

EXHIBIT A-5
(Northeast Water Solutions Report)

Northeast Water Solutions, Inc.

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Town of Jamestown

Memo

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To: Town of Jamestown, RI
From: Robert F. Ferrari, PE
CC: Jeffrey Saletin – Owner, 14 Seaview Avenue, Jamestown, RI
Date: February 16, 2024
Re: Water Supply Evaluation 14 Seaview Avenue, Jamestown RI

Due to repeated water supply problems experienced by the owner, NWSI has conducted several evaluations of the existing water supply well, well water characterization and treatment system at 14 Seaview Ave. Jamestown, RI 02835 (Map 7, Lot 135). The problems reported by the owner, and validated by NWSI have included inadequate well capacity, extremely poor water quality, and periodic loss of well water supply.

The existing residential well is installed to a depth of approximately 500 ft. BGS, located in the NW corner of the parcel, immediately adjacent to the driveway and Seaview Avenue. The well pump is installed at a depth of 350 ft. BGS to maximize storage within the borehole. Due to water supply capacity problems, the well has undergone re-development efforts (Lemme Well Services), demonstrating a maximum effective yield of 1.1 gpm.

Due to extremely poor water quality (see Table 1, below), a whole-house reverse osmosis (RO) water system (Hellenbrand H4-2000) and 500-gallon water storage tank were installed in 2018. This RO capacity and storage volume is necessary to meet the water supply requirements of the 3-bedroom, 3-bathroom residence. The RO system requires a feedwater flowrate of approximately 6 gpm to function correctly. At the time of installation, the submersible well pump was increased in capacity to 7 gpm (1.5 HP) to meet the RO feedwater requirements.

Due to the limited well yield/recharge the well experiences excessive drawdown, ultimately dewatering the well, resulting in multiple loss-of-service events during the 2023 summer season. The drawdown recovery, necessary to reactivate the well, is extremely slow resulting in long periods with no water supply.

Well Water Characterization

NWSI obtained samples of the raw well water in January 2018 and February 2024 to assess the water characterization, summarized in Table 1. The raw well water demonstrates significantly elevated total dissolved solids (TDS) including extremely elevated chloride (1,160 mg/L & 1,290 mg/L) and sodium (450 mg/L & 1,050 mg/L). Calcium (270 mg/L & 222 mg/L) and magnesium (67 mg/L & 70.2 mg/L) are also extremely elevated, resulting in a massive total hardness content in the water. These four (4) contaminants clearly demonstrate the water supply well is under

seawater influence. This raw well water characterization significantly exceeds the USEPA and RIDOH drinking water limits for TDS and chloride, and also exceeds the USEPA Health Advisory Limits for sodium and manganese, mandating treatment.

Parameter	January 3, 2018	February 5, 2024
pH – Field	-----	7.40 s.u.
pH – Laboratory	7.1 s.u.	7.83 s.u.
Total Dissolved Solids (TDS)	2,200 mg/L	3,460 mg/L
Specific Conductance	4,000 umhos/cm	4,160 umhos/cm
Alkalinity (as CaCO ₃)	130 mg/L	120 mg/L
Chloride	1,160 mg/L	1,290 mg/L
Sulfate	121 mg/L	163 mg/L
Calcium	270 mg/L	222 mg/L
Magnesium	67 mg/L	70.2 mg/L
Total Hardness (as CaCO ₃)	950 mg/L	843 mg/L
Iron	0.12 mg/L	0.199 mg/L
Manganese	0.48 mg/L	0.0295 mg/L
Potassium	-----	6.17 mg/L
Sodium	450 mg/L	1,050 mg/L
Zinc	0.021 mg/L	0.0302 mg/L

The water analyses identify another extremely serious problem. In general, coastal wells in Jamestown often demonstrate an increase in salinity (measured as sodium, chloride, TDS and/or Specific Conductance) during the summer period when water withdrawals and aquifer stress are at maximum. However, the well at 14 Seaview Avenue demonstrates seriously elevated salinity during the winter season during a period of low stress. This indicates the well is under relatively strong seawater influence.

Furthermore, the well water characterization has degraded from 2018 to 2024 with significant increases in chloride and sulfate, and a massive increase in sodium, following implementation of the reverse osmosis treatment system. This potentially indicates the water quality in the aquifer underlying this parcel is degrading due to the necessary on-site discharge of the concentrated RO reject water (2.5X concentration factor). The trend of water quality degradation can be anticipated to continue as long as the RO reject water is discharged on-site.

Alternatives for On-Site Water Supply Development

NWSI has evaluated alternatives to develop a new on-site water supply, including the following:

- **Hydro-Frack the Existing Well:** This methodology has been successful to increase the yield of bedrock wells. However, the well at 14 Seaview Avenue has very limited fracturing, which in-turn limits the potential to develop additional water supply yield by hydro-fracking. Another consideration is that hydro-fracking the well to increase recharge would likely result in greater intrusion of seawater water, further degrading an already poor raw water quality.

- Drill a New Well: The existing well is located on the western portion of the residential parcel. The frontage area of this parcel is disqualified because it is in close proximity to Seaview Avenue and neighboring lots (OWTS), and is in a flood zone, all representing contaminant threats. The open, rear area of the parcel extending from the residential structure to the shoreline has access for well drilling. However, this location is disqualified due to proximity to the on-site wastewater disposal system (OWTS), and is also in a flood zone. Furthermore, this alternative location increases the potential for brackish water intrusion into the well. Siting a new water supply well on this 0.611-acre lot would result in non-conformance with the required protective setback from the OWTS, and increase the potential for contamination of the water supply well.

Summary Conclusions:

The existing residential well has an effective recharge/yield of ≤ 1.1 gpm which is inadequate to support a single-family residence. Furthermore, the well demonstrates limited fracturing and recharge, which is not unexpected for the bedrock in this area of Jamestown. As a result, there is no expectation that hydro-fracturing would measurably increase the well yield, and would likely degrade water quality due to increased sea water intrusion.

There is no realistic alternative for drilling a new water supply well on this parcel, due to proximity to unacceptable contaminant threats. Additionally, there is no realistic expectation that a modest relocation of the well position on this site, would result in intersecting more favorable bedrock/geologic conditions to provide improved well capacity or water quality.

Finally, this residence has previously implemented a reverse osmosis system for desalinization of the brackish well water. However, the well has insufficient capacity to meet the RO feedwater requirements for sufficient duration to satisfy the water demands. Furthermore, there is very strong evidence that the disposal of the RO reject water is further degrading the water quality in the underlying aquifer.

The loss of an adequate water supply, and degraded groundwater quality represent a significant public health and safety threat. It is strongly recommended that this residence pursue a connection to the municipal water distribution system, as the optimum means to resolve the water supply and water quality problems.