TOWN OF JAMESTOWN
TOWN COUNCIL MEETING
for
TOWN, WATER AND SEWER MATTERS

Monday, July 8, 2019

A regular meeting of the Jamestown Town Council sitting as the Board of Water and Sewer Commissioners was called to order at the Jamestown Town Hall, Council Chambers, 93 Narragansett Avenue at 6:30 PM by Commission President Michael White.

The following members were present:

Mary E. Meagher, Vice-President
Nancy A. Beye
William J. Piva, Jr.
Randall White

Also present were:

Christina D. Collins, Acting Town Administrator
Wyatt Brochu, Esq. Town Solicitor
Michael Gray PE, Public Works Director
Lisa Bryer, Town Planner
Cheryl Fernstrom, Town Clerk
Paula Swistak, Acting Water and Sewer Clerk

AWARDS, PRESENTATIONS AND ACKNOWLEDGMENTS

(None)

READING AND APPROVAL OF MINUTES

1) 06/17/19 (regular meeting)
Motion was made by Commission Vice-President Meagher, seconded by Commissioner Piva to accept the 06/17/19 regular meeting minutes. So unanimously voted.

OPEN FORUM

1) Scheduled requests to address:

(No scheduled requests)

2) Non-Scheduled requests to address:

(No non-scheduled requests)

REPORT OF TOWN OFFICIALS

1) **Pumping Report:**

The Public Works Director reported the following:

- JR-1 has been turned on for the season. The well pumps water at a rate of 50 gpm directly into the transmission main feeding the water plant from the reservoir.
- North Pond is @ 60MG, usable storage-60MG
- South Pond is @ 6MG, usable storage-6MG

2) **Town project reports: (See attached Project Update Report dated July 2019)**

The Public Works Director reported the following:

Treatment Plant:

- The results from the "at-the-tap" lead and copper testing showed that the 90th percentile lead results for this round is 2 parts per billion which is below the 15 ppb as required by EPA. The average for copper was 0.09 parts per million which is below the 1.3 per million for copper as required by the EPA. An informational brochure regarding lead and copper was enclosed in the June water and sewer bill to all users.
- Mike Gray stated that the average daily withdrawal from our supply, for the last 5 years, 205,000. The average safe yield per day is 238,000 gallons per day.

Transfer Pumping/Reservoir:

- No water was transferred over the past few weeks with the recent rainfall.
- Due to rainfall, the reservoir is spilling over.

Wastewater Treatment Facility:

- The average daily flow at the treatment plant for June was 0.34 million gallons per day. The peak daily flow was 0.58 million gallons. The permitted monthly average is 0.73 million gallons per day as a condition of our discharge permit. The golf course received 854,000 gallons for irrigation for the month of June.

UNFINISHED BUSINESS

(None)

NEW BUSINESS

1) **Application of Our Table, LLC**, Marla Romash and Thomas Sperry (real estate owner) for property located at 29 Narragansett Avenue, and further described as Plat 9, Lot 631: for utility service expansion/change of use from commercial bank to restaurant; review, discussion and/or potential action and/or vote

Deb Foppert, attorney for Thomas Sperry, stated that the estimated annual water usage at 29 Narragansett Avenue would be 145,000 gallons of water. The foot print of the building will not change. The restaurant will have 2 bathrooms.

Motion was made by Commission Vice-President Meagher, seconded by Commissioner Piva to approve the application for expansion/change of utility service at 29 Narragansett Ave. So unanimously voted.

NEW BUSINESS

2) **Finance Director's Report**: Comparison of Budget to Actuals as June 30, 2019
It was the consensus of the Commission to accept the Finance Director's Report as presented.

ADJOURNMENT

There being no further business before the Commission, motion was made by Commission Vice-President Meagher, seconded by Commissioner White to adjourn the meeting at 6:43 PM. So unanimously voted.

Attest:

Paula Swistak
Acting Water and Sewer Clerk

xc: Commission Members (5)
Town Administrator
Town Solicitor
Public Works Director
Town Clerk

Project Update
July 2019

WELLS
JR-1, JR-3

- JR-1 has been turned on for the season. The well pumps water at a rate of 50 gpm directly into the transmission main feeding the water plant from the reservoir.

TREATMENT PLANT

- We have received the results for the "at-the-tap" lead and copper testing from 10 samples collected from homes within the system. The 90th percentile lead results for this round is 2 parts per billion which is below the 15 ppb as required by EPA. The average for copper was 0.09 parts per million which is below the 1.3 parts per million (ppm) for copper as required by EPA.

- I have attached two sections from our most recent update to the Water Supply Management plan submitted to the Water Resources Board in 2018; Section 4.0 Anticipated Future Demands and Section 5.0 Available Water. I hope the two sections are helpful in future discussions and review of applications for connections to the water system. Section 4.0 provides a summary of connections on the system and future build out projections for the water system. The 2016 average day demand is 152,000 gallons per day and the 20-year projected future demand for 2036 is 169,000 gallons per day. The average day demand is based upon the metered water to our customers. Section 5 provides a summary of the safe yield study conducted of our water supply which determined the ability of the existing system of reservoirs and wells to supply water to our customers. The average Safe Yield is 283,000 Gallons per day.

  It is important to note that the average day withdrawal from our supply for the past 5 years is 205,000 gallons per day. This accounts for water that is used for backwashing and water test equipment at the water plant, fire protection, hydrant flushing, and possible leaks within the 20 miles of water mains and services within the system.

TRANSFER PUMPING/RESERVOIR

- No water was transferred over the past few weeks with the recent rainfall received.

DISTRIBUTION SYSTEM
South Pond @ 6 MG
Usable Storage, 6 Million Gallons

North Pond @ 60 MG
Usable Storage 60 Million Gallons

- There were no leaks reported for June.

WASTEWATER TREATMENT PLANT

- The monthly average daily flow at the treatment plant for June was 0.34 million gallons per day. The peak daily flow was 0.58 million gallons. The permitted monthly average is 0.73 million gallons per day as a condition of our discharge permit. There were no sanitary sewer overflows for the month of June. The golf course received 854,000 gallons for irrigation in the month of June.

SECTION 4.0
ANTICIPATED FUTURE DEMANDS

The intent of this section is to project the future water demands expected of the JWD system for the 5-year and 20-year planning periods. To best project future water use several factors must be considered, including changes in population density, commercial water use and development, economic development, changes in service area, land use, water quality, and conservation measures.

4.1 Population and Economic Development

The RI Department of Administration, Division of Planning publishes population projections for each Rhode Island municipality at five-year intervals. These projections were made using 2010 US Census data, which estimated the population in Jamestown in 2010 to be 5,405. The projected population in Jamestown for the period of 2015 to 2040 is summarized in Table 4.1 below.

Table 4.1
POPULATION PROJECTIONS (2015 – 2040)

YEAR	POPULATION	ANNUAL % CHANGE
2015	5,451	--
2020	5,487	0.13%
2025	5,573	0.31%
2030	5,640	0.24%
2035	5,675	0.12%
2040	5,674	--

These projections show only modest population growth and are dramatically different than those previously developed by the RI Division of Planning based on past population trends and US Census data. The population trends projected for Jamestown are similar to population trends for many other communities in Rhode Island.

In 2000, the Town of Jamestown conducted a buildout analysis. The buildout analysis was used to determine maximum potential future population that the Town can accommodate under existing local regulations. At that time, it was estimated that the largest potential population for Jamestown is 8,318 persons, an increase of 2,696 (48%) over the 2000 population. This buildout analysis estimated that an additional 223 dwelling units could potentially be connected to the Town water system.

There were approximately 1,285 residential service connections in 2000 serving approximately 3,058 people, compared to 1,365 services in 2016 serving an estimated 3,184 residents. Based on the buildout analysis, 150 additional dwelling units could potentially be connected to the water system. At an average of 2.38 persons/household, as suggested by US Census data, the number of potential water service customers is 3,589 at full buildout. This is not expected to occur during the 5-year and 20-year planning periods and only modest population growth is anticipated in the water service area and the Town as a whole. It is important to note that no water main extensions or system expansion has been proposed in over 20 years, and none is anticipated at this time.

4.2 Projected Future Demands

Future demand projections were made using the RI Statewide Planning population projections and the methodology described above. Previous versions of this WSSMP also projected demand for a full buildout scenario; however, current population projections represent only modest growth in Jamestown's population over time as compared to past projections that anticipated growth at a much faster rate. The population projected in Jamestown in 20 years (i.e., 2036) is far less than the population at full buildout, and current projections predict that population will plateau in 2035. As such, future demand for a full buildout scenario has not been presented at this time.

Table 4.2 contains the 5-year (2021) and 20-year (2036) water use projections in the JWD water system. It is assumed that all of the anticipated population growth in the Town of Jamestown will be within the water district, which is conservative. This information is also presented on Worksheet No. 27.

Table 4.2
CURRENT AND PROJECTED WATER CONSUMPTION RATES

Year	Total Population in Jamestown	Population Projected in Service Area	Metered/Projected Water Usage			Average Day Demand*
			Residential	Commercial	Government	
2016	5,451	3,184	48.13 MG	5.45 MG	1.84 MG	0.152 MGD
2021	5,487	3,268	49.22 MG	5.90 MG	2.0 MG	0.156 MGD
2036	5,675	3,456	52.10 MG	7.26 MG	2.3 MG	0.169 MGD

* Based on consumption alone (i.e. non-account water not included)

Residential water use for the 5-year period was projected based on a service area population of 3,268 people and an average per capita residential water use of 41.3 gallons per capita per day (gpcd), equivalent to the average per capita residential water use for 2016. Only modest population growth is expected over this timeframe and residential water use is anticipated to remain relatively consistent. Similarly, residential water use for the 20-year planning period was projected based on a service area population of 3,456 and 41.3 gpcd. This assumes that efficient residential water use continues to be a priority in Jamestown.

Commercial and governmental water usage for the 20-year planning period was projected to be equivalent to the highest use rates over the previous 10 years, as shown on Worksheet No. 21. Commercial water use was 7.26 MG in 2005 and governmental water use was 2.30 MG in 2009. Estimates for the 5-year planning period were made assuming a steady, constant increase from 2016 to 2036. Water use by the commercial and government sector in Jamestown has declined over time, and relatively little commercial and governmental development is expected in the JWD service area or in Jamestown as a whole.

The JWD has traditionally used a maximum day to average day peaking factor of 2.0 to estimate maximum day demand (MDD) in the system. Table 4.3 shows the current ADD and MDD as well as projections for the 5-year and 20-year planning periods, based on consumption.

Table 4.3
CURRENT AND PROJECTED AVERAGE DAY & MAXIMUM DAILY DEMANDS

YEAR	AVERAGE DAY DEMAND*	MAXIMUM DAY DEMAND**
2016	0.152 MGD	0.304 MGD
2021	0.156 MGD	0.312 MGD
2036	0.169 MGD	0.338 MGD

* Based on consumption alone (i.e. non-account water excluded)
** Estimated using MDD to ADD ration of 2.0

Projected estimates for water produced have been made assuming 15% non-account water, consistent with State goals. Therefore, the ADD and MDD based on water production are estimated to be 0.18 MGD and 0.36 MGD, respectively, for the 5-year planning period. Similarly, the ADD and MDD are estimated to be 0.19 MGD and 0.39 MGD for the 20-year planning period.

It is noted that non-account water currently exceeds 15% but it has met the State's goal of 15% in the past. These estimates are presented on Worksheet No. 29A along with the estimated available supply capacity. Worksheet No. 29A underscores the importance of JWD obtaining a better understanding of, and altogether lowering, non-account water in the system. One significant step toward this goal is reclaiming the majority of backwash water that currently is discharged to Great Creek, as discussed in Section 2.10 of this WSSMP.

4.3 Category & Subcategory and Major Users Future Demand

Future residential and commercial water demands are summarized on Worksheet No. 27 and in Table 4.2. There are no major users in the system, nor are any current users expected to increase demand to rates that would qualify them as a major user (i.e., demands in excess of 3 million gallons annually). The JWD is not aware of any potential major user currently in planning.

4.4 Legal Obligations to Provide Water

The JWD does not have any wholesale customers, major users, or any other legal obligations to provide water.

4.5 Service Area Extension

4.5.1 Urban Water District

Under the Urban and Rural Water District Regulations adopted in 1986, the Town has specific guidelines for new connections to the water system. Service connections for use other than one or two-family homes require approval of the Board of Water and Sewer Commissioners. Applicants must show to the satisfaction of the Board that the request for service:

1) is consistent with the Comprehensive Community Plan;
2) will not impair available resources of the urban water district;
3) will not reduce the level of fire protection; and
4) will not reduce the quality or quantity of water provided to existing users.

Property owners whose land is within the district or which has frontage on a district boundary road may request a water service connection. Because of the relatively small supply capacity of the system, no expansion of the urban water district is planned or anticipated at this time.

4.5.2 Jamestown Shores Neighborhood

From time to time, the issue of water service to the Jamestown Shores area is raised. This area in the northern half of the island houses 40% of the Town's overall population. There is currently no public water service available in the area.

The Shores area was subdivided in the 1940s into very small lots. Most lots are less than a quarter acre. Each home must have a well and onsite sewage disposal system on the property. This factor, coupled with poor soil conditions, creates the potential for groundwater contamination.

If water quality problems become evident in Jamestown Shores, measures may be needed to provide potable water to the area. This scenario would exact a severe financial and service burden on the Water Department. New transmission lines, pump stations, and possibly other system improvements would be required. There are no plans for serving this area now or in the immediate future, but it is doubtful whether sufficient raw water could be found on the island to meet this demand should it become necessary.

It is therefore imperative that the Town of Jamestown makes every reasonable effort to ensure that water quality in the Jamestown Shores area is maintained. Steps that the Town has taken and should continue in an effort to minimize health risks associated with this area include:

- Monitoring RIDEM's granting of OWTS permits in the area;
- Require maintenance of existing septic systems;
- Create a soils overlay district and prohibit OWTS where severe limitations exist;
- Strictly enforce local regulations on OWTS setbacks from wetlands;
- Encourage RIDEM to consider alternative OWTS technology where appropriate.

SECTION 5.0
AVAILABLE WATER

5.1 General

North Pond is the primary water supply for the Jamestown system. The JWD supplements the reservoir with water withdrawn from their supply well, JR-1, during peak demand times of year. Well withdrawals typically make up a very small amount of the water withdrawn from the JWD's sources.

Analysis of the safe yield of the North Pond Reservoir system was conducted previously by staff of the Rhode Island Department of Environmental Management, Division of Water Supply Management. The purpose of the study was to determine the ability of the existing system to meet the water supply needs of the existing customer base. The full report was provided in the last WSSMP, while this chapter presents the major findings of the study. Also presented are the findings of a more recent study, completed in 2000 by Fay, Spofford and Thorndike, Inc. (FS&T).

In times of drought, the JWD has also utilized South Pond for its water supply. A study of the safe yield of the watershed was conducted by Richard Hazen in 1983. This report will be referred to for supporting data on the probable safe yield of South Pond, though the reservoir has not been used for some time.

5.2 Physical Characteristics of the Reservoirs

Jamestown's reservoirs were constructed in the 19th century by the creation of earth dams in two natural drainage swales. The spillways have been modernized to concrete structures permitting outflow above a certain water level. There is no provision for flashboards at either spillway. Elevation of North Pond, when full is 37 feet above mean sea level, 27 feet above South Pond.

Both reservoirs are shallow, and as such are subject to high rates of evaporation during the hottest months. South Pond, being of small capacity with a fairly large drainage area, is very responsive to rainfall, especially when the ground is saturated. Public Works officials have observed the water level in South Pond rise a foot overnight. Because of the physical and water quality limitations of South Pond, it is not considered a reliable source of supply but remains an active source that can potentially be used in the future should some of its water quality limitations be suitably addressed.

5.3 Safe Yield of Surface Waters

5.3.1 FS&T Safe Yield Analysis, October 2000

FS&T completed a safe yield study of North and South Ponds in October 2000 on behalf of the JWD. The Safe Yield Analysis Report (text only) is included in Appendix D. This represents the most recent safe yield analysis performed on the JWD's supply sources.

FS&T created a computer model to simulate the Town's water supply system and compute the safe yield. The model incorporated historic hydrologic and hydraulic factors (i.e. precipitation, direct runoff, evaporation, demand withdrawal rates) as well as current operational factors in its mass balance approach. The results of this analysis are presented in Table 5.1. A second safe yield analysis was then conducted whereby the transfer of water from South Pond to North Pond was simulated. These results are presented in Table 5.2.

Table 5.1
SAFE YIELD (gpd)

Average Surface Water Inflow Factor	North Pond	South Pond	Total
0.40	175,000	86,000	261,000
0.45	**194,000**	**89,000**	**283,000**
0.50	213,000	92,000	305,000

Table 5.2
SAFE YIELD WITH TRANSFER PUMPING (gpd)

Average Surface Water Inflow Factor	North Pond	South Pond	Total
0.40	304,000	80,000	384,000
0.45	**321,000**	**83,000**	**404,000**
0.50	333,000	55,000	421,000

A transfer pumping between South Pond and North Pond is in place but is not typically used due to the water quality issues in South Pond.

5.3.2 Previous Analyses

RIDEM chose a method of computer mass balance of reservoir inflows and outflows using the U.S. Army Corps of Engineers Hydrologic Engineering Center program HEC-5: Simulation of Flood Control and Conservation Systems.

The Hazen study used stream flow records of mainland rivers. Additionally, the study used storage yield curves recorded in NEWWA reports from 1969. Studies of the 27 square mile Abbott Run watershed and the 93 square mile Scituate watershed during the record-breaking drought of the mid 1960s were used to determine the expected yield of a reservoir in the region. The NEWWA procedure takes into account the drainage area; the percentage of drainage area covered by the reservoir; the rainfall and probable loss by evaporation; the stream flow; and the storage required to assure the desired supply. Data are computed on the basis of drainage areas, with safe yield and storage required stated per square mile.

North Pond
Applying the HEC-5 methodology, the following are the results of the safe yield analysis for different drought scenarios:

Table 5.3
NORTH POND SAFE YIELD

Drought Analysis	Safe Yield (GPD)
1% change of occurrence (100% reliability)	175,000
5% change of occurrence (95% reliability)	210,000
Drought of Record (99% reliability)	185,000

South Pond
Although South Pond is a small reservoir, it receives runoff from 70 percent of the watershed, or 0.7 square miles. Total runoff is 700,000 gpd, but the characteristics of the drainage area are significantly different from the North Pond drainage area. A vast wetland encompasses much of the watershed above South Pond. This increases evaporation and transpiration and reduces the quantity of runoff, especially during dry weather.

South Pond was drawn daily for five months in early 1981. Pumping averaged 180,000 gpd, with a maximum one-day yield of 364,000 gallons. Hazen's estimate of the safe yield of the reservoir is as follows:

Table 5.4
SOUTH POND SAFE YIELD

Drought Analysis	Safe Yield (GPD)
2% change of occurrence (98% reliability)	100,000

Like the FS&T Evaluation, the results of this study suggest that partial use of South Pond would substantially increase available water to the system.

Because South Pond is served by more than two thirds of the drainage area of the watershed, its storage capacity is the primary limiting factor in its utility to the water supply. The other deficiency of South Pond is water quality. Below North Pond, runoff passes slowly through a large wetland on the way to South Pond. This "percolating" process causes the water in South Pond to have high quantities of organic matter, iron, acid, and other contaminants. This results in discoloration and unpleasant tastes and odors.

Drought Duration
The drought of the 1960s is generally considered the drought of record in this region. However, at the time of the drought, the population of Jamestown was around 2,500, half of the current population. No records exist as to the extent of the drought in Jamestown, but anecdotal information suggests that the Town's water system did not experience an inability to provide sufficient water to customers.

During the summer of 1993, a short-term drought occurred. From late-July through September, Jamestown received very little rainfall. As the summer season progressed, evaporation combined with diminished inflow and high demand to create a crisis situation for the water supply system.

South Pond, normally reserved for supplemental supply, was already at the bottom of the reserve storage zone though no water had been drawn from it. The Town instituted an outdoor watering ban in August, and conservation was greatly encouraged.

Efforts to reduce water consumption were not sufficient to stabilize the level of the reservoirs. By late summer North Pond held only a 20-day supply of water. The National Guard was notified and began delivering water by truck from North Kingstown. This practice continued until November 15 of that year.

When winter rains began to recharge South Pond, it was used to supply the water system, allowing North Pond to recharge without use. It was found that when water is drawn from South Pond, the rate of flow through the upstream wetland increases. This unfortunately does not result in improved water quality.

In the final analysis, the National Guard delivered 7.5 million gallons to the Jamestown water supply. It was estimated at the end of the deliveries that the North Pond volume was 6.7 million gallons. Jamestown would almost certainly have run out of water had not the National Guard helped supplement the supply.

The Town has prepared a plan to avoid having a situation like the 1993 water deficiency in the future. The plan is described in the augmentation study section as well as in Section 10 – Drought Management of this WSSMP.

Water Withdrawals
There are no withdrawals from Jamestown Brook.

5.4 Limitations to Water Use

The new water treatment plant has a design capacity of 0.5 MGD, more than the safe yield of the supply sources and above current and future estimates of the MDD. The only limitation to drawing water is the water quality of South Pond. Even when the reservoir is full, water quality at South Pond is much lower than North Pond. While the new treatment plant was designed to treat water from South Pond, sludge generation when using raw water from South Pond makes the treatment plant inefficient. Therefore, supply from South Pond is not typically used.

5.5 Available Water/Demand Comparisons

Although the two reservoirs appear to have a combined safe daily yield of 283,000 gallons, the actual available water is less due to the poor water quality of South Pond, as noted above. In the past, North Pond has been used almost exclusively for supply, providing the Town with a safe daily yield of 185,000 gallons (based on the RIDEM analysis and the Drought of Record). Also, it is doubtful whether South Pond could truly provide 100,000 gpd, due to the water quality problems described above. The ADD exceeds the safe yield of North Pond during the warmer months each year, and the JWD supplements supply with withdrawals from Well JR-1 in periods of higher water use. The JWD has implemented a number of water conservation strategies and continues to impose outdoor water use restrictions in an attempt to control water use peaks during the summer months.

5.6 Alternative Supply

The JWD maintains alternative supply sources in addition to North Pond and the two active supply wells, JR-1 and JR-3. While South Pond is considered an active supply source and is

maintained as such, it effectively acts as an alternate surface water supply as withdrawals are infrequent due to raw water quality.

It was the JWD's intent with construction of the new treatment plant in 2011 to increase treatment capacity to 500,000 gpd while also having the capability to treat water from South Pond. In practice; however, the treatment process is inefficient and a high volume of sludge is generated when raw water from South Pond is used, makings withdrawals from South Pond impractical.

Over the years, the JWD explored development of additional supply wells around wells JR-1 and JR-3. However, these other wells are currently not being used as supply due to concerns over groundwater depletion.

The JWD has an emergency interconnection with North Kingstown, consisting of truck-mounted flexible piping that can be connected to hydrants on either side of the Jamestown Verrazano Bridge. This interconnection is not intended for permanent use, and development of a permanent interconnection is not immediately feasible and would be extremely costly due to Jamestown's isolated nature as an island in Narragansett Bay, over a mile from the nearest mainland.

5.7 Supply Augmentation Study

Since 1993 the Town has investigated various alternatives to source augmentation to meet the ever-increasing demand requirement of drinking water. The following summarizes the actions taken to augment supply.

5.7.1 Water Supply Committee Report (1995)

In response to the drought of 1993, the Town established a Water Supply Committee. The committee was comprised of a variety of professionals with expertise in drinking water issues. Over a two-year period, the committee developed and evaluated a number of alternatives to increase the supply of public water. The committee completed its report in 1995.

A copy of the Water Supply Committee report was provided in the previous WSSMP. Below is a brief description of the primary alternatives considered by the committee, as presented in this report. The committee was only charged with evaluating supply augmentation. Water conservation has been considered separately by the Conservation Commission and JWD staff.

1. *Expand North Reservoir* – This alternative included diversion of Carr Creek and improvements to the impoundment dam. Carr Creek watershed has an area of 0.11 square miles, which could yield over 100,000 gpd. Also, it was estimated that raising the spillway and dam at North Pond by 12 inches would result in an increase in storage capacity of 8 MG. This volume represented a 35-day supply of water, based on 1992 consumption. It would represent a 40-day supply based on current ADD.

Both the Carr Creek diversion and dam improvements involve significant permitting and engineering studies. The committee recommended no action on this alternative at that time, and this alternative has not been revisited since.

2. *Development of South Pond* – South Pond could be utilized if water quality were improved sufficiently to make the water treatable. Methods of reducing the effects of organic material in the watershed were discussed, but this possibility was dismissed as impractical and requiring extensive further study.

Initial results indicate the same portion of South Pond water may be returned to North Pond through transfer pumping or mixed at the treatment plant, but this alternative required further evaluation. Since then, the new treatment plant was designed to treat water from South Pond, but the increased sludge generation would make treatment too inefficient for long term use.

3. *Bedrock Drilling* – This approach involves drilling a series of wells to tap water trapped in bedrock fissures. Significant background study has been done to determine the most effective well locations. The water would be pumped directly into the distribution system if quality is high enough, or it could be pumped to the treatment plant.

The JWD has done extensive well exploration over the years. Well JR-3 is a result of these efforts and has been in service since 2000.

4. *Water Conservation* – Developing methods of reducing per capita consumption were recommended as part of the report. The Conservation Commission has recommended specific steps for water conservation. These affect residential and commercial consumers, as well as treatment plant operations.

Among the most significant recommendations in the report are: (1) an education program to raise public awareness on methods of water conservation, and (2) "change-out" and retrofit programs to encourage/require users to utilize water conserving fixtures, toilets, and washing machines. The results of these programs are discussed elsewhere in this WSSMP.

Results

The Town opted to pursue Alternatives #3 and #4, which were met with success. Well JR-3 has been in service since 2000. Estimated yields from the wells JR-1 and JR-3 are 50,000 gpd, each. They are only used at times of year with high demand. Water conservation measures have also been proven successful and the JWD will continue to pursue water conservation in the system. For instance, the ADD presented in the 1993 report was 248,000 gpd and was a similar rate in the 2000 Safe Yield Analysis performed by FS&T, referenced earlier. Future ADD estimates were projected to increase, but they have decreased and the ADD currently averages 200,000 gpd for a typical year. The JWD has realized a lot of success through water conservation practices.

5.7.2 Water Treatment Feasibility Study – 1999

In September 1998, the Town of Jamestown contracted Fay, Spofford & Thorndike, Inc. to evaluate alternative sources of water supply and the feasibility of associated water treatment requirements. A Water Treatment Feasibility Study was prepared in April 1999. The Executive Summary from the Report was provided in the previous WSSMP. Below is a brief description of the alternatives that were considered in the report.

The report concluded that North Pond is not able to meet the ADD based on its estimated safe yield and recommended that the Town explore one of two tracks for increasing supply. One of the options presented in this report was to

> *"establish a permanent connection with North Kingstown at an estimated life cycle cost of about $3.2 million pending discussions with North Kingstown officials and a more detailed cost evaluation. This has the advantages of providing adequate water supply and being more reliable in terms of water quality. The major disadvantages are cost and the Town becomes dependent upon an outside community for its water supply."*

The Town has since developed an emergency interconnection (6-inch flexible water line) between hydrants with the Town of North Kingstown and the Town of Jamestown, but a permanent connection has not been implemented.

The second recommended track was to develop additional supply in Jamestown. Since 1995 the Town had done extensive well exploration and development. These efforts resulted in installation of Well JR-3 with an estimated safe yield of 50,000 gpd, like that of Well JR-1 though both wells are never used at the same time.

Utilizing Narragansett Bay as a water supply source had also been reviewed. High-pressure reverse Osmosis (RO) is the membrane-separation technique typically utilized to reduce the total dissolved solids (TDS) in the seawater from 34,000 mg/l to less than 500 mg/l for drinking water. This was a very costly option, estimated at close to $6 million for construction of a desalination plant. Costs associated with desalination have increased since completion of this report and this alternative has not been seriously explored in recent years.

5.7.3 Limnological Baseline Study

In 1999, the Town retained Ecosystem Consulting Service, Inc. to conduct a limnological baseline study of the surface water sources based on recommendations from FS&T's 1998 report summarized above. The intent of this study was to quantify the quality of water from the two reservoirs, identify reservoir management techniques, and investigate ways to increase available water supply for the Town. The end result was to assist in identifying cost effective, reasonable approaches to increasing water availability for the Town.

On December 16, 1999, FS&T issued a final/supplemental limnological baseline study for the North and South Ponds in addition to the above. This report identified specific alternatives which could be implemented to increase the overall yield from the surface water supplies while maintaining a reasonable water quality, given the raw water quality limitations of South Pond.

Both reports were provided in the previous WSSMP. Several recommendations for increasing the available water supply were presented, which are summarized as follows:

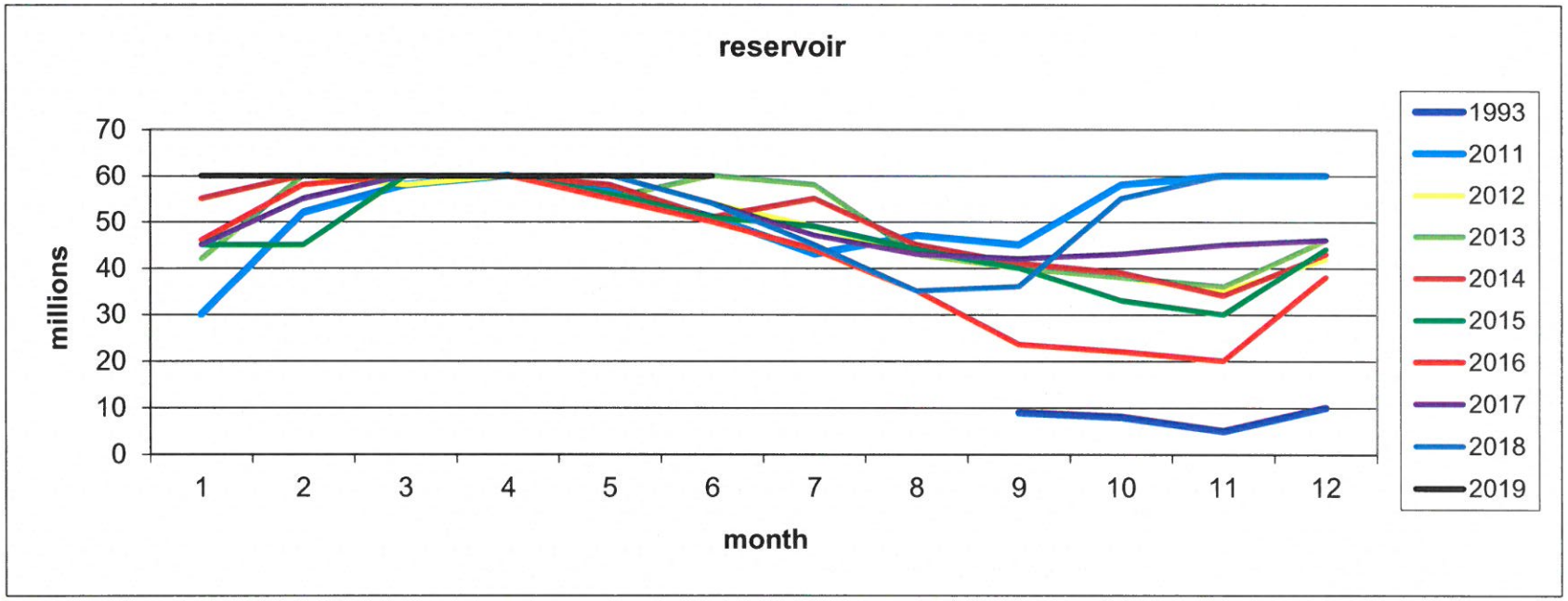
- Increase Safe Yield from North Pond
    - Intercepting and treating water from the South Pond watershed adjacent to the North Pond watershed north of Route 138 and east of wells JR1 and JR3, and diverting this water to North Pond.
    - Increasing the North Pond Reservoir level by 10-14 inches by the addition of flashboards during early summer.
- Improve Water Quality from North Pond
    - By the addition of stormwater detention basins to treat water entering North Pond from the watershed area west of North Main Street. The DPQ was already developed design plans for the installation of these basins to address this issue.
    - The addition of a hypolimnetic aeration and depth selective supply withdrawal system.
- Improve South Pond Water Quality
    - Correcting the "leakage-overflow" to the west from South Pond.

- Increasing the storage volume in South Pond through a shallow reservoir expansion to the west from the dam.
- Installing a hydrologic discharge control assembly at the South Pond spillway.
- Installing a depth-selective supply withdrawal structure at South Pond.

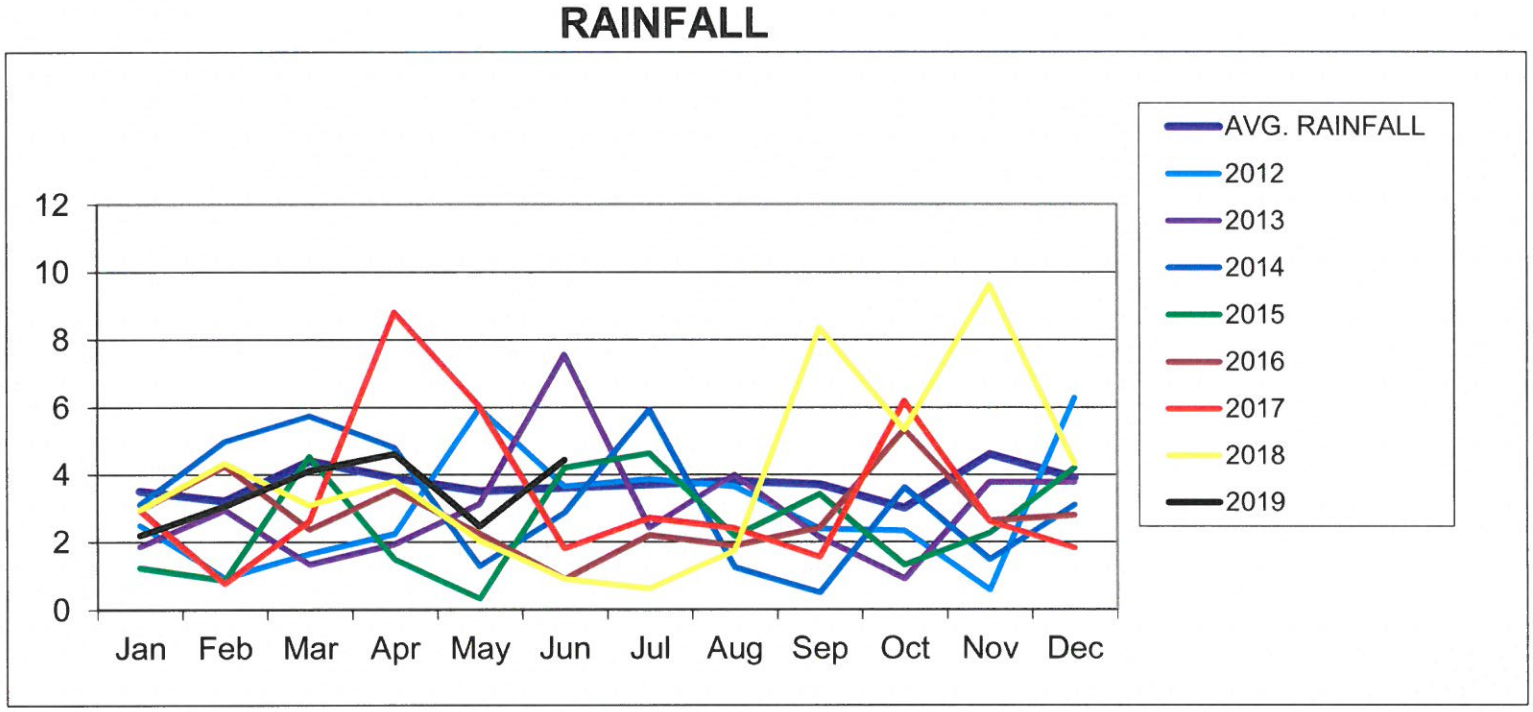
The total cost of these recommendations was estimated at $95,000. It was also recommended that a safe yield study of North and South Ponds be conducted to verify the proper transfer rate between the two ponds and to determine the impact of increasing the North Pond reservoir level. This was conducted in 2000 and was discussed earlier in this section.

RESERVOIR LEVEL

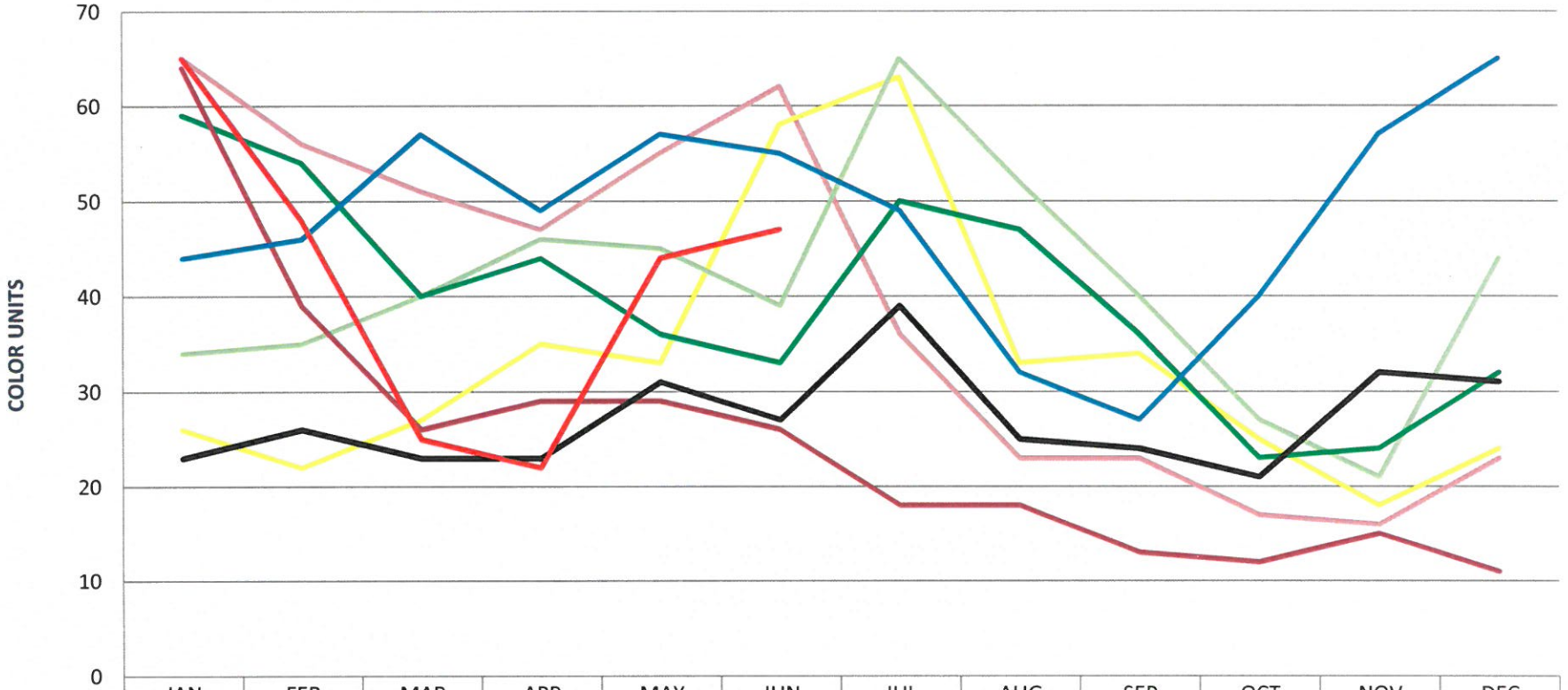
	1993	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan		60	30	60	42	55	45	46	45	60	60
Feb		60	52	60	60	60	45	58	55	60	60
Mar		60	58	58	60	60	60	60	60	60	60
Apr		60	60	60	60	60	60	60	60	60	60
May		60	57	60	55	58	56	55	60	60	60
Jun		51	51	54	60	51	51	50	54	54	60
Jul		43	43	49	58	55	49	44	47	45	
Aug		40	47	43	43	45	44	35	43	35	
Sep	9	35	45	40	40	41	40	23.5	42	36	
Oct	8	30	58	38	38	39	33	22	43	55	
Nov	5	28	60	35	36	34	30	20	45	60	
Dec	10	29	60	42	46	43	44	38	46	60	



	AVG. RAINFALL	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan	3.5	4.22	2.49	1.85	3.1	1.22	2.94	2.94	2.94	2.19
Feb	3.2	3.09	0.93	2.94	4.98	0.86	4.25	0.76	4.33	3.06
Mar	4.4	1.32	1.64	1.32	5.74	4.53	2.36	2.62	3.07	4.11
Apr	3.9	4.25	2.24	1.92	4.8	1.47	3.53	8.8	3.79	4.61
May	3.5	2.32	5.97	3.11	1.27	0.32	2.24	6.03	2.03	2.46
Jun	3.6	4.4	3.64	7.55	2.86	4.2	0.89	1.79	0.89	4.44
Jul	3.7	2.01	3.86	2.42	5.93	4.63	2.19	2.7	0.61	
Aug	3.8	5.23	3.64	3.98	1.23	2.17	1.88	2.4	1.73	
Sep	3.7	5.41	2.39	2.13	0.5	3.41	2.42	1.54	8.35	
Oct	3	7.18	2.33	0.9	3.61	1.31	5.33	6.18	5.34	
Nov	4.6	4.05	0.58	3.76	1.47	2.27	2.63	2.61	9.61	
Dec	3.9	2.51	6.28	3.76	3.1	4.2	2.79	1.81	4.33	
Total	44.8	45.99	35.99	35.64	38.59	30.59	33.45	40.18	47.02	20.87



Transfer Pumping
NORTH POND WATER QUALITY



	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2012	65	56	51	47	55	62	36	23	23	17	16	23
2013	26	22	27	35	33	58	63	33	34	25	18	24
2014	34	35	40	46	45	39	65	52	40	27	21	44
2015	59	54	40	44	36	33	50	47	36	23	24	32
2016	64	39	26	29	29	26	18	18	13	12	15	11
2017	23	26	23	23	31	27	39	25	24	21	32	31
2018	44	46	57	49	57	55	49	32	27	40	57	65
2019	65	48	25	22	44	47						

	1993	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan	171	172	173	239	172	155	191	163	165	159	149	165	141
Feb	192	154	173	210	158	156	187	151	165	165	155	137	135
Mar	169	155	165	198	157	155	178	147	154	160	156	139	144
Apr	181	174	196	210	180	170	198	184	160	190	183	167	167
May	227	202	195	180	212	190	223	185	239	202	183	184	179
Jun	285	246	215	218	226	221	226	232	230	240	210	227	204
Jul	311	296	277	274	279	278	291	267	264	288	261	288	
Aug	301	256	290	251	254	242	291	266	263	264	266	265	
Sep	188	210	245	193	205	210	212	227	215	201	203	208	
Oct	175	187	259	182	175	175	184	187	172	166	170	168	
Nov	166	175	226	160	164	167	177	160	160	157	151	148	
Dec	158	192	230	167	158	180	174	161	158	151	151	142