knew what was happening in other departments, so they felt they needed to educate staff internally.

Dr. Palmer asked if anyone at Rivanna was already coordinating with staff at the County level on the local climate action program that was being expanded.

Ms. Terry asked what staff of the County in particular was working on that.

Mr. Henry stated that it was him and Andy Lowe.

Ms. Terry stated that she coordinated with David Hannah and John Murphy frequently but would be glad to participate in that as well.

Ms. Galvin asked if that was in partnership with the City.

Dr. Palmer stated that it was.

Mr. Henry asked if the goal was to achieve most of these tactics over the next 12 months.

Ms. Terry responded that the tactics initially developed were 12 to 18-month tactics.

Mr. Henry asked if the consultant would help provide a tracking system for how that was measured.

Ms. McIlwee confirmed that they would, stating that they had a program that allowed them to measure how far a tactic was completed, then calculating it into the overall strategy.

Mr. Henry commented that he would be interested in seeing the tracking system. He stated that the Board of Supervisors had many strategic initiatives that were being tracked and he was interested in seeing how the Raftelis consultant was doing this.

Ms. Galvin noted that she was not certain when the City would receive its next strategic plan update, but she would be interested in this information as well.

Mr. Mawyer mentioned that Rivanna would be providing a quarterly updates to the Board of Supervisors and City Council.

Mr. Henry asked if staff could provide the tactics for all strategy areas, particularly the main categories.

Ms. McIlwee stated that she would send them out.

Mr. O'Connell asked if the plan was to revisit the tactics after 12 to 18 months and reset some of them.

Mr. Maywer clarified that this was the first year of a five-year plan, and they would revisit and possibly change items accordingly.

Mr. O'Connell asked if they envisioned any of these as being over the five-year period.

Ms. McIlwee responded that because all the teams were just starting, she wasn't sure if that had been realized – but the teams would continue to meet throughout the five years and may get into one of the tactics and realize it was much more far reaching than originally planned. She stated that this was a continuing, evolving process, so some of the tactics may drop off and others may be added. Ms. McIlwee noted that there was more work to do with the strategies, and there was a lot of crossover among goal teams.

Mr. Gaffney asked when the RWSA and RSWA boards would receive their next updates.

Mr. Mawyer replied that the updates would be given quarterly, with the next update to the Board being in August, and he anticipated written reports in addition to staff's presentations.

The Rivanna Solid Waste Authority Board adjourned its meeting at 3:18 p.m.

a. Presentation of Phase 2 - RWSA Reservoir Water Quality Management Study – Andrea Terry, Water Resources Manager and Kelly Dinatale, DiNatale Water Consultants

Ms. Terry reported that Rivanna had issued a request for proposals in 2014 for reservoir management services, with the goals of getting advice and direction on how they should be monitoring reservoirs for raw water quality inside the reservoirs, learning more about them with whatever sampling program was implemented, and considering other alternatives to treating reservoirs for algae blooms other than using chemical application.

She explained that Rivanna hired DiNatale Water Consultants, which did a Phase 1 study that was completed in 2016. She stated that at that time, the RWSA Board requested a more user-friendly public document that talked about each of the reservoirs. Ms. Terry noted that this was a very helpful document because it showed that each reservoir had its own unique characteristics. Ms. Terry reported that after Phase 1, the consultant was able to determine that there was sediment and nutrients coming in – as well as some internal loading – and some additional

studies were needed. She stated that Kelly DiNatale was present at the meeting and would discuss the results of the Phase 2 study.

Mr. Kelly DiNatale addressed the Board and stated that it was important for them to understand how the reservoirs worked as a foundation for understanding the recommended management methods. He explained that Rivanna had five reservoirs that all behaved differently but did have some common characteristics. Mr. DiNatale stated that in springtime, nutrients were coming in from streams and groundwater, and as the water comes in it is warmed by sunlight, with nutrients feeding algae growth, and the natural cycle meant that algae would die, sink, and decompose. He explained that in summertime the algae growth continued as the water started getting warmer, the top water started warming up but the bottom stayed cold, causing a thermocline – a temperature barrier that prevented the transfer of oxygen from the surface down to the bottom.

Mr. DiNatale stated there was algae growth continuing, thermocline setting up, and algae decomposition happening that consumed oxygen. He noted that if there was no oxygen in the bottom of the reservoirs, nutrients were also released out of the bottom sediments, which was part of the natural eutrophication cycle. Mr. DiNatale stated that there was no oxygen in the colder water, so fish were forced to come up to warmer, shallower waters. He stated that nutrients were still coming in during the fall, but when the top water became cooler than the bottom water, it sank and caused a mixing. Mr. DiNatale stated that the water during the summertime released nutrients such as iron, manganese, nitrogen, and phosphorous, and that water came up to the surface, leading to algae blooms in the fall and nutrients available for the next spring growth cycle.

Mr. DiNatale presented a photo showing Rivanna staff, stating that the staff had been incredible to work with – and their performing the work saved well over $300,000, doing sampling as well as laboratory analysis. He referenced a piece of equipment shown in the photo, an instrument known as a Kemmerer Tube, stating that it could be dropped down at various water levels and noting that the stopper allowed them to physically bring up water from other depths. Mr. DiNatale stated that a sonde allowed them to measure temperature, dissolved oxygen, nutrients and chlorophyll A, and these were valuable tools now located on Rivanna's sampling boat.

Mr. DiNatale reported that they detected a lot of nutrients in Beaver Creek and wanted to determine whether they were coming from internal or external sources. He stated that they knew a lot were coming externally and wanted to pinpoint them within the watershed. Mr. DiNatale noted that there were some horse properties and orchards in the area, and they wanted to implement best management practices where possible. He stated that they divided the watershed up into 10 sub-basins, and Rivanna staff took samples at both high and low flow times, then analyzed them to determine where the nutrients were coming from. Mr. DiNatale stated that their findings were that nutrients were coming from everywhere in the watershed, and they would need to take a lot of nitrogen out of the creeks – whether raining or dry flow – and take out a lot of phosphorous in the creeks during storms and a little bit in dry weather. He noted that they had a lot of nutrients coming from this watershed, and watershed loadings were difficult to deal with.

Mr. DiNatale stated that they also looked at Totier Creek and studied its watershed soils, as well as visiting the watershed in some of the basins and taking soil samples. He noted that the hatched

areas shown were known as group D soils, which were very prone to erosion during high flows and were very rich in clay. He noted that storms eroded the clay, and once it washed into the creek, the creek ran clear a few days later. Mr. DiNatale stated that clay was made up of very fine particles and once it flowed into the reservoir, it remained suspended there. Mr. DiNatale stated that Totier Creek was turbid because of the clay, which was not a water quality hazard, and he presented a picture of some of the soils in the watershed.

Dr. Palmer asked how the presence of clay affected fish and aquatic life.

Mr. DiNatale responded that it did not really affect fish except for cold-water fish such as trout, which are not found in Totier Creek. He stated that one side benefit of clay was that it limited light penetration, which meant algae may not grow quite as deep, but it was a water treatment challenge. Mr. DiNatale commented that Rivanna had good water treatment and done a very good job of treating water at Totier Creek.

Dr. Palmer asked if water was being taken out of the Totier Creek rather than the reservoir.

Mr. DiNatale responded that they were, adding that the creek cleared up very quickly – so they preferred the creek but also ensured that they could treat water taken from the reservoir. He added that the reservoir was a backup in the event of an extreme drought with the creek not having any flow.

Dr. Palmer asked if the clay was the biggest issue.

Mr. DiNatale responded that there were issues of algae and potential taste and odor issues, and the entire region and state were very nutrient rich. He presented a picture of a slope with some erosion, noting that even with muddy banks, the creek can run fairly clear. Mr. DiNatale noted that post-storm, the reservoir remained muddy with lots of clay suspended, and that took a while to settle out.

Mr. DiNatale reported that they had surveyed some other utilities to determine how they managed their reservoirs, looking at five reservoirs in Virginia and a few out of state. He stated that they surveyed the City of Norfolk, Fairfax, Newport News, Culpeper, and western Virginia, as well as Denver, CO water, the City of Thornton, and American Water – and all were experiencing similar water quality challenges. Mr. DiNatale stated that his team asked what management methods were in use or planned, and out of eight utilities, seven were using algecide – but they were using this as a backup now instead of the primary method.

Mr. DiNatale stated that several were using hypo-limnetic aeration oxygenation, a method that introduced oxygen below the thermocline without breaking the thermal barrier; or aeration destratification mixing, which tried to mix the entire reservoir and was generally used with shallower reservoirs. He noted that one utility used phosphorous inactivation, accomplished by applying alum, the same chemical used in water treatment plants – which bonds phosphorous in sediments and prevents them from coming out. Mr. DiNatale stated that in terms of performance evaluation the utility's rated, algecides had a rating from 10 to 1, with an average of 5. He stated

that hypo-limnetic aeration oxygenation was rated 7 to 9 consistently; aeration destratification mixing received a slightly lower average rating.

Mr. DiNatale reported that Rivanna had current challenges with its reservoirs that were not unique and were typical of the majority of utilities throughout the country. He stated that blue-green algae blooms stimulated by excessive nutrients could cause taste and odor issues; some blue-green algae can produce toxins that cause animal and human health problems, but Rivanna was effective in its management such that there have only been a few minor detections in raw water supply and never anything in the treated water supply. He stated that they had anoxic bottom waters and nutrients in iron and manganese releases. Mr. DiNatale noted that excessive algae could lead to filter clogging, but Rivanna was doing a good job at managing that so it was not a problem at the moment.

Mr. DiNatale stated that there could be impacts to recreation and fisheries, and algae could affect shoreline and on-lake recreation, with low-dissolved oxygen occurring when algae died, possibly leading to fish kills. He stated Rivanna had experienced one year with about $95,000 annual costs, with the past several years averaging $70,000. He noted that there has been some concern among scientists and utilities that a buildup over time could make algae resistant to copper and so it could accumulate in reservoir sediments.

Mr. DiNatale reported that his team's recommendations for an adaptive management approach would be to first try to improve the internal health of the reservoirs, evaluate the feasibility of watershed loads, and try to reduce reliance on algecide treatments as a primary management method – as it could disrupt the natural food chain, did impact the ability of zooplankton grazers to help control algae. He presented a graphic of the cycle of algae, zooplankton – which eat algae, small fish that eat the zooplankton, and larger fish that eat the smaller fish. Mr. DiNatale emphasized that algecide disrupts that natural cycle and should be used as a last resort.

Mr. DiNatale presented a schematic of Beaver Creek Reservoir, stating that the way it was currently functioning meant that if it was full, there was a surface overflow – and you cannot separate out the water going to the water treatment plant from the surface overflow. He stated that if algae was growing in the top waters, it could not be prevented from going to the water treatment plant, posing a challenge to plant operators. Mr. DiNatale stated that his team's recommendations for Beaver Creek were to install a new outlet structure that would allow water plant operators to select the highest quality water, install a hypo-limnetic oxygenation system to introduce oxygen to the bottom areas, and continue investigating measures to reduce nutrients to the inflows – acknowledging that there is no "smoking gun" up in the watershed. He noted that their focus was to adjust nutrients entering at the inlet channels to the reservoir, and to look at potentially enhanced wetlands, which would be a significant challenge.

Dr. Palmer asked if they were able to determine the quantity of elements causing the problems, as the County was soon to implement its new storm water program and considering measures in the rural areas – such as dealing with septic systems.

Mr. DiNatale responded that he did have some specific considerations in that regard, such as targeting phosphorous reductions at Beaver Creek and determining where they were coming

from during dry flow. He noted this would likely reflect differently between septic systems versus storm flows that washed nutrients from pasture land.

Dr. Palmer noted that the County was considering small watershed restoration, and it would be interesting for staff to know where those areas were.

Mr. DiNatale presented an image of Beaver Creek looking down at the reservoir, noting the Watts Creek and Beaver Creek streams and the location of Crozet's watershed. He stated that future intake considered was on the south bank of Beaver Creek Reservoir and they were considering an oxygen diffuser line in the reservoir, evaluating potential wetlands treatment at the two streams coming in. Mr. DiNatale commented that they were recommending doing a feasibility study for that, as there could be challenges in terms of private land, very high flows during storms, access, etc. He presented a picture of a hypo-limnetic oxygen diffuser system, stating that it was floating out and then sinking a diffuser line from the shoreline– either generating oxygen or having it trucked in, with an estimated cost for Beaver Creek of about $1 million installed.

Mr. O'Connell asked it functioned as a big blower pushing oxygen.

Mr. DiNatale responded that it was not like an air compressor, so the system bringing it in was much smaller because pure oxygen was being used and they were not having to compress air. He stated that operating costs were significantly less than if they were using a conventional aeration system.

Dr. Palmer asked how that affected recreation.

Mr. DiNatale responded that it would not affect it at all and would help the fisheries, and hopefully it would reduce surface blooms. He stated that for Beaver Creek, it would allow the water treatment plant to divert higher quality, colder, algae-free water from below the thermocline to the water treatment plant. Mr. DiNatale added that there would just be a few small bubbles along the diffuser line, stating that the tube was filled with water and sunk down, and the system could be floated up to the surface if air were blown into it. He noted that four of the utilities surveyed were using this system.

Mr. DiNatale reported that in terms of South Fork Rivanna, the strategy was to first put in the Beaver Creek system and see how it worked, looking at operational issues, costs, and other issues – as well as benefits. He stated that they would also investigate treating inflows with enhanced wetlands, with high stream flows in the South Fork sometimes completely replacing the entire volume of the reservoir in a matter of days. He stated that they were considering a possible oxygen diffuser line, and the oxygen would travel upstream if the system was turned on early enough. Mr. DiNatale added that they would also look at treating wetlands in the area where sediment had built up.

Mr. DiNatale stated that even though Ragged Mountain had been enlarged, the hypolimnion was going anoxic and was anoxic every year, so they were recommending putting in a hypo-limnetic system – but it wouldn't have to be done right away. He stated that there wasn't much that could

be done cost effectively at Totier currently, given the extent of the clay soils within the watershed, so he would recommend continued current operations with the direct creek withdrawal, using the reservoir as a backup but maintaining the ability to treat the high turbidity water with the treatment plant.

Mr. DiNatale acknowledged Rivanna staff for their work.

b. Hybrid GAC System Review – Bill Mawyer, Executive Director and Dave Tungate, Director of Operations

Mr. Mawyer provided an overview of how the granular activated carbon system worked, stating that there is a GAC facility at each of the five water treatment plants. There are eight contactors at the Rivanna WTP, collectively holding about 320K pounds of GAC material. He stated that they can treat about eight million gallons per day going through Rivanna, two million gallons per day at Observatory, one million at North Rivanna, a quarter-million at Scottsville, and one million at Crozet.

Dr. Palmer asked if they would expand those at Observatory as they expanded the water treatment plant there.

Mr. Mawyer responded that there currently was not a plan to expand, but they could make room. He stated that they would need to discuss it further.

Mr. Mawyer provided the history of the GAC system, noting that it had been selected and approved by a four-party agreement in 2012; and the Rivanna Board approved a GAC hybrid design when offered a choice of 100% of water getting treated all of the time versus a hybrid where most of the water got treated but not necessarily all of it. He stated that the Board approved the hybrid design in 2013 and began construction in 2015, to be completed this month at a cost of $24 million for the three urban water treatment plants and $29 million overall.

Mr. Tungate reported that they first began discussing use of GAC in May of 2012, and now they would be using the equipment to implement the system. He explained that they completed a performance-based analysis of various granular-activated carbon products, going to various vendors and requesting ideas for what they think would work best. Mr. Tungate stated that Rivanna did a third-party analysis and chose two vendors out of that process, with their products being dramatically better than what others offered.

Mr. Tungate stated that Rivanna would balance the water treatment plan production to use 100% of water through the GAC vessels in the urban plants, and would monitor how the carbon reacted and how it was exhausted, balancing it with their replacement plan – which was an evolving process. He stated that they were still using a powder-activated carbon product at all water treatment plants to make the water cleaner as it went into the GAC contactors, to extend the life of the GAC in the contactors.

Mr. O'Connell asked if the strategy was different in the two rural plants – Scottsville and Crozet.

Mr. Tungate responded that it was not, stating that they would treat 100% of the water there with GAC.

Ms. Hildebrand asked how long the GAC lasted and if it varied among the different plants.

Mr. Tungate responded that it would vary and they would know more once they had more field conditions experience.

Mr. O'Connell recalled during their original considerations that the GAC would need to be replaced after six to eight months.

Mr. Mawyer confirmed this, stating that they had chosen a laboratory test to help choose a product that would be most effective and now would get real life experience in Rivanna's contactors and monitor how well they react. He stated that GAC acted as a filter and they would see how long it took to get dirty, then replace it. Mr. Mawyer stated that as long as they were treating less than 8 million gallons at South Rivanna, 2 million at Observatory, and 1 million at North Rivanna, it would be 100% GAC treated water in the Urban System. He noted that it was a day-to-day matter that would go into the operational strategy for water supply, with the goal of saving as much water at Ragged Mountain as possible by using South Rivanna – but they would need to balance that with the desire to use GAC as much as possible, given the 8 million threshold. Mr. Mawyer added that they would come back with recommendations as to when GAC should be replaced and how it should be balanced with the three urban facilities, as well as whether they should increase the scope of Observatory improvements to add GAC.

Mr. Gaffney asked for clarification as to why GAC didn't need to be used as much as Observatory.

Mr. Tungate explained that when they chose two contactors at Observatory, it was more reflective of the production they were putting through Observatory at the time.

Mr. Mawyer stated that if South Rivanna had more turbidity, they may want to use Observatory Plant more to reduce treatment costs – but that would mean using more water out of Ragged and having to balance it with GAC use.

Dr. Palmer commented that there was likely plenty of room at Crozet to add another tank and increase that level to 2 MGD.

Mr. Mawyer responded that it would likely be later, noting that the current plans did not have another GAC vessel included and stating that a capacity of 1 MGD with average daily use of 400 - 500,000 gallons made it likely that they would only exceed capacity on peak days. He stated that they were also evaluating whether organic levels and disinfection byproducts were being created throughout the system, and Rivanna would make treatment adjustments as needed.

Ms. Galvin commented that it was hard to believe that GAC was just a policy decision six years ago, and she asked whether the cost estimates had changed a lot over that time.

Ms. Whitaker explained that the recession had an impact on materials prices, and Rivanna bid the project at an advantageous time.

Dr. Palmer stated that Rivanna had bid the project at $18 million and was criticized at the time for over-estimating it.

Ms. Galvin stated that it was an historic moment with all four bodies in agreement, and she applauded the community for advocating for a less chemical approach.

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*

Dr. Palmer moved to adjourn the meeting. Ms. Galvin seconded the motion, which passed unanimously (6-0). Mr. Jones was absent from the meeting and the vote.

The RWSA Board adjourned the meeting at 3:54 p.m.

Respectfully submitted,

Mr. Jeff Richardson
Secretary-Treasurer