STATE OF NEW HAMPSHIRE

BEFORE THE

PUBLIC UTILITIES COMMISSION

RE: PENNICHUCK WATER WORKS, INC

Docket No. DW 22-___

Petition of Pennichuck Water Works Inc. for Approval of Financings From the New Hampshire Drinking Water State Revolving Loan Fund for the Sweet Hill and Twin Ridge Community Water Systems in Plaistow, NH

DIRECT PREFILED TESTIMONY OF JOHN J. BOISVERT

May 26, 2022

Professional and Educational Background

Q. What is your name and what is your position with Pennichuck East Utility, Inc.?

A. My name is John J. Boisvert. I am the Chief Engineer of Pennichuck Water Works, Inc. ("PWW"). I have worked for PWW since February 1, 2006. I am a licensed professional engineer in New Hampshire and Maine.

Q. Please describe your educational background.

A. I have a Bachelor of Science degree and a Master of Science degree in Civil Engineering from the University of New Hampshire in Durham, New Hampshire. I also have a Master's degree in Environmental Law and Policy from Vermont Law School in South Royalton, Vermont.

Q. Please describe your professional background.

A. Prior to joining PWW, I served as a Team Leader for Weston & Sampson Engineers of Portsmouth, New Hampshire in their Water Practices Group from 2000 to 2006. Prior to Weston & Sampson, I was employed by the Layne Christensen Company of Shawnee Mission, Kansas as Regional Manager for their Geosciences Division in Dracut, Massachusetts from 1994 to 2000. I completed graduate school in 1992 and was employed by Hoyle, Tanner, & Associates of Manchester, New Hampshire as a Project Engineer from 1992 to 1994. Prior to entering full time graduate programs at the University of New Hampshire and Vermont Law School, I was employed by Civil Consultants of South Berwick, Maine as a Project Engineer from 1986 to 1989 and by

Underwood Engineers of Portsmouth, New Hampshire as a project Engineer from 1985 to 1986.

Q. What are your responsibilities as Chief Engineer?

A. As Chief Engineer, I am responsible for the planning, design, permitting, construction, and startup of major capital projects, including pipelines, reservoirs/dams, building structures, pumping facilities, treatment facilities, and groundwater supplies. I oversee the Company's Asset Management program and provide regular technical assistance to PWW's Water Supply Department, Operations Department, Customer Service Department, and Senior Management.

Q. What is the purpose of your testimony?

A. I will be describing two projects that the Company is seeking to finance with loans from the NH State Revolving Loan Fund (SRF) administered by the NH Department of Environmental Services (NHDES). The two projects include the interconnection of the Twin Ridge Community Water System (Twin Ridge) and the Sweet Hill Community Water System (Sweet Hill) to the soon to be completed Plaistow Public Water System (Plaistow) which is part of the Southern NH Regional Water System (SNHRWS). Both projects were approved for funding by the NHDES in 2020. The final SRF application process with the NHDES is underway. It is anticipated that the SNHRWS and the Plaistow portion of the SNHRWS will be operational in late 2022. Due to the timing for which an interconnection to this system will be available, and the timing for which the needed materials will be available to complete these projects,

the Company anticipates construction of the interconnection water mains and associated appurtenances to be constructed in the second and third quarter of 2023. The Twin Ridge project and the Sweet Hill project were approved for funding by the NHDES as separate projects. The Company is seeking financing approval for both in a single docket for efficiency since both water systems are owned by PWW, and the construction of both projects will be completed simultaneously. It should be noted that the SRF funding process is competitive. Each project application is reviewed by the NHDES and ranked according to the project need, public health benefits, and cost effectiveness. Projects ranked the highest receive the approval for this low interest source of financing. Each project will be described separately below.

Q. What is the purpose and need to complete each interconnection project currently?

A. Both the Twin Ridge and Sweet Hill systems are standalone small community water systems, supplied by groundwater wells. Each of these systems have experienced shortages of supply over time, which prompted number of actions by the Company over several years, which included drilling additional wells, trucking water in from another source to meet demand, and ongoing outside water use restrictions. The particulars of these actions for each system are as follows:

<u>Twin Ridge</u>

The Twin Ridge system serves the Twin Ridge community water system as well providing water supply to the Pennichuck East Utility, Inc. (PEU) Rolling Hills community water system. Presently 5 bedrock wells are the active sources of supply

at Twin Ridge. Of these total wells, 4 were original to the system when PWW acquired the system in 1985. Wells 4 and 5 were permitted, drilled and placed in service in 1985 later followed by Well 8 in 2011 to address falling capacity from the pre-existing wells. The aggregate water pumped and supplied from all of the wells requires filtration for iron, manganese, and softening for hardness. The softening process requires regeneration of the softening media with a brine (sodium chloride or salt) solution. Regeneration backwash is returned to the ground/groundwater through an onsite infiltration basin permitted by the NHDES. This infiltration basin is located in close proximity to the existing wells near the treatment station. Discharge of brine has caused elevated sodium levels above the secondary water quality standard in water pumped from those wells. Removal of sodium is not achieved by conventional treatment methods, thus the Company has had to reduce the flow from wells impacted by sodium and rely more heavily on Well 8, which is not as impacted by sodium, in order to blend water to reduce sodium below the secondary drinking water standard. Twin Ridge is within defined property boundaries of the Twin Ridge Condominiums complex. The accumulation of these source of supply and treatment factors is reaching the point that Pennichuck, if it is to continue to operate the existing Twin Ridge Wells, will need to install a backwash holding tank in order to store the brine backwash, and periodically haul it to a local wastewater treatment plant. Handling the brine backwash in this manner would eliminate the cross contamination of the existing wells. Pennichuck has two systems (W&E and Spruce Pond) in Windham where it ultimately had to discharge the backwash from the softening system to a holding tank for later removal and treatment at a local wastewater treatment plant.

The installation of a backwash holding of 10-20,000 gallons for the backwash is estimated to cost about $50,000 and is included in the overall project cost analysis. The cost to haul and dispose of the backwash water is about $1.60 per CCF (based on costs experienced at W&E and Spruce Pond water systems).

The Company has access via easement rights within the property boundary of Twin Ridge, for this type of installation. There are no remaining areas within the Twin Ridge property to locate new groundwater water sources in an alternate aquifer that is different from the aquifer the existing wells are withdrawing water from. With the addition of Well 8 in 2012, the Company has exhausted its options to locate new sources of supply to supplement the existing sources of water. A compounding concern in the Company's overall analysis of the best long-term solution for this system is: if the existing aquifer were to become contaminated or its capacity were to fall, the Company couldn't meet the base demand of the system given the present treatment system. The only option the Company would then have available to meet base demand, is to truck in water from another larger water system in the short-term while a long-term permanent solution is sought. The trucking of water, other than for short-term emergencies, is not only untenable and unsustainable, it is a violation of NHDES regulations. The long-term solution would be to reach out to adjacent/nearby properties to attempt to secure rights to develop wells on them. The success of this option is limited at best, as nearby and adjacent properties include auto salvage facilities and the Beede Waste Oil Superfund Site (Beede). The Twin Ridge franchise area and the distribution system was expanded in 2012 to private homes with wells impacted by contamination from Beede, and as such, development of an

additional groundwater source in that area would be unacceptable, and most likely not allowed.

Until the advent of the SNHRWS, which allowed the Town of Plaistow to begin constructing a public water system, the Company had few, if any, viable options to seek additional water supply to address potential shortages, respond to changes in water quality, and provide for a redundant source of supply should an existing well be out of service temporarily or permanently. The interconnection of the Twin Ridge System to the Plaistow system has been recognized by the Company and the NHDES as the option that offers the most effective solution to address the ongoing and chronic concerns of supply capacity and treatability associated with the existing Twin Ridge wells. Replacement of the station, the treatment system and the storage tanks, which are all almost 50 years in age and approaching the end of their useful lives, as well as the addition of a backwash/brine holding tank system, compared to this interconnection alternative, make little sense for a number of factors. The replacement of the Treatment system, storage tanks, and station would cost an estimated $1,039,085 including the pending need to install a backwash holding tank. And this cost would still result in the incurrence of operating costs associated with continuing to operate the Twin Ridge System as a stand-alone system. As opposed to availing Twin Ridge of the opportunity to connect to the now available public water system in Plaistow via an interconnection which is ultimately less expensive and risky than maintaining the existing stand-alone system. This change would result in the Company abandoning these near end of life assets for the existing supply and enter into a new domain by buying water directly from the Town of Plaistow.

Sweet Hill

The Sweet Hill CWS is served by two bedrock wells and one seasonal shallow overburden well. Sweet Hill has been a system that has been on a continuous outside water use restriction for more than a decade. The Company has attempted to develop new source capacity by drilling additional wells in the land area of the development where wells can be sited, meeting required setback limitations. Bedrock Well #1 was one of the original wells in the development. Well #2 was drilled and permitted in 2009 to address shortages of supply and provide additional capacity to Well #1. Testing and operation of Well #2 showed that it was drawing water from the same aquifer as Well #1 such that the pumping of both wells would further exceed the capacity of the aquifer. Thus, Well #2 offered no additional needed capacity for the water system. Well #2 did however provide the system with a second well for backup to Well #1, should Well #1 need to be taken offline for any reason. In 2016-2017, the Company drilled and permitted Well #3. Well #3 was located in an open space of the Sweet Hill development and is located in a very shallow sand and gravel aquifer. Well #3 is only 13 feet deep and the strategy was to operate it when the groundwater table was high in order to rest Well #1 and Well #2, thus allowing the bedrock aquifer to recover and store water when it is needed in the dryer periods of the year. However, the extremely dry year of 2019 through 2020 and into 2021 resulted in a low water table, such that Well #3 could not be operated in a sustained fashion (as intended) to allow recovery of the bedrock aquifer. This once again, and further exposed the vulnerability of the supply sources to the Sweet Hill CWS.

The current interconnection project will take advantage of the soon to be completed Plaistow water system enabled by the establishment of the Southern NH Regional Water System. The Plaistow water distribution system, once completed and operational, is located within Sweet Hill Road adjacent to the Sweet Hill Development. The interconnection will offer a reliable supplemental and emergency source of water for the Sweet Hill CWS when capacity of the existing wells drops below acceptable levels to meet base demand, and/or in case of mechanical/pump failures. The interconnection may also allow for a reasonable amount (restricted) of outside water use during the summer months.

Q. Please describe the basic components to each interconnection project.

A. A more detailed description for each project will be provided late in this testimony. However, the basic components for each project are listed below.

Twin Ridge

The components of the Twin Ridge Interconnection are depicted in Figure 1 attached as Exhibit JJB-1. The Company will connect to the existing Town of Plaistow water main at the intersection of Walton Road and Route 125. The interconnection will include the following:

- A tap/connection to the existing Plaistow water main on Route 125
- Approximately 150 feet of 8-inch watermain will be added to the Company's existing 8-inch water main on Walton Road
- A meter vault in accordance with the Town of Plaistow requirements, will be installed

- Gate valves will be installed to operated and control the interconnection, and
- Pavement restoration will be completed.

Sweet Hill

The components of the Sweet Hill Interconnection are depicted in Figure 2 attached as JJB-1. The Company will connect the Sweet Hill water main to the Town of Plaistow water main at the intersection of Sweet Hill Road and Partridge Lane (Sweet Hill development). The interconnection will include the following:

- A tap/connection to the existing Plaistow water main on Route 125
- Approximately 1,600 feet of 4-inch watermain will be installed leading up to the Company's pumping station on Partridge Lane
- A meter vault in accordance with the Town of Plaistow requirements, will be installed
- Gate valves will be installed to operated and control the interconnection, and
- Pavement restoration will be completed.

Q. What is the intended operation plan for the existing wells, pumping facilities, treatment system, and storage tanks at the Twin Ridge CWS upon completion of the interconnection to the Town of Plaistow water system?

A. The Company will discontinue the use of its wells and treatment system at Twin Ridge in favor of purchasing 100% of the Twin Ridge water demand from the Town of Plaistow.

Q. What is the intended operation plan for the existing wells, pumping facilities, treatment system, and storage tanks at the Sweet Hill CWS upon completion of the interconnection to the Town of Plaistow water system?

A. At Sweet Hill, the Company will continue to operate the existing wells to the most practical extent possible and use the interconnection with Plaistow as a supplemental source.

Q. Does the alternate source of water from the Southern NH Regional Water System present any challenges with respect to water quality and distribution system operation?

- A. Water is supplied to the RWS by Manchester Water Works (MWW). MWW utilizes chloramines as a disinfectant. To reach Plaistow, the water flows from Manchester though Derry then Windham, Salem and Hampstead Area Water Company (HAWC). HAWC converts from chloramines to free chlorine using a technique called break point chlorination. It is unclear if HAWC will continue this practice going forward. If they don't elect to continue this conversion process, Plaistow may receive water treated with chloramines in the future. Since the Company proposes to purchase 100% of the Twin Ridge demand from Plaistow there will be no mixing of water disinfected differently. Where the Company is proposing to maintain use of its wells at Sweet Hill and use water from Plaistow as a supplemental source, the potential for mixing water of two different disinfectants (chloramines versus chlorine) would exist, fully dependent upon this possible decision made by HAWC in the future. As such, the Company will include provisions for chloramine removal by granular activated carbon filtration

followed by chlorination within the existing Sweet Hill station. Chloramine filtration will allow water produced by the well and that water purchased from Plaistow to receive the same type of disinfection.

Q. What are the estimated construction costs for each project and the corresponding loan amounts and terms for the Twin Ridge and Sweet Hill projects?

A. The estimated capital cost for the Twin Ridge interconnection is $261,173 which will be covered by the SRF loan of $300,000 with an interest rate of 1.256% for 20 years. The estimated capital cost for Sweet Hill is $415,072 and will be covered in part by the available SRF loan of $240,000 with an interest rate of 1.256% for 20 years. The remaining $175,027 will be covered by bonds issued in 2023.

As addressed in the testimony of Larry Goodhue in this docket, if the Order for this financing cannot be approved prior to the annual reset of the eligible interest rate for these loans at the end of July 2022, the stated interest rate on these loans will increase to a rate estimated to be 2.5%. Sensitivity for this impact on these projects is included later in this testimony, and in exhibits attached hereto.

Q. Please provide addition detail/analysis that supports the Company's decision to discontinue the use of the Twin Ridge wells, treatment and storage facilities in favor of purchasing 100% of the Twin Ridge demand from Plaistow.

A. The Company looked at three options to address the water supply needs of Twin Ridge, as follows:

Option 1. Purchase 100% of the Twin Ridge demand from Plaistow and discontinue the use of the existing wells, treatment, pumping and storage system.

Option 2. Purchase 100% of the Twin Ridge demand from Plaistow and discontinue the use of the existing wells, treatment, and storage systems. The Company would maintain booster pumping facilities if necessary, to maintain existing operating pressures in the Twin Ridge distribution system.

Option 3. Rebuild the existing water treatment, pumping, and storage facilities. Add a backwash/brine holding tank and periodically haul the filter and softener backwash to a local wastewater treatment plant for disposal. Utilize Plaistow as a supplemental source of supply.

In completing the evaluation of these options, it was revealed that the treatment, pumping, and storage facilities at Twin Ridge, which were constructed in the late 1970's, were at or beyond their useful service life. The storage tanks, the station building, building mechanical and electrical systems as well as the treatment equipment are in need of replacement. The building structure is original to the system and the raw water quality from the wells has become more difficult to treat, primarily due to hardness, manganese, and dissolved solids (salts). As such, continued use of the existing wells would require substantial capital expenditures in addition to the interconnection with Plaistow. The investigation also determined that if 100% of the Twin Ridge Demand was purchased from Plaistow, the Company would not need to replace or maintain additional booster pumps or provided for the operating and electrical costs to run those pumps. The hydraulic grade line (Plaistow water system

operating pressures) are within the range currently provided in Twin Ridge, and as such, boosting of operating pressures would not be required. Option 2 was no longer relevant since it was the same as Option 1, as the only difference between those two options was the booster station pumping facilities being kept in service, which would not be needed.

The Company analyzed the net present value (NPV) of each option to assist in the determination of the most cost-effective option for water supply to Twin Ridge going forward. The NPV analysis is detailed in Exhibit JJB-2 at a 1.256% rate and Exhibit JJB-3 at a 2.50% rate. The NPV analysis of each option included the following:

- The principle and interest payments for the initial capital costs including:
  - One-time fees such as Plaistow tapping fees and Merrimack Source Development Charges (MSDC)
  - Well Decommissioning
  - Station and facility demolition followed by site restoration/stabilization
- Ongoing future operating costs, including:
  - Purchased water costs paid to Plaistow
  - Property tax implications
  - Current and future operation and maintenance
  - Inflationary impacts

The NPV analysis used a 20-year planning horizon. The resulting NPV for each option is depicted below and in Exhibit JJB-2 and Exhibit JJB-3 both at Page 6.

Option	NPV in $ (at 1.256% interest rate)	NPV in $ (at 2.5% interest rate)
Option 1	($1,144,185.03)	($1,167,921.48)
Option 2	($1,462,335.89)	($1,489,601.09)
Option 3	($2,151,656.67)	($2,178,921.87)

Option 1 represents the lowest NPV therefore in this case the most cost-effective solution of the options available as evaluated as a long-term solution to the water supply needs of Twin Ridge and the Company.

Q. Please provide addition detail/analysis that supports the Company's decision to continue the use of the Sweet Hill wells, treatment and storage facilities with Plaistow as a supplemental source rather than purchasing 100% of the Sweet Hill demand from Plaistow.

A. The Company looked at two options to address the water supply needs of Sweet Hill as follows:

1. Option 1 - Purchase 100% of the Twin Ridge demand from Plaistow while maintaining the Sweet Hill Station and booster pumps.

2. Option 2 - Maintain use of the existing Sweet Hill wells, storage tanks and booster pumps. While using Plaistow as a supplemental source of water.

Unlike at Twin Ridge, the Plaistow hydraulic grade line is not sufficient to maintain pressure in the Sweet Hill system at pressures that the customers are currently needing and experiencing. Booster pumps to maintain those needed operating pressures are required regardless of Option 1 or Option 2. Existing water quality from the Sweet Hill wells is relatively good, requiring only disinfection prior to pumping water into the distribution system. The concerns described previously in this testimony is that the system lacks source redundancy and can only support essential domestic use (non-outside).

As with Twin Ridge, the Company analyzed the net present value (NPV) of each option to assist in the determination of the most cost-effective option for water supply to Sweet Hill going forward. The NPV analysis is detailed in Exhibit JJB-2. The NPV analysis of each option included the following:

- The principle and interest payments for the initial capital costs including:
  - One-time fees such as Plaistow tapping fees and Merrimack Source Development Charges (MSDC)
  - Well Decommissioning
  - Station and facility demolition followed by site restoration/stabilization
- Ongoing future operating costs, including:
  - Purchased water costs paid to Plaistow

- Property tax implications
- Current and future operation and maintenance
- Inflationary impacts

- The Company did include replacement of the portion of the Sweet Hill station that houses the booster pumps. The replacement of the station structure was included in year 14 of the NPV analysis JJB-1 Page 11. In year 14 of the NPV analysis the station structure reaches the end of its useful life, when the station turns 40 years old, and as such, that is included in the overall planning horizon for this analysis.

The NPV analysis used a 20-year planning horizon. The resulting NPV for each option is depicted below and in Exhibit JJB-2, Page 6.

Option	NPV in $ (at 1.256% interest rate)	NPV in $ (at 2.5% interest rate)
Option 1	($1,204,638.57)	($1,2256,450.74)
Option 2	($1,277,220.90)	($1,299,033.07)

The NPV analysis of Option 1 and Option 2 are very close, unlike the differential in the valuations for Twin Ridge. Since there are inherent assumptions (interest rates, inflation, actual vs. estimated water demand, etc.) included in the NPV analysis, the Company recommends maintaining the use of the wells, and keeping Plaistow as a

supplemental source for the time being, at least until existing facilities such as well and storage tanks require significant repair or replacement. Decisions can be made at that time by the Company as to maintaining the wells as a source of supply or converting the Sweet Hill system to 100% Plaistow Source of supply, based upon the factors, economics and needs at that future date.

Q. Does this complete your testimony?

A. Yes.