



State of Rhode Island and Providence Plantations
Water Resources Board
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MINUTES OF BOARD MEETING # 445

December 13, 2005

Members Present:

Daniel W. Varin, Chairman
William Penn, V. Chairman
Robert Griffith
Frank Perry
William Stamp, III
June Swallow
Alicia Good*
William Parsons
Timothy Brown

Staff Present:

Juan Mariscal
Kathleen Crawley
Brian Riggs
Beverly O'Keefe
Rob Christina
William Rivero
Elaine Maguire
Tracy Shields

Members Absent:

Jon Schock

*Member designee

Guests:

Pasquale DeLise, BCWA
Anne Veeger, Ph.D

1. CALL TO ORDER

With a quorum present, Chairman Varin called the meeting to order at 12:09 PM.

2. APPROVAL OF MINUTES:

Mr. Perry moved approval of the minutes of the November meeting with a second by Mr. Brown. The motion carried unanimously.

3. CHIEF BUSINESS OFFICER'S REPORT

Mr. Penn moved approval of the Chief Business Officer's Report. Mr. Brown seconded and the Board unanimously approved the Chief Business Officer's Report dated November 2005.

4. CHAIRMAN'S REMARKS

Chairman Varin noted that there are a couple of good books in paperback format and he explained one was on ground water (Water Follies) and the other is on surface water (Cadillac Desert). He added that they are both good reads although they present some worrisome details.

5. GENERAL MANAGER'S REPORT

Mr. Mariscal reported that as always there is a lot going on at the Board and the staff has been very active.

Mr. Mariscal explained that he and Mr. Rivero had been presenting checks to some of the communities for which the Board had approved funding of their projects. He noted meetings with Stone Bridge Fire District, North Kingstown Town Council and the Westerly Town Council. All were very pleased to see the Board staff arrive with checks.

Mr. Mariscal noted that the priorities paper that was developed in September was discussed at the Strategic Committee last week. Mr. Mariscal also made presentations at the Environmental Council of RI, to the Nature Conservancy and also last week to the RI Water Works Association. He noted his belief that all are interested in getting these priorities moving forward and there is some alternative thinking on what some of the priorities are.

He noted that staff has made comments and contributions to the update of the Land Use Plan 2025. He added that many of our comments will be incorporated to establish a linkage between water usage and land development for the first time.

As always, Big River is an active area. We have had all the materials removed which were deposited by Richmond Sand and Gravel. We are still working with DEM on some outstanding issues of having the Warwick composting material analyzed. He noted he has been in contact with Warwick officials and they are cooperating and providing information to us.

Mr. Mariscal continued that he and Elaine Maguire met with Amgen and discussed their water needs, some of their projects, had a tour of their facilities and discussed how their former parking area was going to be replanted in the Springtime with proper materials.

Mr. Mariscal also met with Mr. Nicholas Cambio to discuss his issues. Mr. Mariscal added that there would be a meeting with DiPrete Engineering later this week to discuss the Arlington Trailer project that will be located at the corner of Division Road and New London Turnpike.

He continued that he has been working with the RI Rivers Council on some proposed legislation regarding funding for the Rivers Council. He noted that Mr. Christina has been working with the Council on their website, supporting their website. One thing that Mr. Mariscal has discussed with them because they are this “associated function” of the Water Resources Board is that in the future the director Ms. Kerr will be presenting to the Board, so this Board can more fully understand what this “associated function” is.

Mr. Mariscal explained that he and Mr. Riverso had also toured South County looking at all the prospective ground water well sites. He continued that they had met with Kingston Water as well as the Richmond Water Department to talk about their issues and concerns. He continued that as outlined in some of the Board actions, we would be going forward to the State Properties Committee with reference to some of the sites in South County.

Mr. Mariscal explained that he was working with the Bay Coordination Team on some of their activities. He noted a positive result of this effort being the restoration of funding for the stream gages which has been a high priority for the Bay Coordination Team as well.

In the later part of January, the 25th, he explained that the Board would be called before the legislative commission that is looking at the operations of the Kent County Water Authority. He continued that the members would be asking for our views on some of the water issues. Mr. Mariscal stated that one of the best things he expects to come out of that committee will be a greater understanding of water issues throughout the state.

Mr. Mariscal noted that Mr. Riverso has completed his water rates survey, and sent the summary table back to the water suppliers to have them verify before we publish it. We will be meeting later this week with the Health Department, DEM, and some folks from URI to begin discussions about the water systems supply management plans and how they are done and changes that might be needed and making some modifications to some on-going projects.

Mr. Penn asked whether or not the Board had a final determination as to what the Board’s responsibilities were with respect to the Board’s affiliation with the Rivers Council. Mr. Mariscal explained that we did not. Mr. Penn continued that this should be clarified since the statute stated that the Board had “oversight,” and he wanted to know exactly what that meant. Mr. Mariscal explained that in his discussions with Ms. Kerr about the Rivers Council, he noted that as he gives a monthly report to the Board members regarding staff activities, he advised Ms. Kerr that it would be of value to the Board members to receive a report regarding the Rivers Council as this is now an “associated function” of the Board. Mr. Mariscal continued that the legislation is purposefully vague and the Rivers Council has no solid form of financial support. He explained that this was one issue which needed to be addressed and that he would be meeting with Representative Norton tomorrow or Thursday.

Chairman Varin explained that at the time the legislation was passed he and Ms. Crawley had met with Mr. Kenneth Payne who had authored the legislation to ask what “associated function” meant, and he was unable to offer a definition. Mr. Stamp asked if it was left for the Board to determine and the Chairman explained that he did not believe so.

Mr. Mariscal elaborated that one thing the Rivers Council has that this Board does not have is a direct relationship to the watershed councils that exist. It has a grass-roots connection in the communities, so the Rivers Council could possibly assist us in making the public aware of some of the programs that we are trying to develop and implement. Mr. Stamp clarified that this would provide open channels of communications for the Board.

Mr. Penn noted his concern was whether or not the Board had a fiduciary responsibility of financial oversight for this organization. Chairman Varin explained that this was one of the specific questions that Mr. Payne either would not or could not answer. Mr. Stamp wanted to know if the Rivers Council went into financial debt would this Board be responsible. Mr. Penn explained no, but as the members did with the Board, there would be a requirement to review the expenditures of the Rivers Council to ensure that the monies are being spent appropriately. Mr. Penn was quick to add that he was sure monies were being spent appropriately. But if this Board does have a fiduciary responsibility, it would require such financial reviews.

Mr. Mariscal added that this had been a concern of his as well—even if there were no “real” responsibility, there could be a “perceived” responsibility, which then becomes real. The Rivers Council is concerned about this as well, and they, too, want this clarified in the legislation.

6. COMMITTEE REPORTS AND ACTION ITEMS RESULTING

A. Public Drinking Water Protection Committee—Chair Robert Griffith

(1) Groundwater Protection/Acquisition Program:

(a) Conceptual Approval of Site Development Rights Acquisitions. Request for Approval

Mr. Griffith explained that this was a request for conceptual approval for site development rights and/or acquisition of two well sites. He referred the members to enclosure 3, which contained descriptions of the sites as well as a map and an aerial photograph. The current owners of the sites approached Mr. Henry Myer (Manager, Kingston Water) and Ms. Lisa Primiano (Appraiser, DEM) regarding potential sale of the property. They in turn notified staff. Granting conceptual approval does not obligate the Board to purchase the properties; it simply approves proceeding with the appraisal, survey, title search, and other due diligence, so the Board may—if it chooses—proceed with negotiations. Mr. Griffith moved approval with a second from Ms. Swallow.

Ms. Good wanted to make certain that the Board was aware that the Chipuxet is potentially already stressed. She acknowledged the benefits of moving forward with obtaining the development rights for the future. However, she wanted everyone to be aware that this was a difficult area to place a new supply system.

Mr. Stamp asked if South Kingstown had not mentioned that there would be a replacement effort in the future if need be. Ms. Good acknowledged that this was her understanding for all of these sites—they would be supplemental or replacement. Regardless, that area seems stressed.

Mr. Griffith noted that staff did recognize that and further he reiterated that this does not obligate us to purchase nor to develop at this time. Ms. Good noted that was the reason she was not objecting—just making certain all the members were aware of the issues.

Mr. Penn commented that the Board had several million dollars of unissued general obligation bonds at the state level for this acquisition program. He expressed concern about public perception of this agency and encouraged the Board to move forward on this acquisition and any others as quickly as possible so the \$2 or \$3 million that is currently available will be spent.

Mr. Mariscal explained that there had been a similar discussion in the Finance Committee meeting, and noted that the Board would receive a complete update at the January meeting of the status of properties under discussion. He added that at staff level discussions, it was recognized we should move forward on these acquisitions.

Ms. Crawley added that one of the areas that would be modeled and where extensive scenarios would be run was in this area and that both of these well sites are part of those optimization scenarios. So there will be better information about how the wells interact.

This motion carried unanimously.

(2) Water Allocation Program:

a) Jamestown Water Use and Availability Study. Request for Acceptance

Mr. Griffith explained that as the General Manager had previously mentioned, Dr. Anne Veeger was here to present a summary of her work on this project. Mr. Griffith added that a draft of her report had been distributed to relevant agencies for comment and the recommendation of the subcommittee to the Board was to accept the report and incorporate it ultimately into the water use and availability study at the state level.

Dr. Veeger explained that she wanted to give the Board an overview of the investigation which was done on water use and availability on Jamestown. The work was done at the University of Rhode Island with two graduate students, Stacy O'Brien and Kristen Ware. She explained that the objective of this study was the same as for other water use availability studies—to quantify water withdrawals within the Jamestown area, quantify for use by category (in other words, how much are we taking out, where are we getting it from, what are we using it for, and where is it going), and then to review what is the water availability and compare that to how much is being used—to determine if we have a stressed condition or what the situation is.

Sources of data for the Jamestown Study include: the Jamestown Water Company and also the wastewater treatment facility, US Bureau of Census population data, RI Economic Development Council on various types of commercial activities, RI Department of Environmental Management information on RIPDES and also information on agricultural activities in the area.

What has been happening over time on Jamestown (Census data from 1990 and 2000) population has increased by about 12 percent; number of housing units has increased by about 10 percent; occupied housing units has increased by 19 percent, and most striking is that seasonal housing units have decreased by almost 20 percent. There is a real shift in demographics on Jamestown. Whereas before it had a significant percentage of seasonal homes that demographic use is really disappearing and it is becoming a year-round community with more and more people in the homes. So the total population is increasing, but also the year-round population is increasing.

The island is served by public water supply that is derived predominantly from the North Reservoir and is supplemented by a ground water well JR-1 which is located just off the southeastern corner of North Reservoir. This was as of 2001, at present, they have another pond South Pond or South Reservoir that has very high concentrations of tannins in the water, and in its current quality, it is not treatable. They have been piping it up to North Reservoir, into the reservoir where it mixes and gets it to a treatable concentration. So, they have been augmenting their supply, but as for the data we are using for this study that is not part of this investigation.

The horizontal hatch pattern shows the distribution of the public water supply district. In other words, residents in those areas are eligible to hook up, but it does not mean all those who are eligible are connected. The sewer district is much smaller and is predominantly the high density area surrounding downtown and the older communities.

Dr. Veeger pointed out regarding this data that while most of the other water studies that have been conducted span a 5-year interval, this one only spans a 1-year interval. Not because we did not want to do a 5-year study, but because Jamestown switched over its computerized data system at the end of 2000 and somehow all data prior to 2000 was lost. So, this is the first complete data set that is available.

Water supply distribution: essentially they take water from both a ground water source and a surface water source. Dr. Veeger noted that most of the Board would be familiar with mgd figures, and noted that these would be very small numbers for Jamestown, so these figures referred to million gallons **per year**.

There is an almost even split between ground water and surface water. Ground water gets used both for public supply and for self-supply. Surface water just goes into the public supply, so the total use on the island is a little over 150 mgy—almost 80 mg of it supplied by the Jamestown Water Company, and about 72 mg withdrawn through private wells.

Seasonal distribution of public supply withdrawals: the Jamestown Water Company records its pumping and extractions from the reservoir on a monthly basis and reports those to the Water Resources Board. As you can see, it's a relatively even distribution with the exception of the expected peak in the summer months and that is when they start tapping into their ground water supply. So, JR-1 gets pumped at a rate of approximately 50 gpm (gallons per minute) and at present, gets pumped right into the supply line that leads to the water treatment plant and gets treated along with the surface water supply. There is a definite seasonal increase. They have also had some problems in certain years meeting their water demand just on the island and have had to import water from North Kingstown. This was not the case on 2001, but historically it has happened.

Self-supply withdrawal estimation: Dr. Veeger explained that this is always a big question—how to figure out how much water people who have their own wells are using. There are 2 approaches that can be used: if you have some sort of metering in place—what happens on Jamestown is that some of the people who have private supply wells are connected to the sewer system. In order to get them to pay for the sewer use, their well has been metered by the wastewater treatment folks even though it's a private well. So we have data for some domestic self-supply use. There's one single commercial user who is self-supplied and is hooked into the wastewater treatment facility and also has a metered well. The balance of that is done with water use coefficients. The US Geological Survey through a series of investigations has established average water use coefficients and a methodology. For example, for domestic use we would multiply an average per capita water use times the number of people being served and come up with the total use. There is definitely an error bar on this estimate but it is the best that we can do at this time.

For agriculture: On Jamestown, there really isn't irrigation predominant uses—just livestock and there are per head of whatever the livestock happens to be water use coefficients that can be used. Agriculture is a very, very small component of total water use on the island.

Mr. Perry asked if any comparison was made between the coefficients for domestic and the metered. Dr. Veeger explained that she would get to this and that they actually are different. What you use actually ends up being a big question because as you'll see it does make a difference.

Dr. Veeger explained that the domestic coefficients that were used here for the self supply estimation was 65 gallons per person per day and that is the value the USGS came up with for southern RI self supply users.

Dr. Veeger continued that in terms of total withdrawals then by quarter, public supply, self supply and then total withdrawals, you can see that self supply also has a seasonal pattern, but the interesting thing is that it is not the same as the public supply one. This is a bit of a mystery. We are not sure why that comes out that way. Some of it has to do with metering of the wastewater. For example, homes that are not occupied year-round, have a different kind of a wastewater account, where they only get charged once per year instead of getting charged once per quarter. So that shifts that use out of the quarter in which it is actually happening, but overall it really is not a very significant difference. But, you do see a rather large spike in the public supply in the third quarter, which corresponds to the summer. So there is the total annual use of 152 mgy.

Where is the water getting used? Here is the public supply and here is the self-supply that we talked about and the categories of use that we evaluated on the island were domestic use (in other words, use in the home), commercial use, public use (that would be things like schools, the public parks that are available on the island), agricultural use (which is livestock use) and then unaccounted for use. Unaccounted for use is the difference between the reported withdrawals reported by the water supply company and the metered

billings. In other words, they say we withdrew almost 80 mgy, but we only billed for about 60 mgy. So there is 20 mgy that the water treatment plant is pulling in but is not billing anybody for—nobody is paying for it.

Dr. Veeger explained that this was one thing the water studies have done—really allowed water companies to assess and we will see it's even worse at the wastewater end of things—to assess what is the reason for that unaccounted for use. Some of it's processing depending on the type of processing they have to do—filtered backwashing uses up water that then goes out to waste.

Just to see what this looks like overall—this big yellow slice of the pie is domestic use; it's over 80 percent of the total use on the island. Commercial use is much smaller—only 4 percent; public use and livestock use are about 1 percent and unaccounted for use is 13 percent. This is important to keep in mind when you are thinking about water conservation strategies. Many times people will point a finger at commercial or agricultural entities and on Jamestown several years ago was an example where they said they were not going to give water anymore at the restaurants, and were not going to allow the nurseries to keep their plants watered in the garden centers. In fact if you want to get significant conservation, obviously, the slice of the pie to focus on is the domestic slice since it is the largest user.

Here is the distribution by source: Here is public supply in blue and self-supply (ground water withdrawals) in red and as you will note self supply very, very strongly is skewed toward domestic which is expected and a little bit for agriculture, but commercial use/public use is strictly public supply and the unaccounted for use is a calculation on the public supply total, so we just don't have an equivalent to measure.

Regarding per capita use: We do know how much water is delivered to residential customers on the island because the water company keeps track of the categories of account. So we know how many domestic accounts there are on the island, and we can look at those and see how many are active in any given quarter. The problem is how many people live in those houses. When you are dealing with a very large area, it evens out. So using the census number (which is what this is 2.25 people per house) works just fine. In a small population that can, however, introduce a significant error. So, what we have done is calculated it for the 4 quarters and you see we are anywhere from a 41 to a 56—we are talking about a 25 percent difference in the per capita water use. All of which is significantly lower than the 65 that the USGS determined for some of the larger watershed studies still in comparable areas of southern RI with comparable demographics. So, exactly what is the number? I'll leave you to think about that, but somewhere between 50 and 65 gallons per day per person is a reasonable estimate.

Seasonal variations: We looked at this before, but here we have it split apart by use and the most interesting thing here is not only does the domestic use spike significantly during the 3rd quarter, but also this unaccounted for use has a big spike in the 2nd and going into the 3rd quarter and then virtually disappears in the 4th quarter. That is some information that the water company can use to backtrack how are their operations different during those different quarters that would result in those losses to unaccounted for use

Where does it go? Here are the total withdrawals 152 mgy; unaccounted for use 20 mgy, so we don't know what happens with that because we don't know what it was used for. So, of this total withdrawal the rest of it goes to 1 of 3 places: it either goes to consumptive use, which is defined by the US Geological Survey ultimately as lost to the atmosphere; in other words, it ends up being lost from the waste stream. An example would be, if you water your lawn, the assumption is that all of that is going to evaporate into the atmosphere. Some of it goes to the wastewater treatment facility; some of it goes to ground water return flow. Wastewater treatment facility—we do have metered data. The problem is that the waste water treatment facility assumes 100 percent of the water which goes into a home or a business comes back out. Therefore, we have adjusted the wastewater treatment facility number down to account for consumptive use. Ground water return flow then is a mathematical subtraction. We know how much water was used, we know how much water went to the wastewater treatment plant, we've estimated how much gets

consumed, the balance of it must have gone into ISDS systems. Then the wastewater treatment plant discharges its waste into a discharge into the Bay, but also recycles about 10 mg to the Jamestown Golf Course—that is a summertime use which reduces the flow into the Bay.

What we will come back to again, though, is if you do a little quick math and you say this is a 141 mg then you start to say the math isn't working out too well here. We've identified over 100 mg of infiltration into the wastewater stream that cannot be accounted for by discharges from homes and businesses, which is a real problem.

How does consumptive use work? There are coefficients which define what percentage of the water that is being used for a given purpose gets lost to consumptive use. In a household, the assumption is that 15 percent of it gets lost, 85 percent of it goes back into the waste stream. Commercial and public use, somewhat lower, 10 percent; livestock use is assumed to be 100 percent lost to the atmosphere. This gives the 20 mg ultimately lost to the atmosphere.

Here is the water treatment plant data. These are adjusted for consumptive use. We took the metered data, we subtracted off that portion which is lost to consumptive use and here is what is left. The vast majority of it is coming from domestic connections which is to be expected; a smaller percentage for commercial and public use; and nothing coming from livestock. This gives us an adjusted total return of 42 mg—this is approximately what the wastewater treatment plant should be discharging. However, what the wastewater treatment plant is actually discharging is the 141 mg. They say we have metered wastewater of 48 mg. We've adjusted that downward based on those consumptive use figures. They've also discharged 10 mg to the golf course, which is great. However, the math just doesn't work out; there's over 100 mg that's infiltrating into the wastewater stream from somewhere.

Where does it come from? Everything from illegal hookups, which do exist and include everything from people having sump pumps in their basement, which they put into a drain in their home to no one knowing they are even hooked up to begin with, but probably the biggest source is storm water infiltration, coming in from manhole covers and coming in from old and leaky pipes. This is an enormous volume, which represents an enormous cost on their part because they have to treat all of this water.

The last category of return flow is what is going out to ground water. Again, this is a subtraction exercise. We know how much was withdrawn from the system, 152 mg; we know that 20 mg of that was unaccounted for use—we are assuming that this gets lost; we know that 42 mg got returned to the wastewater treatment facility. We know that 20 mg went to consumptive use and that leaves us with 60 mg being returned into the ground water. So of the 150 mg that is getting pulled out of the ground or out of the water cycle on the island, about 69 mg is going back into the water cycle on the island.

Here's what that looks like distribution wise. We have excluded the 109 mg unaccounted for infiltration out of this pie diagram—otherwise the shape of this diagram would be very different. But, the bulk then of the water that is being used on the island is going back through individual treatment systems on individual lots. The wastewater treatment is only about 32 percent of that total. One of the things about this 109 mg is how much of that represents a loss from the ground water system and how much of that represents a loss just from the surface water system. We don't really know, so we don't really know how much of an impact that has.

Mr. Stamp stated that a lot could be coming from surface water that people have pumped into the system. Dr. Veeger explained it could be coming from surface water or storm runoff. Still, it's an enormous number and we don't really know from where it is coming.

Dr. Veeger continued regarding the water availability picture. We used a water budget method that for the North Reservoir, we look at the area, the drainage basin area for the North Reservoir, how much rain falls in that area and what percentage of that rain will be ultimately available as runoff to the reservoir. We calculated about 90mg or about .25 mgd and it obviously doesn't arrive at that rate all year long, which is one of the problems here. The established safe yield according to a report by Pare Engineering was not quite 55 mg, significantly below the 90 mg because this is a "safe yield," which is meant to be a buffer

against drought conditions and meaning you will have that supply on a regular basis. Current withdrawals are almost 74 mg/y; this is well above the established safe yield, and is approaching—it's 80 percent of this calculated runoff number to the reservoir. Therefore, this really confirms what people over on Jamestown could have told you a long time ago—North Reservoir is an inadequate supply for their purposes. There is absolutely no additional capacity. It is possible that these figures could be somewhat augmented by ground water discharging through into the sides into the reservoir, but we do not know; we don't have any data on that. We don't know what the magnitude of that is and it could just as easily be going in the other direction—we could be having loss going out through the sides.

So the surface water status, current demand exceeds safe yield and is approaching total potential yield. It does not have additional capacity and this 80 percent usage rate suggests moderate to severe water shortage during the summer peak demand months when the runoff is at its lowest are going to be the status quo until they can find some other source of water supply.

So, what about ground water? Here, we have to look at this on an island-wide basis. But, it's the same sort of idea: how much precipitation falls, what percentage of that is expected to infiltrate into the ground and end up as ground water? We get a billion gallons—that is a very large number. A very small percentage of that is actually available for use because the bulk of it has to stay forming the fresh water lens that keeps the salt water at bay. Current withdrawals are 79 mg/y—that's about 8 percent of the total recharge. Has that caused any kind of problems? There is some evidence for very low levels of salt water intrusion, which I will show you a graphic of later. It is an island; it's a long and narrow island and it's an island that has fractured bedrock. All of those things make it particularly susceptible to salt water intrusion if wells are not properly placed and if they are pumped at too high a pumping rate.

The 8 percent usage ratio for ground water appears to be sustainable. There are additional withdrawals that should be feasible—it all depends on where you put these wells. As I mentioned, there is salt water intrusion and there also may be water quality limitations. High density housing in areas where you are on both self supply and self disposal have resulted in degraded water quality conditions. Assessing that was outside the scope of this report, but it's a project that I worked on a number of years ago, so I've thrown a couple of slides in from that report. This is chloride concentration and the only thing that really matters to you here is that the larger the symbol, the higher the chloride concentration. The very smallest dots are 20 mg per liter, which is a background level. Anything above that, you're starting to get some kind of impact, but of course, you have road salt, you have septic systems—there are a lot of different sources. But, by the time you get up over here, over 100 you definitely have a degraded water quality from some source that is not natural. It still could be septic system, it still could be salt water from road salt runoff, but it could also be from salt water intrusion. We have a couple of clusters up here; this is a low-density housing area, but you can see we have these enormously high chloride concentrations; there is another cluster down here that is like that. The higher levels in Jamestown Shores, we attribute it to road salt contamination more so than salt water intrusion, but this really suggests that in some of these areas close to the shore that they are already perilously close to removing that salt water interface and if they were to pump at a higher rate that would be a problem.

Mr. Stamp asked if these were measurements from wells, and Dr. Veeger answered yes. The same thing here—this is for nitrate, again from the same data set, from private home owner wells. Again, the size of the symbol indicates the concentrations—background should really be less than 1 mg per liter, so anything above that indicates that there is some additional source of nitrate in there. You will see in these low density areas predominantly you have much smaller symbols and what obviously catches your eye here is that in Jamestown Shores where the lot sizes are 1/8 to 1/4 of an acre, they are all on individual wells; they are all on individual septic systems. Clearly, there has been a degradation of water quality. Only a small number of these was above the drinking water standard, but nevertheless, the trend is obviously moving towards higher concentrations of nitrates in the water as a result of this high-density use. So we looked at the relationship between lot size and nitrate concentration, and that's this last one here. On the bottom, we established groups: this is .1 to .25 acres; .25 to .5 acres; .5 to 1 acre; 1 to 2 acres; and greater than 2 acres lot size, and this is the nitrate concentration over here. The bar represents the range of concentrations in 75 percent of the samples and the horizontal line in the middle represents the mean concentration for those—

the average concentrations. So, for these very small lot sizes, you see that the average is above 2 mg per liter and a significant number of them have concentrations that are well above that. Even in the ¼ acre to ½ acre lot size, it's still statistically elevated; .5 to 1 acre is still significantly elevated and it's not until you get above 1 acre in lot size that you see a distinct break in the nitrate concentrations. So, in this particular setting, with the fractured rock, it appears that 1 acre is really the minimum lot size to be protective of water quality. Any lot size smaller than that, if you're thinking about putting in more homes and you're putting in more wells, water quality needs to be a part of that picture not just water availability or water quantity.

Chairman Varin asked if there were already a lot of lots in the smaller sizes. Dr. Veeger responded that they have quite a little problem there. For many years, they didn't address this issue because the ISDS regulations made the lots unbuildable. With the advent of newer technologies for ISDS systems, more lots have become buildable.

Quickly to summarize, total withdrawals are about 150 mgy; public supply accounts for just over ½ of that; domestic use is the single largest category of use on the island accounting for about 80 percent of the use; about 45 percent of the total withdrawals are returned to the ground via private disposal systems, which is a good thing in terms of maintaining the fresh water lens, but in some areas is a bit of a problem in terms of water quality. So you have a balancing act going on there. Unaccounted for disposal is a major problem—over 100 mgy accounts for 70 percent of the wastewater treated on the island, which is a huge expense. North Reservoir does not have any additional surface water supply capacity, but ground water capacity could be developed with careful placement of wells and careful attention to pumping rates. There has been some degradation of water quality in areas of high housing density. Any conservation efforts to bring supply and demand back into balance should really focus on the domestic use category, because that accounts for 80 percent of the use. This concluded Dr. Veeger's report.

Mr. Perry asked how South Reservoir factored into this. Dr. Veeger explained it's relatively small so in and of itself it's not going to solve all of their problems, but it's at the very bottom of the watershed and so it captures essentially runoff from North Reservoir eventually makes its way down to South Reservoir—it's essentially a last ditch effort on their part to provide additional surface water supply. But, it is not a good solution.

Mr. Stamp inquired if the problem with the tannins in that water could be solved. Dr. Veeger explained that it was a very extensive wetland area that goes all the way from North Reservoir down to South Reservoir and there are a lot of oak trees in it with natural decomposition of the vegetation releasing tannins in the water—it's difficult to treat because it's dissolved in the water and it's not a health hazard per se, but it makes the water brown and people don't like brown water coming out of the faucet.

Chairman Varin noted that the plan for the present wastewater treatment plant on Jamestown had been reviewed in the late 1970s, and the plant as proposed had a huge capacity, so big that it attracted attention, which we delved into and found that the plant was designed to handle future development on the island including 600 acres of industry. So, we reduced that to 6 acres arbitrarily and scaled down the plant accordingly. Mr. DeLise noted that that would be about 6 houses more per acre. Chairman Varin continued that the present connection between North Kingstown and Jamestown is in the old Jamestown Bridge, which now has to be demolished. He believed that the demolition is funded in this fiscal year. There are provisions in the new bridge for the connection, but all of the pipe is not there. Some additional work will have to be done to restore the connection once the old bridge is demolished.

Mr. Penn asked what would be done with this report. Mr. Griffith explained that this becomes part of the overall availability and use study for the state. Mr. Mariscal noted it would become part of the whole water management plan. Chairman Varin added that the Board would ensure that Mr. Goslee and others are aware of the results of this study. Mr. Penn asked if the Board had an obligation to the residents of Jamestown to publish this and give it to them so that they know. Chairman Varin stated that he did not know. Ms. Crawley noted that the Board has published these reports in the past as well as having made public presentations to the communities. She explained that the reports are just that—reports. However, the data that is contained in these reports is put into a system that we are working with right now that will

be kept current once the reporting of water use is in place as well. Mr. Penn noted that if he were a Jamestown resident, he would want to know that water quality could be jeopardized. Ms. Crawley explained that these reports are posted on our website as well as at the USGS website. When Mr. Penn asked how many RI residents actually accessed our website, Mr. Mariscal noted that we could certainly hold a public meeting. Mr. Penn and Mr. Stamp thought this a wise move; Chairman Varin pointed out that if we were realtors on Jamestown, we might think differently. Mr. Stamp explained that it behooves us to notify the officials on Jamestown of what is actually going on with their water. Ms. Good wanted to know if the past reports had been supplied to the municipalities and Ms. Crawley responded that they had. Chairman Varin noted that particularly with what was discovered here especially with excess withdrawal from surface water is close to exceeding the safe yield and the wastewater coming in, those pipes must be like sieves. Ms. Good noted that if DEM were to see that sort of data, they would require that and I and I study be done. Dr. Veeger explained that they have been doing them. Mr. Perry noted that the water going into the house is metered, but many of these people have sump pumps and they're getting rid of that is free as far as they are concerned. They can hook roof drains, they can hook anything into the sewer system and there is no penalty. He noted that it's something the sewer people should be looking at; Mr. Stamp added that the cost of processing that water is huge.

Mr. Griffith then moved acceptance with Mr. Perry seconding. The motion carried unanimously.

B. Finance Committee—Chair William Penn

Mr. Penn explained that there was nothing under this item for the Board.

C. Construction, Engineering and Operations Committee—Chair June Swallow

Ms. Swallow noted that this committee had not met.

D. Legislative Committee—Chair Daniel W. Varin

Chairman Varin noted that while this wasn't really legislative committee work, there is much discussion about the use of eminent domain for economic development purposes, which has certainly occurred in this state. At the last count that he had heard 17 bills had been pre-filed in the General Assembly for consideration in the session that starts in January to prohibit the use of eminent domain for economic development purposes. What it focuses on, of course, is the definition of "public use" and without a definition of public use, it's very difficult to tell what the affect of those bills' prohibition could be. If you build a water line anywhere, the vast majority of users are going to be private parties—houses, businesses hooked to the water line. If you build a road, any road, the traffic of private vehicles is well over 90 percent of the total usage. So, he noted that this is something we must watch.

E. Strategic Committee—Chair Daniel W. Varin

Chairman Varin noted that this committee had met on December 1st and about half of the board members were present. Briefly, that September summary paper has been updated. The priority issues are the same, but we have some more recent information on them. We discussed the problem with a lack of stream gages generally, and specifically about the shut down of the Pawtuxet gage, which has been re-activated. We discussed the ecological assessment of the Big River Area to refine the estimates of ground water available. We discussed the update of the land use plan, and the potential use of watershed protection funds for Phase IV. We are not yet ready to initiate Phase IV, but I think we have to do some more investigating and give more thought to what the eligible activities should be. There may be some good ones, which have not been presented yet, but there may be some on the current list of 12 or 13 that are not particularly worthwhile. Therefore, some time before we get to Phase IV, which won't be until there is enough money to support Phase IV, we must review eligibility.

7. NEW BUSINESS

8. OTHER BUSINESS

(1) Shad Factory Briefing—Pasquale DeLise, Executive Direct, Bristol County Water Authority

Mr. DeLise noted that most of the repairs have been completed. The pipeline has been in operation for a couple of months. There are some additional supports that have to be repaired. This cost approximately \$115,000.00. As far as the design for the new Shad pipeline, that is on schedule and we should have the conceptual

design in January. So, in February he will have Dewberry back to present before this Board. Additionally, he will be meeting with Mr. Mariscal this week to discuss the water treatment plant. In January or February, he would like to address this Board with those plant issues.

Chairman Varin asked if the conceptual design provides the information required to begin the permitting process, and Mr. DeLise stated, "to start the process, yes."

Chairman Varin asked if the plant was producing water that right now goes into Bristol County Water Authority's distribution system. Mr. DeLise responded that at this point it did—it had been running for one day. However, they have been trying for about a year to put this online. During this process, the Authority has become aware of issues, and these were the things he would be discussing with Mr. Mariscal this week. He admitted that with the amount of improvements made to the plant so far, it still will not meet the necessary performance standards 12 months a year. He added that his meeting with Mr. Mariscal would include representatives from Maguire Group and Weston and Sampson.

Ms. Swallow asked exactly what standard the Authority would not be reaching and whether Mr. DeLise had planned on reporting this to the Department of Health. He answered yes and claimed that "Sue" (at DOH) was aware of the situation, and he acknowledged that the Authority would come before the Board. Ms. Swallow reiterated her question regarding which standard would not be met. Mr. DeLise noted that chlorides were a problem although they are OK now, he expects in the coming summer as happened last summer they will exceed chlorides. He noted that they would go back and review the Maguire Report with an eye to the improvements they had not yet made.

9. RECESS OF BOARD FOR BOARD CORPORATE BUSINESS

With no objection, Chairman Varin recessed the Board for Board Corporate business at 1:15 p.m.

10. RETURN FROM BOARD CORPORATE BUSINESS

At 1:35 p.m., the Board returned from Board Corporate business.

11. ADJOURNMENT

On a motion by Mr. Parsons, seconded by Mr. Stamp, the Board unanimously voted to adjourn at 1:36 p.m.

Respectfully Submitted,

Tracy Shields
Personnel Aide

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