Select Board

Meeting Agenda

The Provincetown Select Board will hold a public meeting on Wednesday, May 29, 2019 at 5:00 p.m. at the Truro Community Center, 7 Standish Way, Truro, MA 02666.

1. Joint Meeting with Truro Board of Selectmen (Votes may be taken):
    a) Inter-Municipal Water Agreement Between the Town of Provincetown and the Town of Truro- Annual Report

Posted by the Assistant Town Clerk www.provincetown-ma.gov, 05/23/2019, 2:00 pm AR

Provincetown Select Board
AGENDA ACTION REQUEST

Wednesday, May 29, 2019

1

JOINT MEETING – TRURO BOARD OF SELECTMEN

Inter-Municipal Water Agreement

Requested by: Provincetown/Truro Board of Selectmen

Action Sought: Discussion

Proposed Motion(s)

Discussion dependent. Votes may be taken.

Additional Information

- Annual Meeting per the Inter-Municipal Water Agreement Between the Town of Provincetown and the Town of Truro- Annual Report
- Water Superintendent Memo and presentation attached.

Board Action

Motion	*Second*	*Yea*	*Nay*	*Abstain*	*Disposition*

Town Of Provincetown

Department of Public Works – Water Dept.
Water System Update
Provincetown/Truro Joint Selectmen Meeting
May 29, 2019

EXECUTIVE SUMMARY:

The Town of Provincetown Water Department is proud to present the Board of Selectmen with an annual report regarding water system operations. The Town of Provincetown Water Department operates and maintains a total of three groundwater sources located within the Town of Truro: the Knowles Crossing Wellfield consisting of three gravel packed wells, the Paul Daley Wellfield consisting of six active gravel packed wells, and the North Union Field Well Site consisting of two gravel packed wells. The water distribution system consists of approximately forty-five (45) miles of water mains, two (2) water storage tanks, two hundred eighty two (282) fire hydrants, seven hundred (700) gate valves, and three thousand nine hundred eleven (3,911) service accounts.

Provincetown Water Department completed four major projects in 2018. First, an update to the Water System Atlas was conducted, which also included a hydraulic model update and study on the distribution system. Second, the Water Department performed an update to the groundwater model associated with the North Union Field Well Site in order to evaluate data collected over the last five years. Third, a cleaning and maintenance project was performed at the Winslow II Tank; and finally, water service renewals were performed within the Commercial Street Phase IV project area.

As you may recall, Provincetown Water Department was able to meet the MassDEP compliance standard of 10% Unaccounted-for-Water (UAW) for the first time in several years in calendar year 2017. The Water Department reported 10.4% UAW on the Annual Statistical Report for calendar year 2018. Although up slightly over 2017, UAW continues to be much less than prior years. Provincetown Water Department continues to perform routine leak detection throughout the system in an effort to reduce Unaccounted-for-Water (UAW) and meet the Massachusetts Department of Environmental Protection's compliance standard of ten percent (10%).

The Water Department worked with Environmental Partners Group (EP), engineers of record, to update the Water System Hydraulic Model, a useful tool for assessing the overall health of the distribution system as it relates to fire flow requirements and overall system demands. Additionally, an update was performed to the groundwater model associated with the North Union Field Well Site. The Water Department also performed maintenance and cleaning to the Winslow II Storage tank, and performed water service renewals to approximately eighty-five services within the Commercial Street Phase IV project area.

ACCOMPLISHMENTS 2018:

Provincetown Water Department completed several projects throughout the course 2018, however four (4) major projects will be outlined and discussed. The four major projects include an update to the Hydraulic Model for the system, an update and analysis of the north Union Field Groundwater Model, cleaning and maintenance to the "Winslow 2" Storage Tank, and finally the renewal of water services within the Phase IV Commercial Street re-construction area.

Hydraulic Model and System Atlas Update

Provincetown Water Department finalized an update to the Water Management Study in April 2017; a portion of this study was outlining a ten year Capital Improvements Plan (CIP). The first item on the CIP was to complete a hydraulic model update and system mapping update. The Water Department contracted with Environmental Partners, engineers of record, to perform the necessary updates.

The previous water system atlas and hydraulic model were created in 2002 by Environmental Partners. Therefore, mapping did not include any facilities or piping constructed after 2002, such as the Knowles Crossing Water Treatment Plant, North Union Field, demolition of the Winslow I tank, raw water transmission main, and various distribution system upgrades. The hydraulic model is a useful tool to evaluate system performance conditions, such as fire flows, under various demand scenarios, including peak season demands. The conclusion of the updated model illustrated the system performed very well, with limited areas of deficient fire flows. The areas of deficient fire flows, based on ISO recommendations, were the Race Point Beach area and the area of North Truro near the terminus of the system. Various scenarios were included to rectify this situation, including the placement of a tank in North Truro to improve static pressure condition and increase available fire flows.

In addition to the hydraulic model, Environmental Partners also updated the system atlas to reflect changes made to the system since the last update in 2002. The atlas includes all water system piping, valves, hydrants, tanks, facilities, wells, and background layers with streets, parcels, buildings and Zone II overlay. The service technicians use this as a reference in the field, in addition to the electronic GIS mapping available on laptops/iPads. The atlas will continue to receive periodic updates as warranted in order to reflect major changes to system.

North Union Field Groundwater Model Update

The Water Department contracted with EP to conduct an update to the North Union Field Groundwater model in early 2018. The purpose of this update was to analyze the results of the past five years of sampling data collected at the observation wells located throughout the well site. In accordance with the DEP New Water Supply Approval, Provincetown Water Department conducts quarterly monitoring at six (6) observation wells. This monitoring program assists with ensuring the quality and potability of the North Union Field sources by monitoring water quality within the intermediate and deep aquifer zones, where the saltwater and freshwater transition zone exists. The parameters analyzed from each observation well include sodium, chloride, sulfate, total dissolved solids, iron and manganese.

The Water Department provided Environmental Partners with the sample results since the monitoring program inception in 2012, which included graphs plotting the data over time. EP evaluated this data and found the data to be reliable with only a few anomalies noted, potentially sampling or lab errors. The lab results over the last five years indicated a steady rise of chloride and sodium levels in the #9 and #11 deep observation wells, which are located near the top of the freshwater-saltwater interface zone. The original groundwater model predicted a rise in sodium and chloride levels in these wells after five years or pumping, however the levels observed in the well site are higher than the model originally predicted. Therefore, it was necessary to recalibrate the model based on the data collected from the commencement of water production at the well site. The groundwater data collected over the last five years under actual pumping conditions were used to update the groundwater model in order to evaluate long term water quality trends. EP worked with McLane Environmental, LLC to update the existing model. To evaluate the long term pumping effects, the model was run over a 100-year period, and was also upgraded to include not only the observation wells, but also the production wells in the scenario. The model results were provided in a comprehensive report from EP, which has been attached to this memo.

At the conclusion of the upgraded model run, which used the data collected over the last five years as the baseline, the model predicted that under current pumping conditions, the sodium and chloride levels in the North Union Field #1 and #2 production wells will remain steady at approximately 30mg/L chloride and 15mg/L sodium until 2024. Beginning in the year 2024 the salinity in both production wells will gradually increase and then slowly taper after several decades of additional pumping. North Union Field #1 well is calculated to reach approximately 100mg/L chloride and 45 mg/L sodium by 2072; whereas North Union Field #2 well is expected to reach 45 mg/L chloride and 20 mg/L sodium by 2072. If current pumping conditions are maintained for the next 100 years, the salinity is expected to reach a new equilibrium concentration with small incremental increase thereafter, assuming that aquifer recharge, pumping of nearby wells, and sea levels do not change drastically from current levels.

A well site management scenario was also investigated as part of the model. The scenario analyzed pumping North Union Field #2 at a rate twice that of North Union Field #1. The results indicated the measured concentrations within the two wells to be approximately equal. This scenario indicated North Union Field #2 will have a higher seasonal variation in concentrations when sampled quarterly due to a larger difference between summer and winter pumping rates. This updated model is a useful tool to predict water quality at various pumping rates, as well as impacts of future hydrologic changes on the water quality.

The information outlined above was presented to the Water & Sewer Board by Ms. Ann Marie Patricia, a hydrogeologist with Environmental Partners, at the November 2018 regular meeting. The meeting was also attended by Mr. Blake Martin, an engineer with Weston & Sampson, the consulting engineers of record for the Town of Truro. Mr. Martin expressed several concerns with the data, primarily related to the expected rise in salinity levels in the production wells, specifically sodium levels. Mr. Martin raised the issue that the Water Department/Water & Sewer Board should consider approaching the National Park Service in order to utilize the former Air Force base wells once again in order to supplement the North Union Field Supply and alleviate any undue stress on the supply. I raised the point that these wells, although registered to Provincetown Water Department with MassDEP, are emergency sources only and that it is highly unlikely MassDEP would construe a projected rise in sodium levels over the course of the next fifty years to be an emergency. These wells are to be utilized for true emergency situations, such as a total loss of source supply from one of the other well sites.

Chloride is considered a “Secondary Standard”. Contaminants listed as secondary standards are non-enforceable guidelines for Public Water Systems regulating contaminants that may cause cosmetic or aesthetic effects on water. The obvious effect with Chloride is a salty taste. However, the Secondary Maximum Contaminant Level (MCL) set by the EPA, and MassDEP, is 250 mg/L. The Chloride level in North union #1 is expected to reach 100 mg/L in fifty years, which is less than half the current Secondary MCL. Currently, Secondary Contaminants are measured annually at both are Knowles Crossing Treatment Plant (which treats raw water from Knowles Crossing and Paul Daley wellfields) and the South Treatment Plant (which treats raw water from North Union Field #1 & #2). The last results from 2018 for chloride were 54 mg/L for Knowles Crossing Plant and 30 mg/L for the South hollow Plant. This reflects blended quality for the respective wells each plant treats.

Sodium is not a regulated contaminant, but MassDEP has established a *guideline* of 20 mg/L. This amount was established to be in line with the U.S. Food and Drug Administration (FDA) for low sodium water. Provincetown Water Department currently samples for sodium in the finished (treated) water under required Inorganic Contaminant sampling requirements. Current sodium levels in treated water from the Knowles Crossing plant and the South Hollow plant are 28mg/L and 17 mg/L, respectively. These sodium results are reported to the Mass Dept. of Public Health and the local Board of Health once results are known. The expected levels of Sodium in the North Union Field wells, as predicted by the model, are not a cause for alarm. The levels are expected to exceed the established guideline, however our current water from the Knowles Crossing Plant currently exceeds this guideline, as do numerous other water supplies throughout Massachusetts. At one time the Knowles Crossing was producing much higher levels of sodium before the Knowles Crossing well site was blended with the Paul Daley wells. The Water Department will continue to monitor the North Union Field observation network, as well as the production wells, and closely analyze a rising trend that could potentially indicate saltwater intrusion. Our consulting engineers will be engaged in the data collection and will periodically provide secondary analysis. Additionally, the Department plans to modify operations to include pumping NUF #2 at approximately twice the rate of #1 in order to level the trend over time, as suggested by the model results. At this time there has been no discussion of a sodium regulation on the horizon, and will continue as a guideline for Public Water Systems. The next regulation will likely be regarding manganese, and we are ahead of the curve by already providing treatment and filtration for iron and manganese at Knowles Crossing Treatment Facility for the Paul Daley and Knowles Crossing wells.

Winslow 2 Storage Tank Cleaning and Maintenance Project

Provincetown Water Department contracted with Caldwell & Associates to perform a cleaning and maintenance project to the Winslow 2 Storage tank. The project included fully draining the tank in order to clean and perform spot repairs to the interior, replace the existing ladder cage, replace and reconfigure the feed piping in a below-grade vault structure, and perform spot repairs to the exterior.

The tank draining operation began in late October and was fully drained by the first of November. The interior was heavily stained and the walls were cleaned using a proprietary, NSF and MassDEP approved cleaning agent called “Pantonite”. This product was also used on the Mt. Gilboa site during a similar project in 2015. Once the walls were cleaned the contractor performed several corrosion issues to the interior, mainly located at the welded seam areas on the steel plate walls. Temporary heat was needed in order to maintain proper temperature inside the tank during the month of December and January to allow proper curing of the epoxy fillers and coatings. The tank was disinfected, filled, sampled, and placed back in service on February 5, 2019.

The exterior work is currently underway, which does not involve the tank being placed out-of-service. The exterior portion of the project has experienced delays due to the wet weather pattern, however welded spot repairs have been performed, as well as replacement of the roof hatch. Several exterior areas have been primed and are awaiting the finish coat of exterior paint. The contractor is expected to be completed by the first week of June with all necessary repairs.

The repairs performed with this project are expected to prolong the life of the existing coating on both the interior and exterior by another 5-7 years, at which time the full-scale rehabilitation will need to be performed. The Water Department currently has both the Mt. Gilboa tank and Winslow 2 tank being rehabilitated on the Capital Improvement Plan (CIP) schedule within the next 7 years.

Commercial St Phase IV Re-construction Project – Water Service Renewals

As with previous phases of Commercial Street improvements, the current water infrastructure was evaluated within the planned project area. A water main assessment performed in 2017 did not show the water main to be in poor structural condition, as it did in the prior Phase III area. Therefore, only water services were targeted for replacement within the Phase IV project area.

Provincetown Water Department contracted with GFM Enterprises to replace approximately 87 water services from the water main to the curb stop valve, and to relocate one existing fire hydrant. All water services between Allerton Street and Howland Street were replaced. The work was started in October 2018, and continued until completion during the third week of December 2018.

WATER WITHDRAWALS AND PRODUCTION:

The overall annual withdrawal from all sources for the year 2018 was reported at *227,260,015* gallons, a increase of *3,170,555* gallons over 2017 (1.4%). This equates to an overall annual daily average withdrawal of *622,630* gallons per day, whereas the DEP permit is restricted to an annual average daily withdrawal of *850,000* gallons per day. Although this is a slight increase over the prior year, we continue to hold the lowest withdrawal volumes in several years. **Appendix 'A'** includes a table displaying a four year history of overall annual water withdrawals for the system, and also a ten year trend graph. The North Union Field well site continues to provide approximately 45% of the treated water for the system, as initially projected during study phases of the project. Overall water withdrawals from the other two sources, Paul Daley and Knowles Crossing, have been reduced since the addition of North Union Field.

Prior to the North Union Field well site being placed online in 2013, the Town operated under a MassDEP Declaration of Water Emergency due to the lack of ability to meet peak demands. The Town was allowed, under a Special Use Permit with the National Seashore, to withdrawal 330,000 gallons per day from the former North Truro Air Force Base wells from June 1st to October 1st. This additional withdrawal capacity allowed the Town to meet demands during the peak season. After several years of seeking a redundant supply, the North Union Field well site was placed online in 2013, with a permitted maximum daily withdrawal of 734,000 gallons. This additional withdrawal capacity allows the Town to meet peak day demands, provides redundancy to the Paul Daley Wellfield, and allows operational flexibility with the other supply sources. The additional

withdrawal volume from North Union Field does not increase the annual average daily withdrawal volume of 850,000 gallons per day.

However, during the summer peak period for water consumption, including a number of July and August weekends in addition to the July 4th holiday and Carnival Week peak periods, the water system is limited by the maximum daily withdrawal amounts specified in the DEP Water Management Permit and by safe yields for each of our three wellfields. Nearly all the total water withdrawal amount that is available for consumption on a peak demand day is already being used, even though annual water consumption has been flat or declining over the past 10 years and unaccounted for water shows an overall decline for this time period. Our annual use may be decreasing but our peak day and peak summer weekend use remains close to our maximum daily withdrawal capacity from all of our Water Management Act permitted sources.

UNACCOUNTED-FOR-WATER:

Historically, Provincetown Water Department has struggled with Unaccounted-for-Water (UAW), as indicated in the timeline located in **Appendix 'B'**. Unaccounted-for-Water, now referred widely as non-revenue water, is water that is lost before the customer's meter. UAW is calculated by the amount of finished (treated) water to the distribution system minus metered consumption minus municipal/authorized unmetered water. Aggressive leak detection efforts have significantly reduced UAW in recent years, and the Department continues to employ these efforts.

Provincetown Water Department met the MassDEP compliance standard of 10% unaccounted-for-water in 2017 for the first time in several years. The Water Department recently filed the MassDEP required Annual Statistical Report (ASR), and filed 10.4% UAW for calendar year 2018. Although this number is up slightly over 2017, UAW is down significantly over prior years. The Department maintains an aggressive leak detection program and continues to strive to maintain the 10% standard. Per the Massachusetts Department of Environmental Protection (MassDEP) Water Management Act Permit, Provincetown Water Department shall meet the 10% compliance standard by December 31, 2019 for two of the last three ASR's filed. However, should the Water Department not be able to meet the standard, MassDEP considers all Public Water Systems "functionally equivalent" if an on-going program is in place that ensures "best practices" for controlling water losses. The water loss control program shall be based on the American Water Works Association Manual 36 "Water Audits and Loss Control Programs." Fortunately for Provincetown Water Department, an M36 Audit was already performed under a MassDEP grant funded program, so the process is very familiar and a baseline audit exists.

FINANCIAL OUTLOOK:

Provincetown Water Department conducted a comprehensive financial review and subsequent rate study beginning in late 2016 and continuing throughout 2017, the first time a comprehensive review was performed in over five years. Since 2015, the Water Enterprise Fund has had operating shortfalls and it was forecasted that shortfalls would increase for at least ten years due to the widening gap between expenses and water revenues if a rate increase did not occur. Over the past ten years, expenses continued to increase with the rate of inflation

while rates remained the same and water consumption had been flat or declining. In order to have a financially viable system, the need for an immediate rate increase was necessary.

Based upon several options presented to the Provincetown Water & Sewer Board as well as the Provincetown Board of Selectmen, both Boards voted a rate increase to take effect for the "peak-season" 2018 beginning April 16, 2018. The rate schedule is included in **Appendix 'C'**, and includes an increase in the Basic Service Charge, which now includes the first 10,000 gallons of consumption. Peak-season rates will increase 2.5% annually for the first usage tier of 11,000 gallons to 15,000 gallons, with all other tiers receiving a 3.82% annual increase. The April 2019 billing cycle marks the first full year of billing under the new rate structure. Both billing periods (peak and off-peak) met expectations consistent with the water pro forma developed during the financial review process. It is expected the Water Enterprise Fund will continue to hit revenue projections outlined in the pro forma, and an analysis will be conducted after another full year of billing cycles have been performed. All of the current and ten year forecasted capital projects were included in the financial review process.

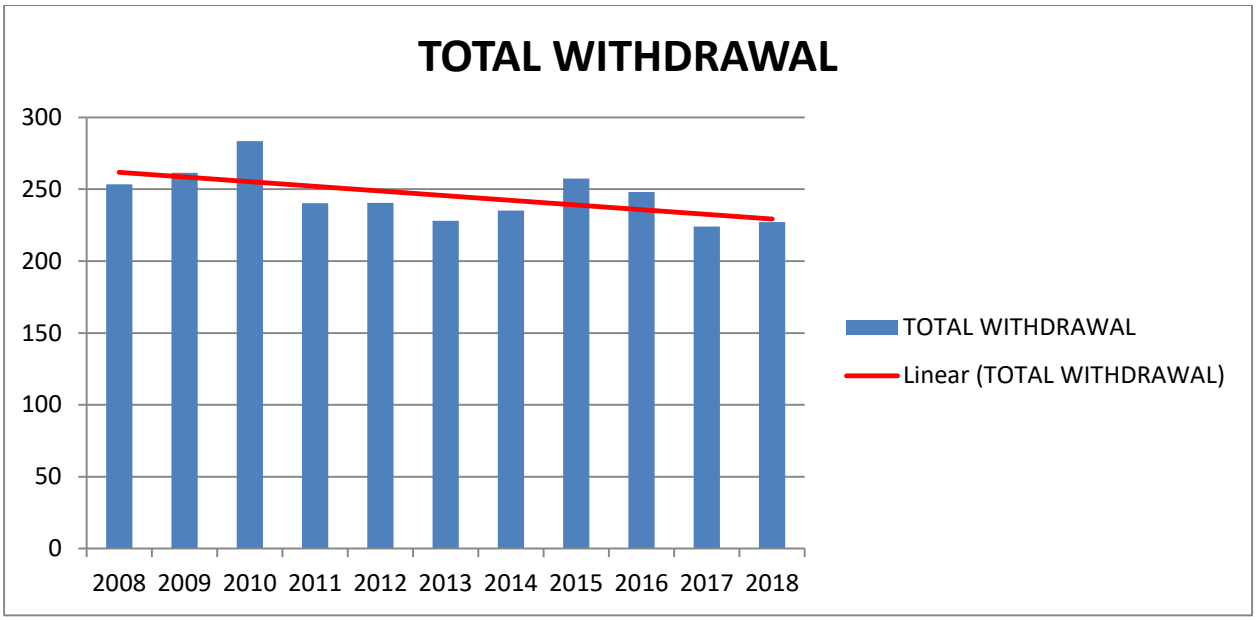
PWS AWARD 2019

Provincetown Water Department is proud to announce it was a recipient of a Massachusetts Department of Environmental Protection Public Water System Award for the 2019 year. This award, in the category of medium and large systems, was given for "beyond compliance". Eligibility for the award is for those systems that have not had violations in the past five years, and have gone above and beyond to maintain a compliance record. This award speaks to the level of all staff presently within the Department; our continued efforts to reduce UAW, our compliance record with required water sampling, and our compliance records for required reporting. We are proud and hope we may receive another award in the future!

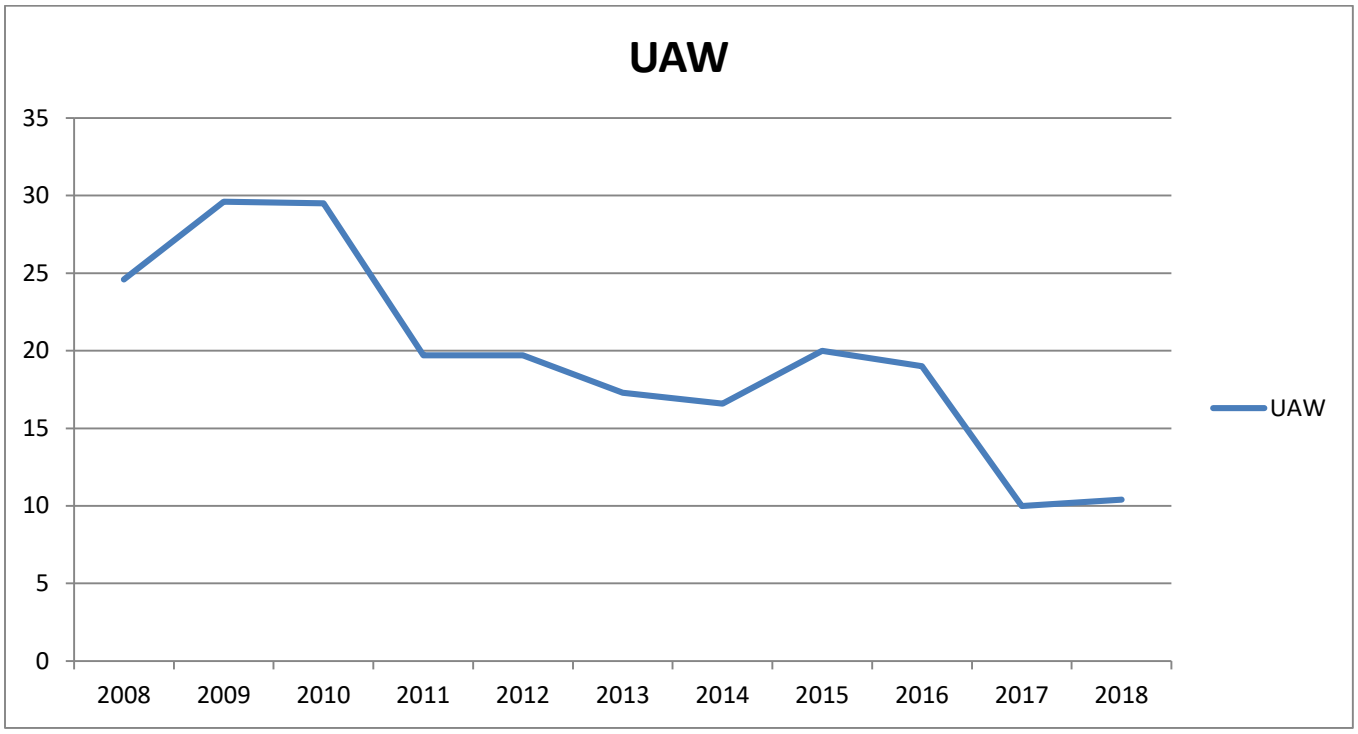
APPENDIX 'A'

GALLONS PUMPED

	2015	2016	2017	2018	2017/2018 % diff	Days > 850,000
Jan	12,444,478	13,194,744	9,823,278	12,991,581	32%	6
Feb	12,238,066	12,133,693	8,784,034	9,987,032	13%	8
March	11,006,750	14,051,164	10,640,748	9,488,604	-11%	7
April	14,134,676	15,236,864	13,083,394	13,167,325	1%	4
May	21,886,288	21,094,099	18,569,207	17,812,674	-4%	10
June	25,802,527	27,293,838	23,382,363	24,513,841	4%	16
July	37,798,899	38,146,466	36,820,291	36,090,172	-2%	26
August	40,032,554	38,856,572	37,291,255	34,951,353	-6%	28
Sept	29,954,900	25,983,804	25,323,808	24,076,699	-5%	15
Oct	21,281,046	18,097,287	18,134,796	17,488,817	-4%	8
Nov	15,275,667	11,903,588	11,954,447	13,298,521	11%	0
Dec	15,686,730	12,201,624	10,281,839	13,393,396	30%	0
ANNUAL TOTAL	***257,542,581***	***248,193,744***	***224,089,460***	***227,260,015***	1.4%	***128***
TOTAL THROUGH CURRENT MONTH	***257,542,581***	***248,193,744***	***224,089,460***	***227,260,015***		



APPENDIX 'B'


UAW
35
30
25
20
15
10
5
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
UAW

APPENDIX 'C'

BASIC SERVICE CHARGE

METER SIZE	BASIC SERVICE CHARGE PER BILLING PERIOD *INCLUDES 10,000 GAL. OF USAGE*
5/8"	$112.30
¾"	$119.50
1"	$141.20
1 ½"	$170.10
2"	$249.60

	Tier 1	Tier 2	Tier 3	Tier 4
	11,000 - 15,000	16,000 - 40,000	41,000 - 100,000	101,000 +
April 16, 2018-October 15, 2018	$5.13/1,000	$7.79/1,000	$12.46/1,000	$16.61/1,000
April 16, 2019-October 15, 2019	$5.25/1,000	$8.08/1,000	$12.94/1,000	$17.25/1,000
April 16, 2020-October 15, 2020	$5.38/1,000	$8.39/1,000	$13.43/1,000	$17.91/1,000
April 16, 2021-October 15, 2021	$5.52/1,000	$8.71/1,000	$13.94/1,000	$18.59/1,000
April 16, 2022-October 15, 2022	$5.66/1,000	$9.05/1,000	$14.48/1,000	$19.30/1,000
April 16, 2023-October 15, 2023	$5.80/1,000	$9.39/1,000	$15.03/1,000	$20.04/1,000
April 16, 2024-October 15, 2024	$5.94/1,000	$9.75/1,000	$15.60/1,000	$20.81/1,000
April 16, 2025-October 15, 2025	$6.09/1,000	$10.13/1,000	$16.20/1,000	$21.60/1,000
April 16, 2026-October 15, 2026	$6.24/1,000	$10.51/1,000	$16.82/1,000	$22.43/1,000
April 16, 2027-October 15, 2027	$6.40/1,000	$10.92/1,000	$17.46/1,000	$23.29/1,000

Off-Peak Rates October 16 – April 15

Usage Rates	Tier 1	Tier 2	Tier 3	Tier 4
	11,000 - 15,000	16,000 - 40,000	41,000 - 100,000	101,000 + +
	$3.00/1,000	$5.00/1,000	$7.00/1,000	$9.00/1,000

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Town of Provincetown & Truro, Massachusetts
Board of Selectmen Joint Meeting
Wednesday, May 29th, 2019

Water System Update

PROVINCETOWN WATER DEPT

5:00 p.m., Truro Community Center

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

PROVINCETOWN WATER DEPARTMENT: "AT A GLANCE."

- "The Town of Provincetown Water Department operates and maintains a total of three groundwater sources located within the Town of Truro: the Knowles Crossing Wellfield consisting of three gravel packed wells, the Paul Daley Wellfield consisting of six active gravel packed wells, and the North Union Field Well Site consisting of two gravel packed wells.
- Two water treatment facilities; a 1.2 MGD membrane filtration facility and a .734 MGD corrosion control facitlity.
- The water distribution system consists of approximately forty-five (45) miles of water mains;
- One booster pump station
- Two (2) water storage tanks totaling 6.4 millions gallons;
- Two hundred eighty-two (282) fire hydrants;
- Seven hundred (700) gate valves;
- Three thousand, none hundred, twenty-three (3,923) service accounts.

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Project Highlights 2018

- Hydraulic Model & System Atlas Update
- North Union Field Groundwater Model Update
- Winslow Storage Tank Cleaning & Rehabilitation Project
- Water Service Renewals – Phase IV Commercial Street Re-Construction Area

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Hydraulic Model & System Atlas Update 2018

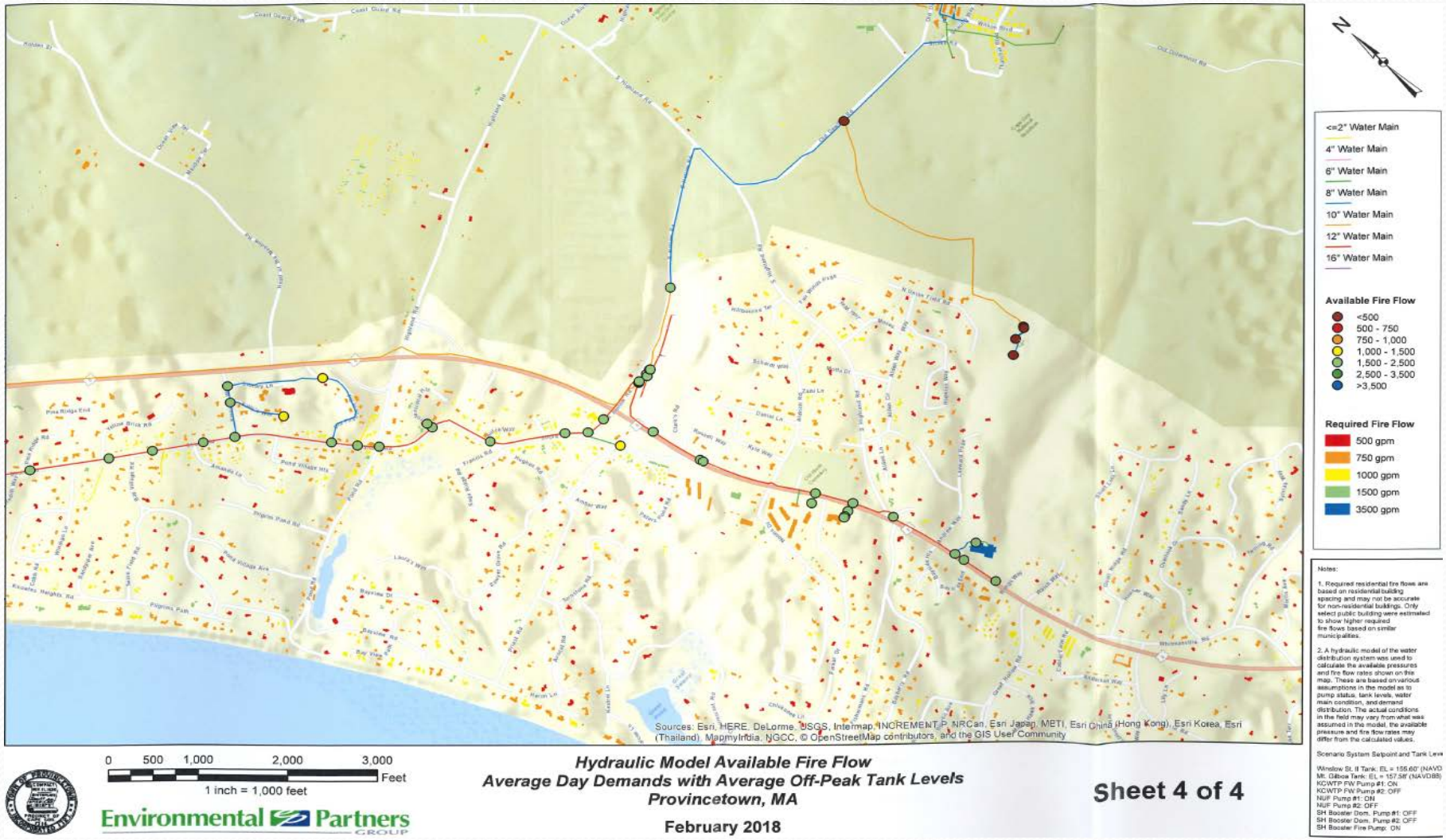
- Water Dept. contracted with Environmental Partners Group, water engineers of record, to perform an update to the existing hydraulic model for the entire system
- Hydraulic model provides ability to analyze current system design and evaluates fire flow rates throughout the system
- As expected, the system performed very well, with limited areas of deficiency
- The Truro portion of the system, nearest the terminus on Route 6, is operated by a booster pump station. A storage tank is ultimately recommended to increase fire flows and stabilize system pressures in the area, as further expansion on this end will not be possible.

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Hydraulic Model Update – Provincetown Fire Flows

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Hydraulic Model Update – Truro Fire Flows Existing



0 500 1,000 2,000 3,000 Feet
1 inch = 1,000 feet

Environmental Partners GROUP

Hydraulic Model Available Fire Flow
Average Day Demands with Average Off-Peak Tank Levels
Provincetown, MA

February 2018

Sheet 4 of 4

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Hydraulic Model Update – Truro Storage Tank Scenario

0 500 1,000 2,000 3,000 Feet

1 inch = 1,000 feet

Environmental Partners GROUP

Proposed N. Truro Water Storage Tank Scenario
Hydraulic Model Available Fire Flow
Max Day Demands with Average Peak Tank Levels
Provincetown, MA
February 2018

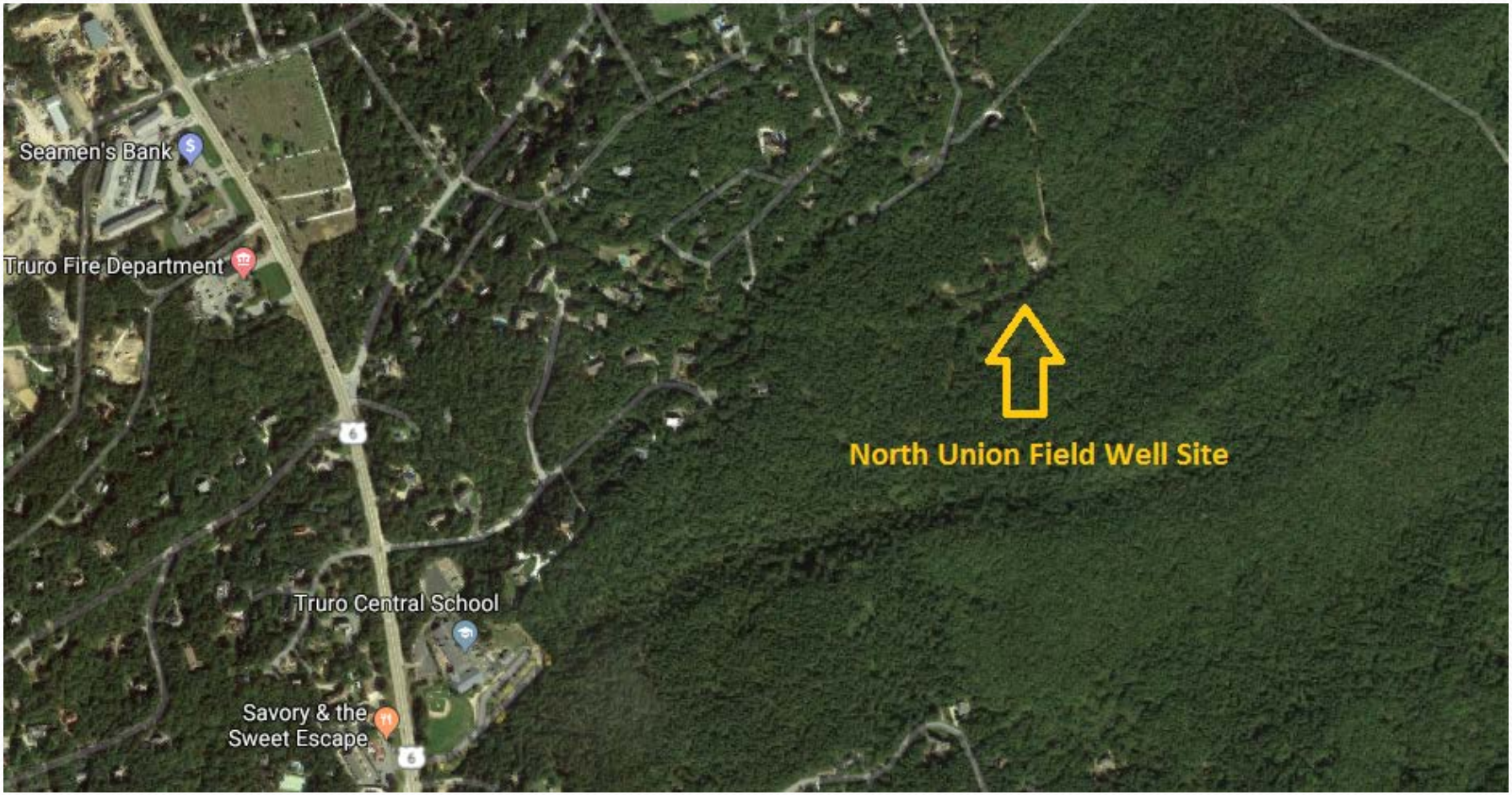
North Union Field Well Site – Groundwater Model Update

NUF Water Quality Monitoring Program Background

- Water Dept. performs quarterly water quality sampling at six (4) observation wells in accordance with the 2011 MassDEP New Water Source Approval (Observation Wells 9 – 12, each containing shallow, intermediate and deep)
- Monitoring program ensures the potability of the water produced by monitoring intermediate and deep aquifer zones
- Water quality data on file since well site start-up in 2013, including Sodium, Chloride, Sulfate, Total Dissolved Solids (TDS), Iron and Manganese

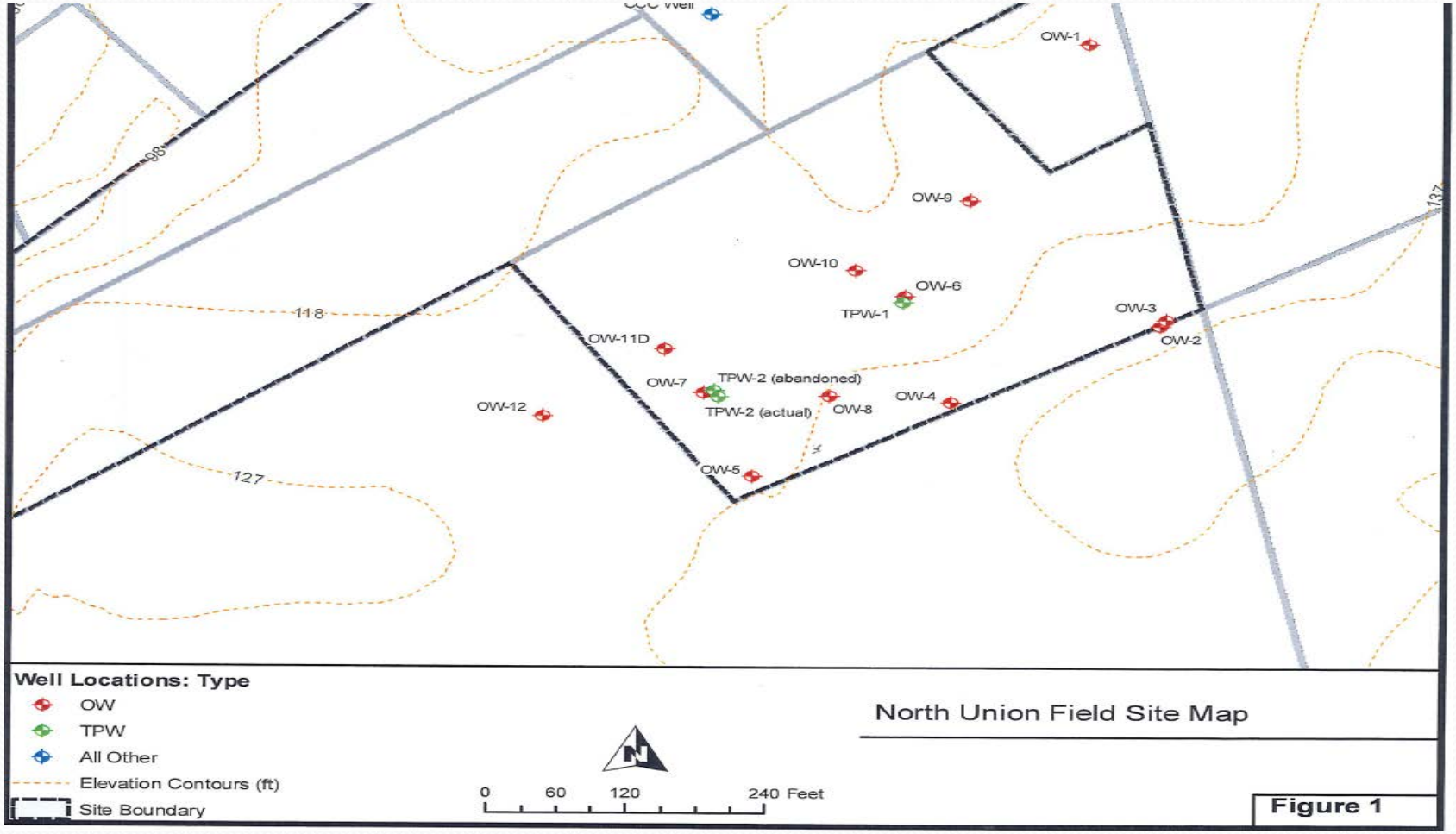
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Groundwater Model Update



TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Groundwater Model Update



TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

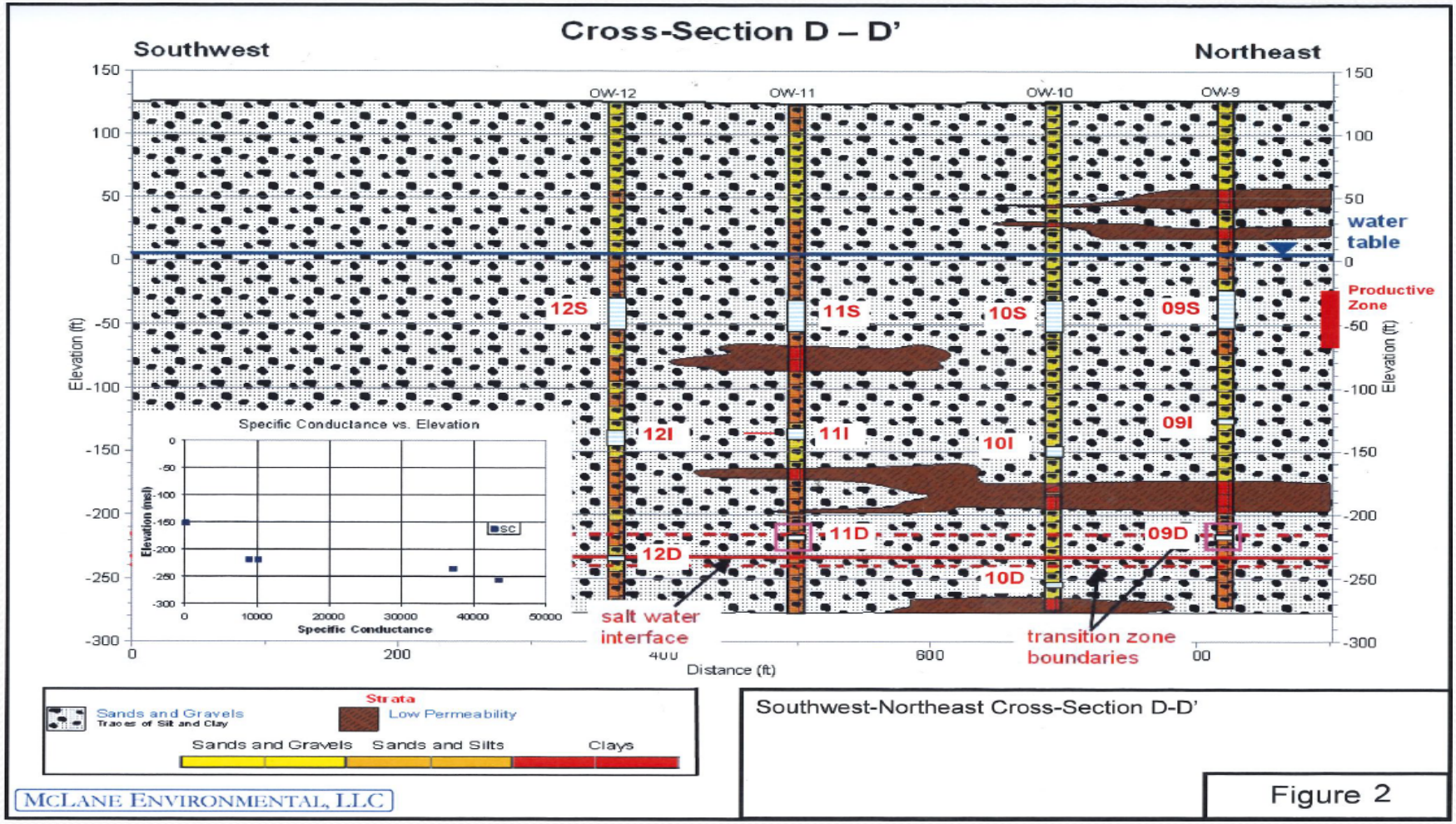
North Union Field Well Site – Groundwater Model Update

Groundwater Model Update Background

- Original model was developed in 2011 prior to well start-up
- OW-9D & OW-11D showed a gradual increase in sodium, chloride, and TDS levels over five year period. Both wells are screened near the top of the transition zone above the freshwater-saltwater interface.
- The initial groundwater model predicted lower initial sodium, chloride and TDS than what was field measured. Also, rate of change in the in water quality data was different.
- Five year field results suggested the model should be adjusted to match observed water quality results now that sufficient data has been collected from the site.
- Model was updated based on salinity measured in the monitoring well network, and in order to evaluate long term pumping effects, was run over 100-year period. Additionally, model was upgraded to evaluate the production wells.

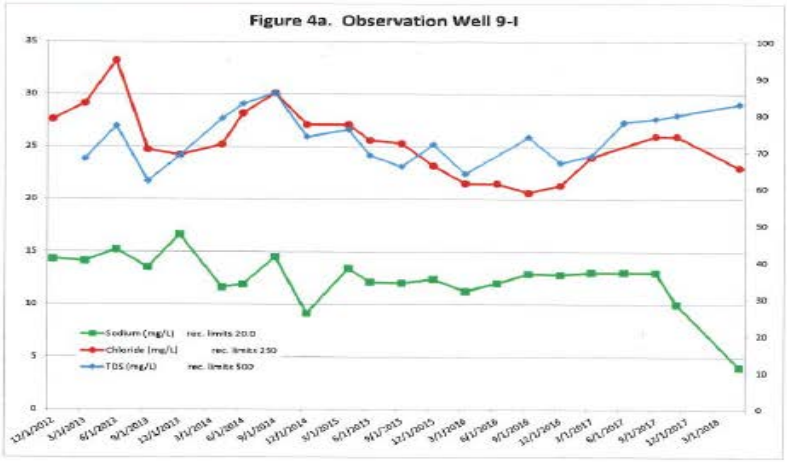
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

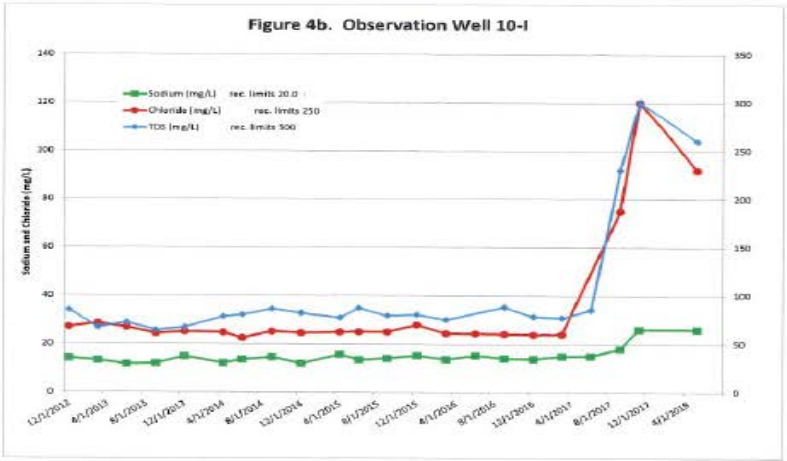
North Union Field Well Site – Groundwater Model Update

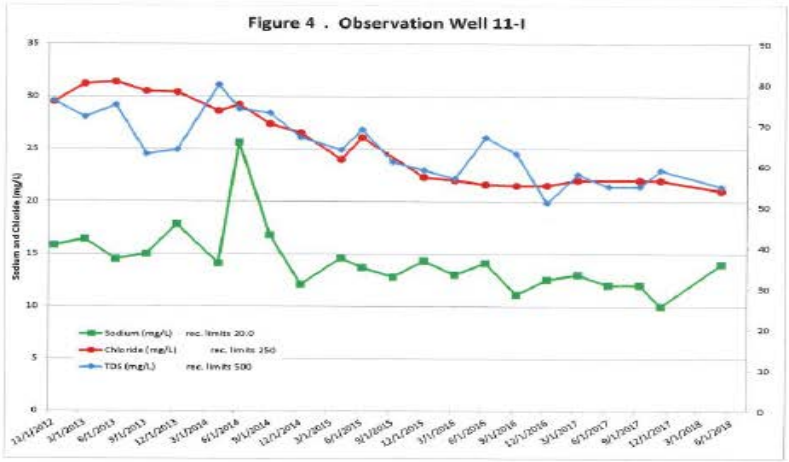


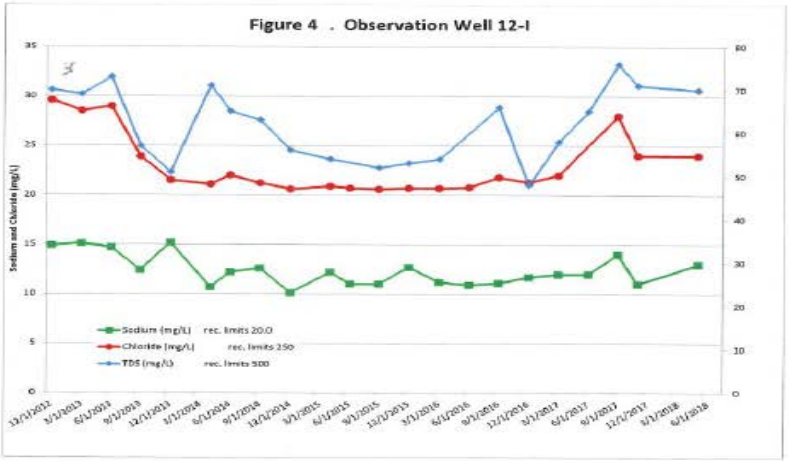
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Field Collected Data 2013-2018 – INTERMEDIATE WELLS



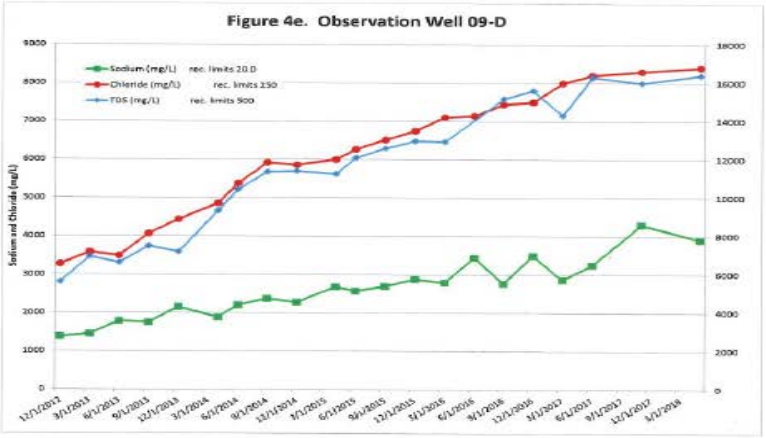


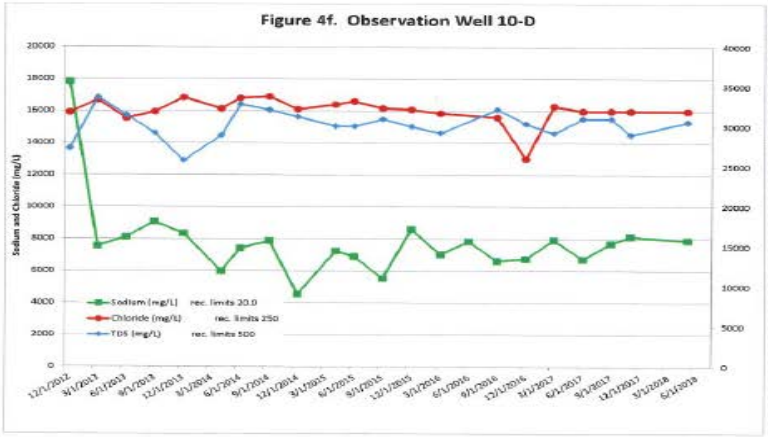


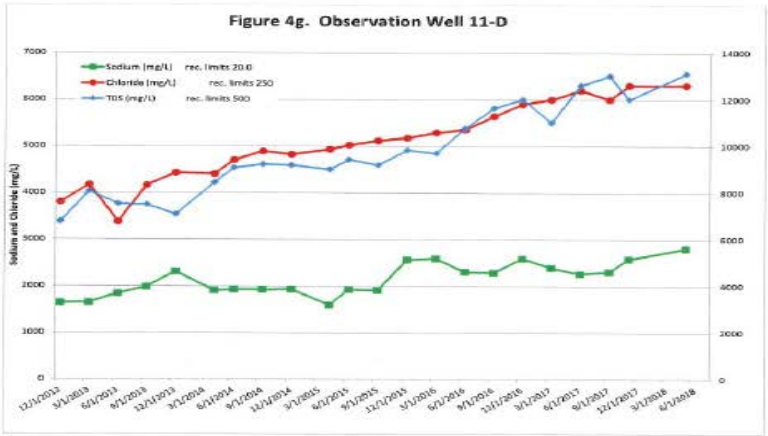


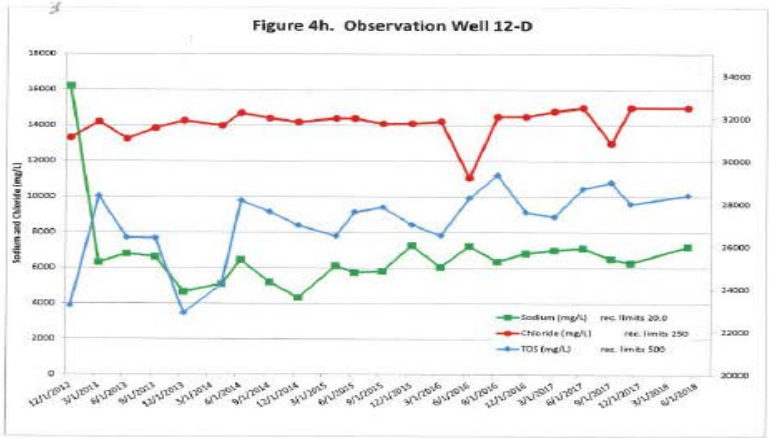
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Field Collected Data 2013-2018 – DEEP WELLS









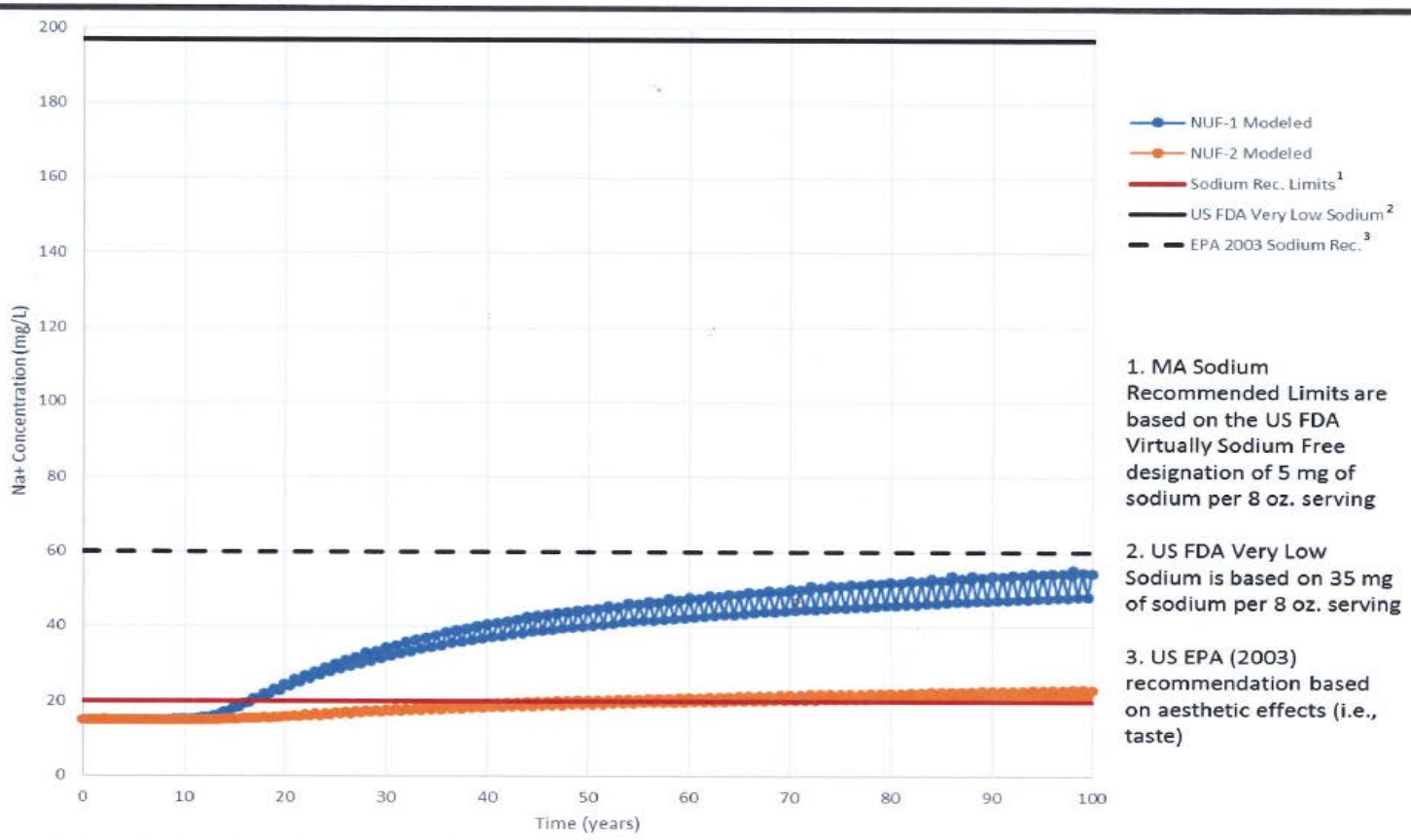
North Union Field Well Site – Groundwater Model Update

Groundwater Model Update Conclusions

- Updated model included NUF-1 & NUF-2 production wells as a more accurate tool for predicting future conditions.
- Under current pumping conditions, chloride and sodium levels in NUF-1 and NUF-2 will remain steady at approximately 30 mg/L Cl and 15 mg/L Na until 2024. After 2024, levels gradually rise and slowly level off after several decades of pumping.
- NUF-1 is predicted to reach 100 mg/L Cl and 45 mg/L Na by 2072; NUF-2 is predicted to reach 45 mg/L Cl and 20 mg/L by 2072.
- After 100 years of pumping, salinity reaches an equilibrium with minor increases afterward, assuming recharge, nearby well pumping, and sea levels do not drastically change.
- Preliminary wellfield management analyses indicate increasing the pumping rate of NUF-2 to twice that of NUF-1 will cause concentrations within the wells to roughly equalize.

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Groundwater Model Update



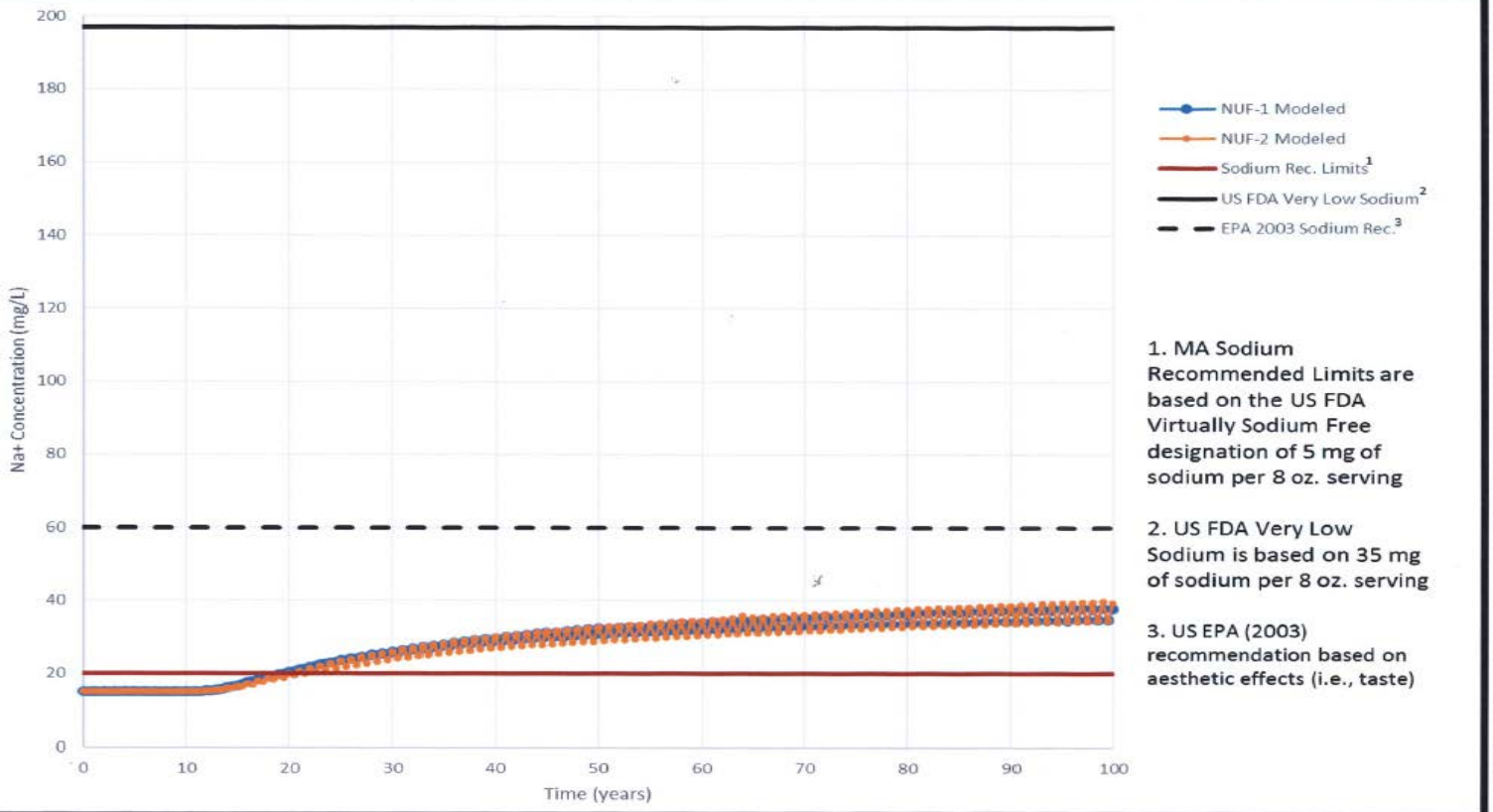
McLane Environmental LLC
Consulting Scientists & Engineers

Sodium concentration (mg/L) in NUF pumping wells after 100 years of pumping at current rate.

Figure 6

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

North Union Field Well Site – Groundwater Model Update



McLane Environmental LLC
Consulting Scientists & Engineers

Sodium concentration (mg/L) in NUF pumping wells after 100 years of pumping with NUF-2 pumping twice as much as NUF-1.

Figure 5.2

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Winslow 2 Storage Tank Cleaning & Maintenance Project

- Water Department contracted with Caldwell & Associates to perform maintenance to the Winslow 2 Storage tank, work began November 2018.
- Tank was fully drained to perform cleaning and spot repairs to the interior, similar project as Mt. Gilboa Tank that was performed in 2015.
- Feed piping in a below-grade vault was replaced and reconfigured while the tank was out of service.
- Work on the exterior has begun April 2019, including spot repairs to walls and roof, roof hatch and ladder cage replacement, and roof vent replacement.

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Winslow 2 Storage Tank Cleaning & Maintenance Project

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Phase IV Commercial Street Project – Water Service Replacement

- Water Department contracted with GFM Enterprises to perform water service replacement within the Phase IV Commercial Street re-construction area (Allerton Street to Howland Street)
- Project included replacing 87 water services from water main to curb stop valve, and re-locating one fire hydrant within the project area
- Work was completed within budget and on schedule (completed December 2018).

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Water Withdrawals and Production 2018

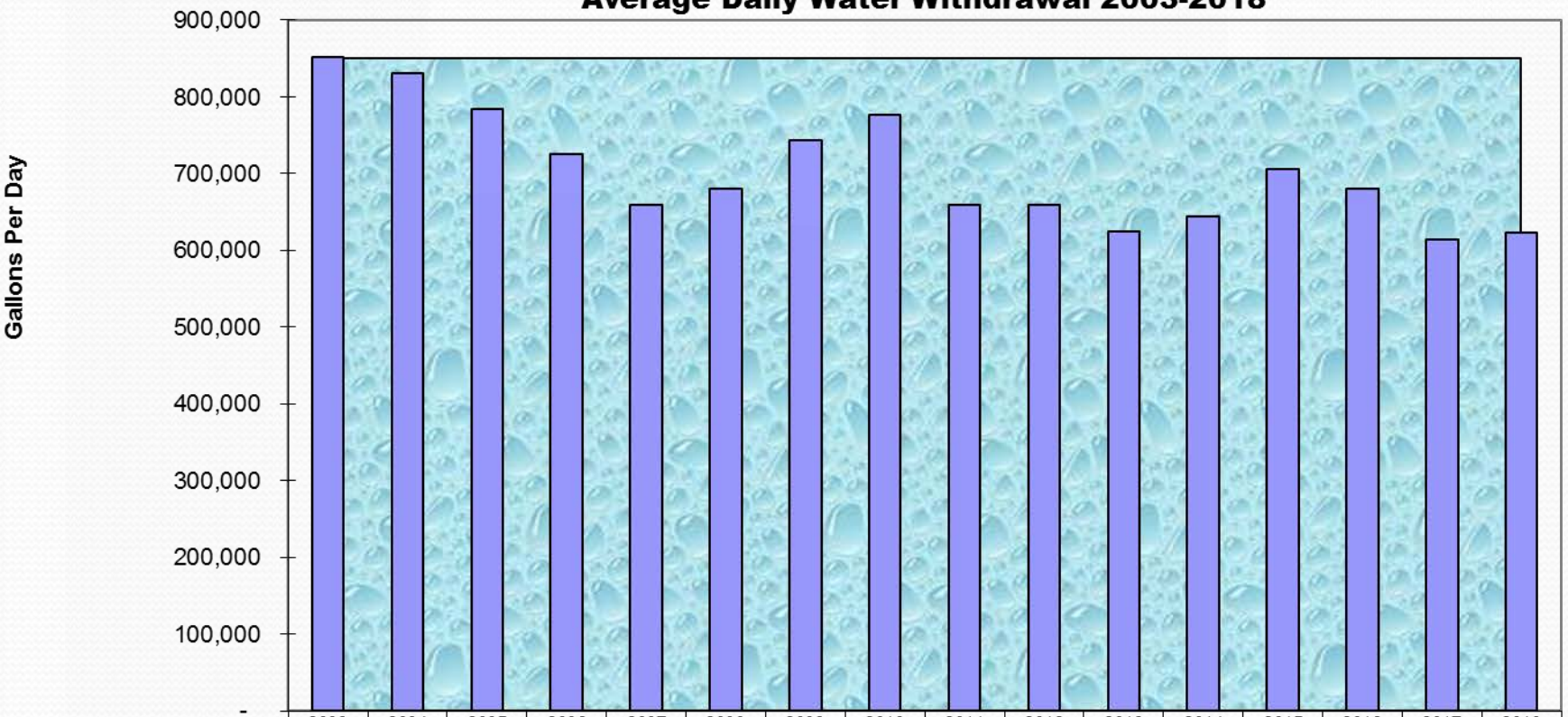
- Overall water withdrawals for 2018 were 227,260,015 from all sources. This reflects an increase of 3,170,555 gallons over 2017.
- Annual Average daily withdrawal for 2018 was 622,630 gallons. Three year Annual Average Withdrawal equals 638,852 gallons; MassDEP permit = max annual average of 850,000.
- Peak-season withdrawals, particularly the months of July and August, are staying consistent, between 35-40 million gallons per month (an average of 1.2 – 1.3 million per day), with maximum withdrawal days (namely July 4th and Carnival) exceeding 1.7 million gallons. Our current maximum aggregate pumping capacity is approximately 1.7 million gallons per day.
- Paul Daley Wellfield provides approximately 48% of total volume; NUF provides approximately 38%; Knowles Crossing wellfield 14%

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Water Withdrawals and Production 2018

Provincetown Water System

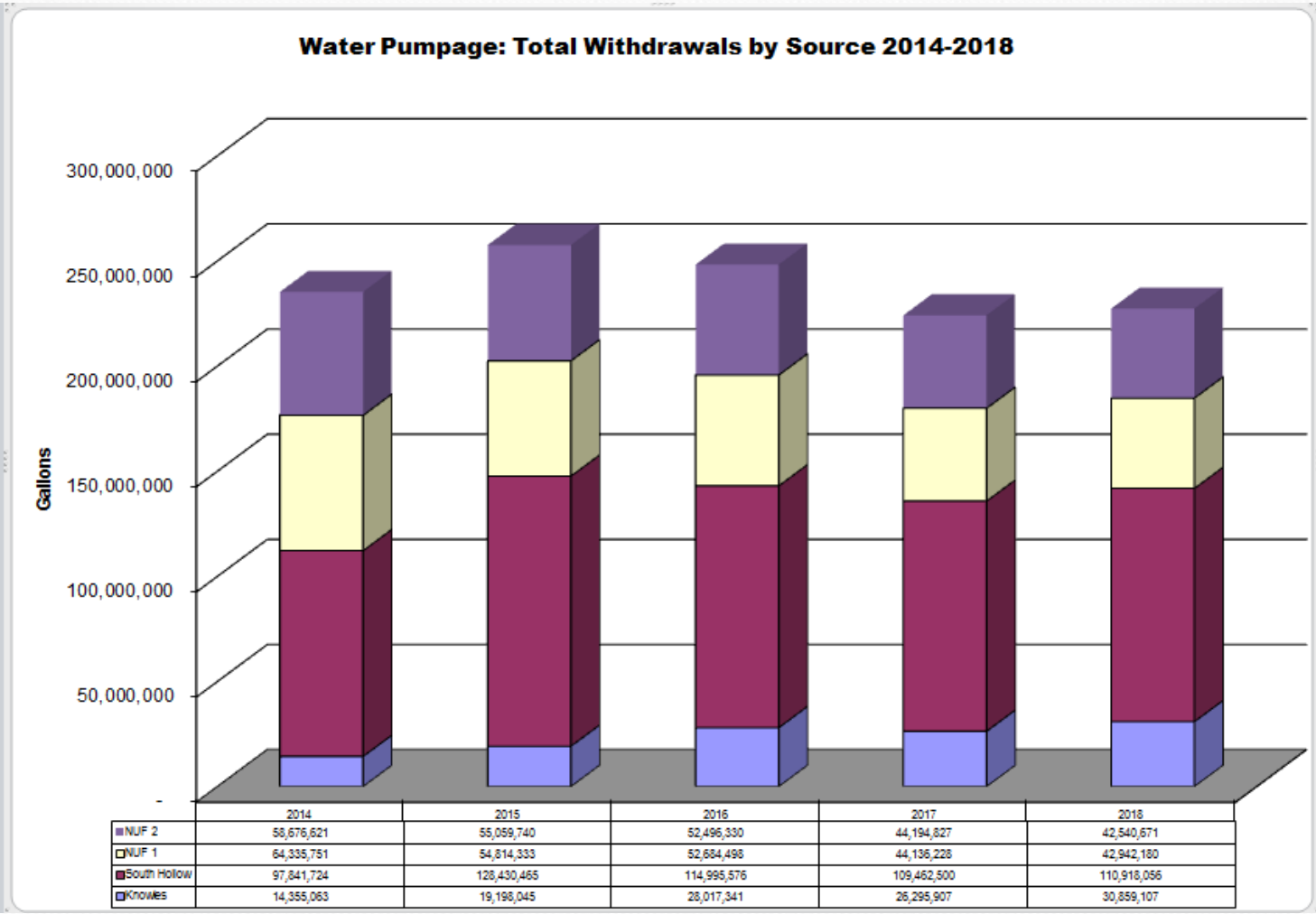
Average Daily Water Withdrawal 2003-2018



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DEP Permit	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000	850,000
Daily Avg	852,377	829,898	784,666	724,797	658,563	679,705	743,476	776,830	658,511	659,157	624,902	644,409	705,596	679,835	613,944	622,630

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Water Withdrawals and Production 2018



	2014	2015	2016	2017	2018
NUF 2	58,676,621	55,059,740	52,496,330	44,194,827	42,540,671
NUF 1	64,335,751	54,814,333	52,684,498	44,136,228	42,942,180
South Hollow	97,841,724	128,430,465	114,995,576	109,462,500	110,918,056
Knowles	14,355,063	19,198,045	28,017,341	26,295,907	30,859,107

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Unaccounted-for-Water (UAW)

- MassDEP Standard is 10% UAW, calculated annually within Annual Statistical Report (ASR)
- Historically, Provincetown Water Dept. has struggled with UAW, as high as 30% in recent years
- A MassDEP grant funded American Water Works Association “Water Audit” was performed in 2017 as a pilot study. Results confirmed the majority of UAW was “real losses”….Leaks!
- Aggressive leak detection and service replacements have helped keep UAW under control.
- For the first time in several years, PWD has reported 10% UAW for both the 2017 and 2018 ASRs.

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Defining Unaccounted For Water (UAW); and How it is Calculated

WATER PRODUCED THAT IS LOST **PRIOR** TO REACHING THE CUSTOMER'S METER

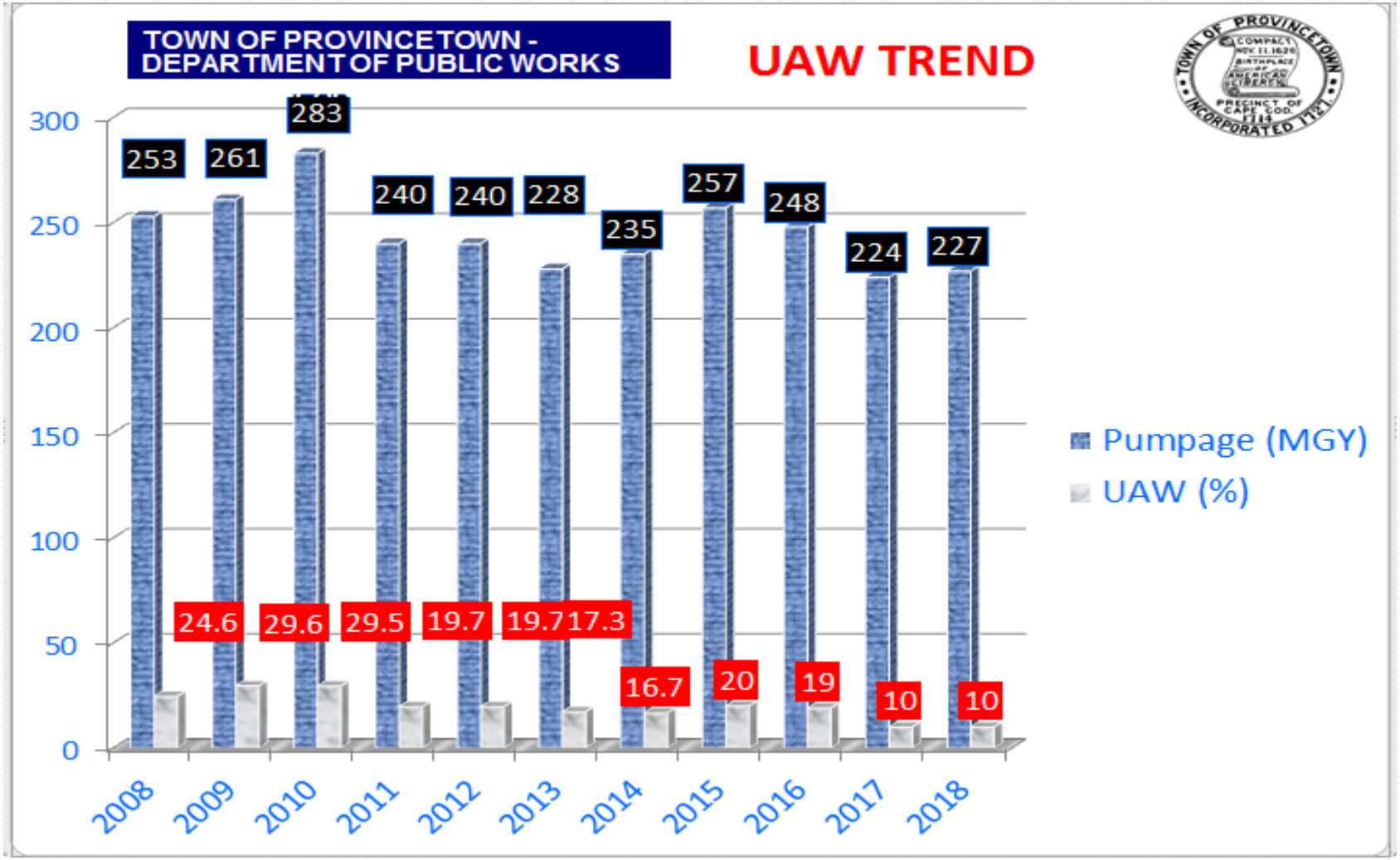
WATER PRODUCED

- MINUS Metered Water; and
- MINUS Authorized Unmetered Water (CEMU) (EQUALS) =

UNACCOUNTED-FOR-WATER (UAW)

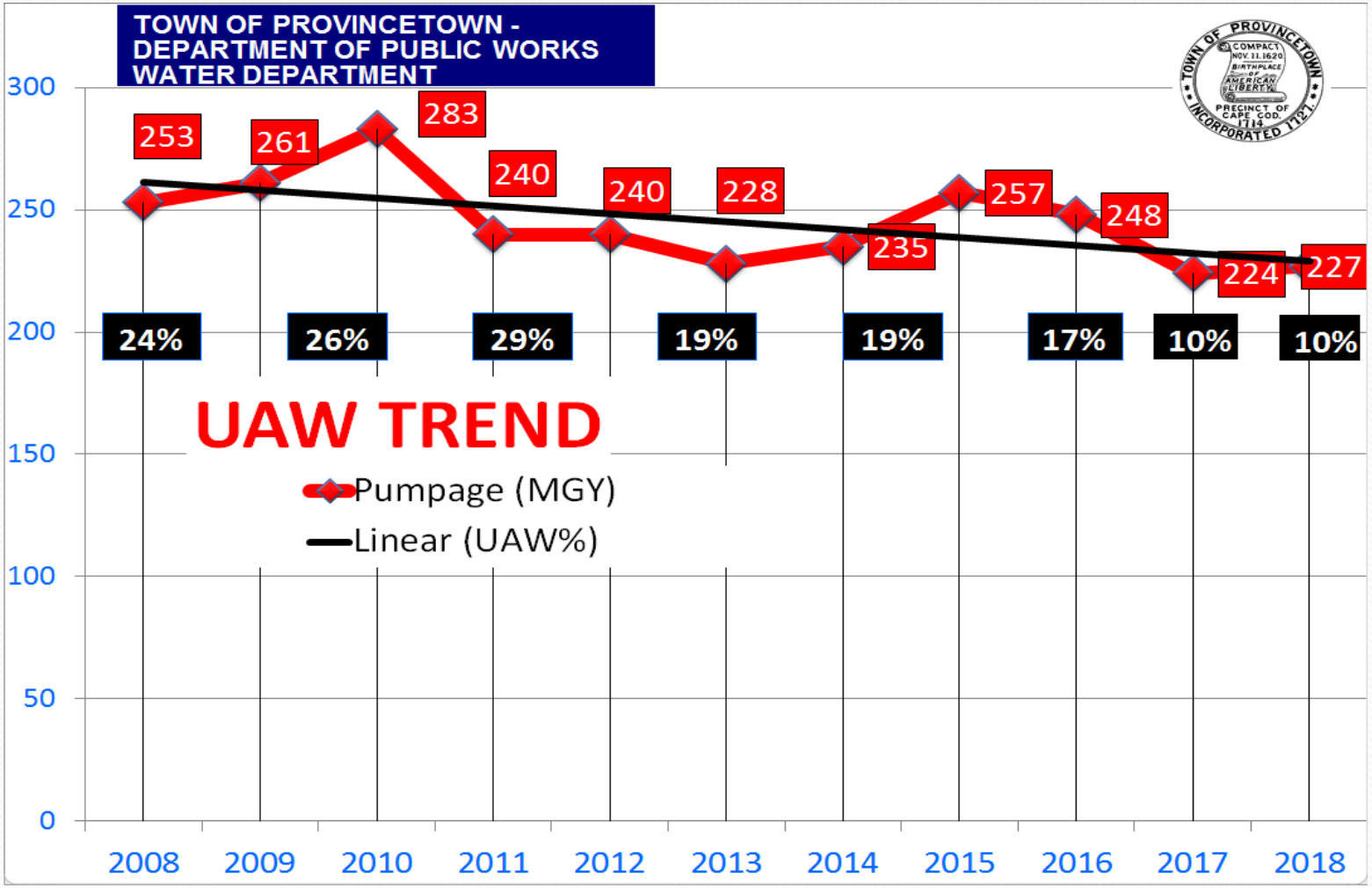
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Unaccounted-for-Water (UAW)



TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Unaccounted-for-Water (UAW)

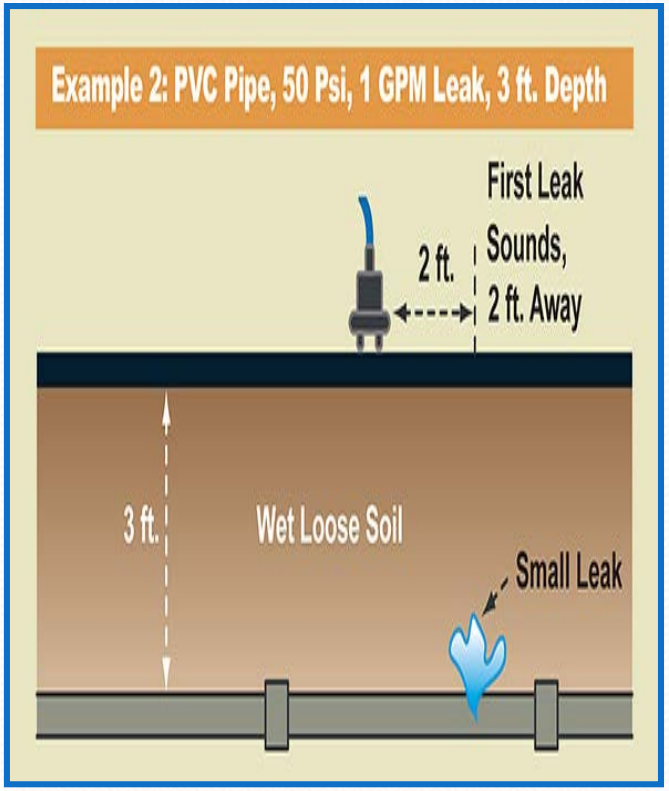


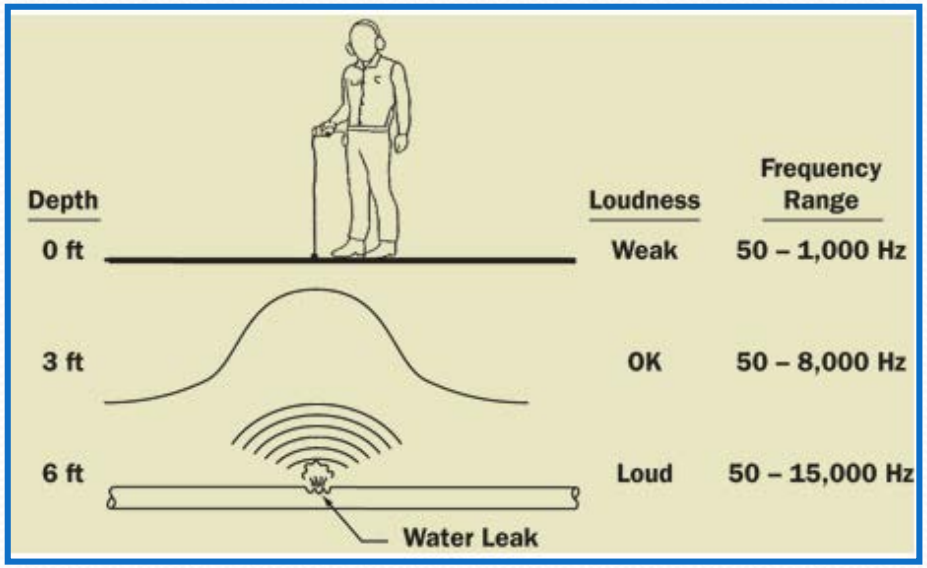
- Locating leaks in plastic and asbestos cement pipe is far more challenging than in metal pipelines. A WaterRF research project by the National Research Council of Canada (Hunaidi et al.1999) identified the frequencies of plastic pipe leaks at less than 50 HZ with an amplitude of the sound diminishing at a rate of about 25 decibels per 100 meters (8 decibels per 100 feet).

Water Research Foundation, Web Report #4144
"Pipe Location and Leakage Management for Small Water Systems"

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

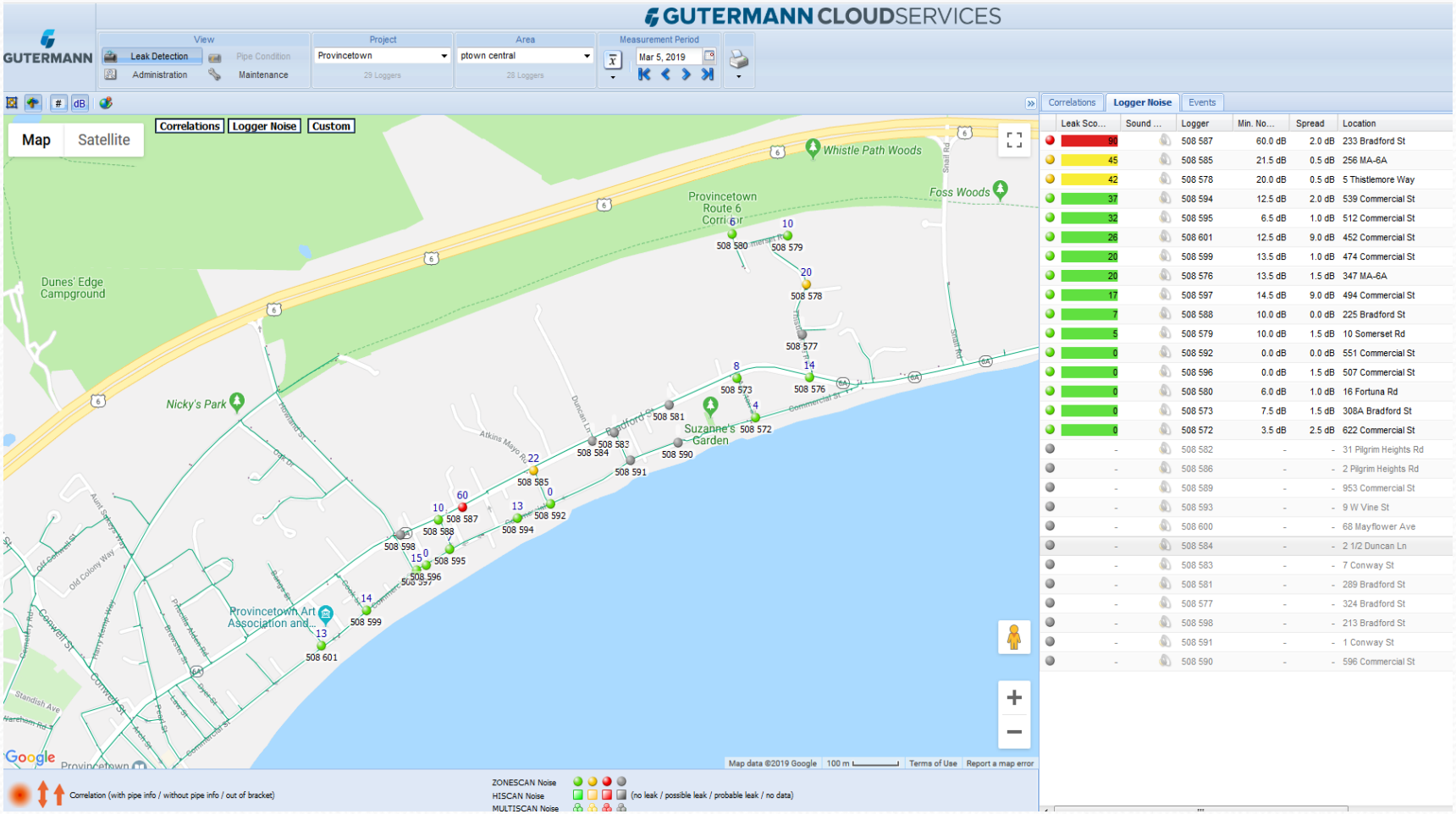
LEAK NOISE ON PIPES - ILLUSTRATED





TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Data Logging Leak Noise Correlators



TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

FINANCIAL OVERVIEW

- Rate increase approved December 2017; new rates went into effect April 15th 2018 (“peak-season” billing cycle).
- Recently finished second billing cycle under new rates; we have now performed one “peak” and one “off-peak” billing cycle.
- Off-peak rates generated additional $171k compared to off-peak 2018 (old rate was in effect). This is due to the new basic fee structure which includes first 10,000 gallons.
- Revenues for both cycles are consistent with the proforma statement that was developed during the rate study process.
- Total WEF retained earnings are approximately $1.045M

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

SCHEDULE OF WATER USER RATES

SCHEDULE OF WATER USER RATES

On December 11, 2017 the Provincetown Water and Sewer Board held a public hearing and voted to adopt the following schedule of water rates.

Basic Service Fee*- (Per Billing Period):

Meter Size	*Includes 10,000 Gallons of Usage
5/8"	$112.30
3/4"	$119.50
1"	$141.20
1½"	$170.10
2"	$249.60

Peak Period – April 16 through October 15:

	Tier 1	Tier 2	Tier 3	Tier 4
Usage Rates	**11,000 – 15,000**	**16,000 – 40,000**	**41,000 – 100,000**	**101,000 +**
April 16, 2018-October 15, 2018	$5.13/1,000	$7.79/1,000	$12.46/1,000	$16.61/1,000
April 16, 2019-October 15, 2019	$5.25/1,000	$8.08/1,000	$12.94/1,000	$17.25/1,000
April 16, 2020-October 15, 2020	$5.38/1,000	$8.39/1,000	$13.43/1,000	$17.91/1,000
April 16, 2021-October 15, 2021	$5.52/1,000	$8.71/1,000	$13.94/1,000	$18.59/1,000
April 16, 2022-October 15, 2022	$5.66/1,000	$9.05/1,000	$14.48/1,000	$19.30/1,000
April 16, 2023-October 15, 2023	$5.80/1,000	$9.39/1,000	$15.03/1,000	$20.04/1,000
April 16, 2024-October 15, 2024	$5.94/1,000	$9.75/1,000	$15.60/1,000	$20.81/1,000
April 16, 2025-October 15, 2025	$6.09/1,000	$10.13/1,000	$16.20/1,000	$21.60/1,000
April 16, 2026-October 15, 2026	$6.24/1,000	$10.51/1,000	$16.82/1,000	$22.43/1,000
April 16, 2027-October 15, 2027	$6.40/1,000	$10.92/1,000	$17.46/1,000	$23.29/1,000

Off-Peak Period –October 16 through April 15:

	Tier 1	Tier 2	Tier 3	Tier 4
Usage Rates	**11,000 – 15,000**	**16,000 – 40,000**	**41,000 – 100,000**	**101,000 +**
	$3.00/1,000	$5.00/1,000	$7.00/1,000	$9.00/1,000

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

SCHEDULE OF WATER USER RATES – (Cont'd)

Schedule of Various Water-Related Fees:

Miscellaneous Fees	
Turn on/off: Monday - Thursday: 7:00 a.m. - 4:00 p.m.; or Friday: 7:00 a.m. - 11:00 a.m.	No Charge
Turn on/off: (Outside regular business hours)	$150.00
Meter Testing	$50.00, waived if meter over-registers
Fire Flow Test	$75.00
Mark Out Water Service	No Charge
Leak Detection	No Charge
Damaged/Frozen Meter	Current Meter Price
Private Water Main/Commercial Fire Service Inspection	$2.75/LF of pipe, $225.00 Minimum

Tap Fees	
1" Service Tap	$2,100.00 (add'l $375.00 for street crossing)
1 ½" Service Tap	$2,300.00 (add'l $375.00 for street crossing)
2" Service Tap	$2,500.00 (add'l $375.00 for street crossing)
>2" Service Tap (incl. Fire Service)	Private Contractor/$100.00 Permit Fee

Backflow & Cross Connection Survey	
RPPA & DCVA	$75.00 per device
Cross Connection Survey	$125.00

On September 18, 2015 the Provincetown Water and sewer Board held a public hearing and voted to adopt the following schedule of miscellaneous water-related fees. On October 13, 2015, the Provincetown Board of Selectmen voted, pursuant to MGL c. 40, §22F, to approve the recommendation of the Water and Sewer Board, effective October 29, 2015.

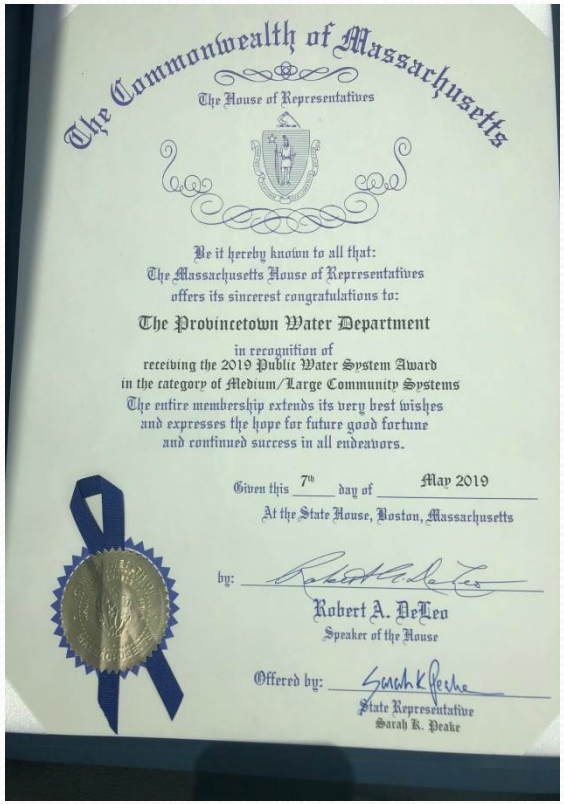
TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

UPCOMING PROJECTS

- Water main replacement project on lower Montello Street and lower Conant Street – Provincetown
- Knowles Crossing Project – Distribution garage construction
- Radio modem upgrade and integration (SCADA system)
- Membrane filter modules – full scale replacement
- Well redevelopment at Knowles Crossing and Paul Daley Wellfields (9 active wells total)
- Shank Painter Road water main replacement

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

MassDEP PWS AWARD 2019



The Commonwealth of Massachusetts
The House of Representatives

Be it hereby known to all that:
The Massachusetts House of Representatives
offers its sincerest congratulations to:

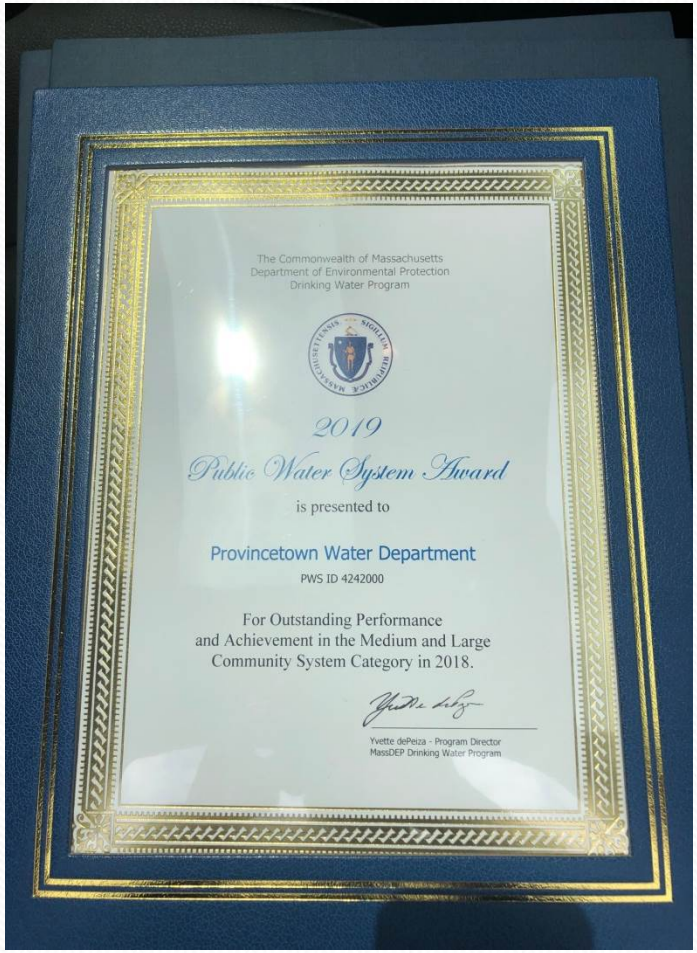
The Provincetown Water Department

in recognition of
receiving the 2019 Public Water System Award
in the category of Medium/Large Community Systems
The entire membership extends its very best wishes
and expresses the hope for future good fortune
and continued success in all endeavors.

Given this 7th day of May 2019
At the State House, Boston, Massachusetts

by: Robert A. DeLeo
Speaker of the House

Offered by: Sarah K. Peake
State Representative
Sarah K. Peake



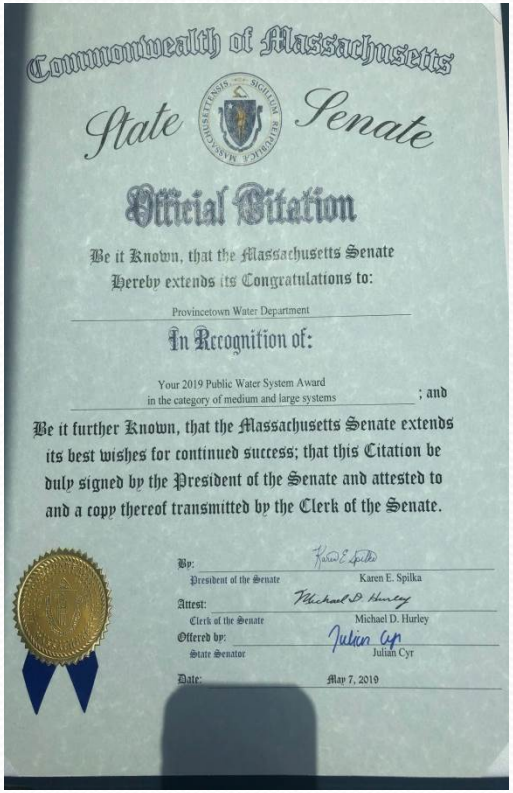
The Commonwealth of Massachusetts
Department of Environmental Protection
Drinking Water Program

2019
Public Water System Award
is presented to

Provincetown Water Department
PWS ID 4242000

For Outstanding Performance
and Achievement in the Medium and Large
Community System Category in 2018.

Yvette dePeiza - Program Director
MassDEP Drinking Water Program



Commonwealth of Massachusetts
State Senate

Official Citation

Be it Known, that the Massachusetts Senate
Hereby extends its Congratulations to:

Provincetown Water Department

In Recognition of:

Your 2019 Public Water System Award
in the category of medium and large systems ; and

Be it further Known, that the Massachusetts Senate extends its best wishes for continued success; that this Citation be duly signed by the President of the Senate and attested to and a copy thereof transmitted by the Clerk of the Senate.

By: Karen E. Spilka
President of the Senate

Attest: Michael D. Hurley
Clerk of the Senate

Offered by: Julian Cyr
State Senator

Date: May 7, 2019

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

Our commitment then…

TOWN OF PROVINCETOWN
DEPARTMENT OF PUBLIC WORKS – WATER DEPARTMENT

proudly continues to the present.

Thank you for your attendance!