Water Balance (and Audits) – How is Your System Doing?

New Hampshire Water Works Association

October 22, 2020

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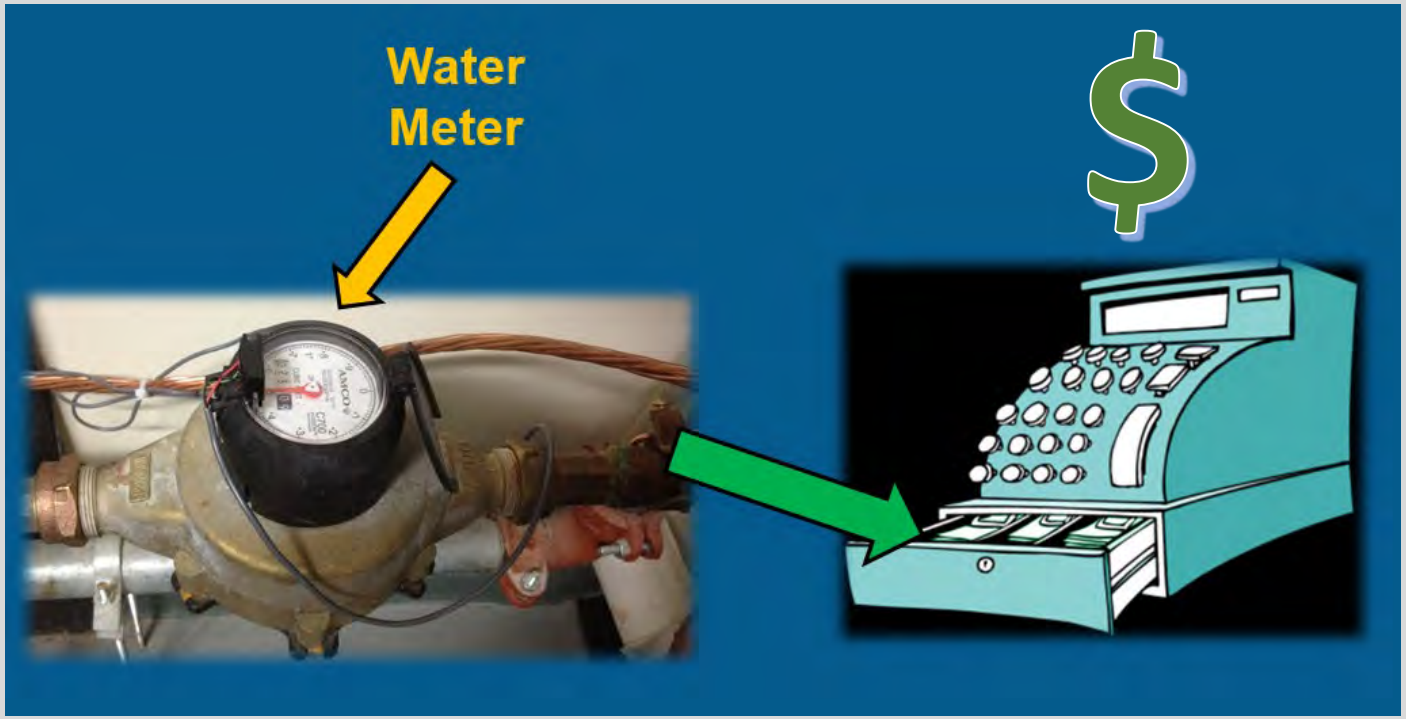
City of Portsmouth, New Hampshire

What is Water Balance and Why Worry About it?

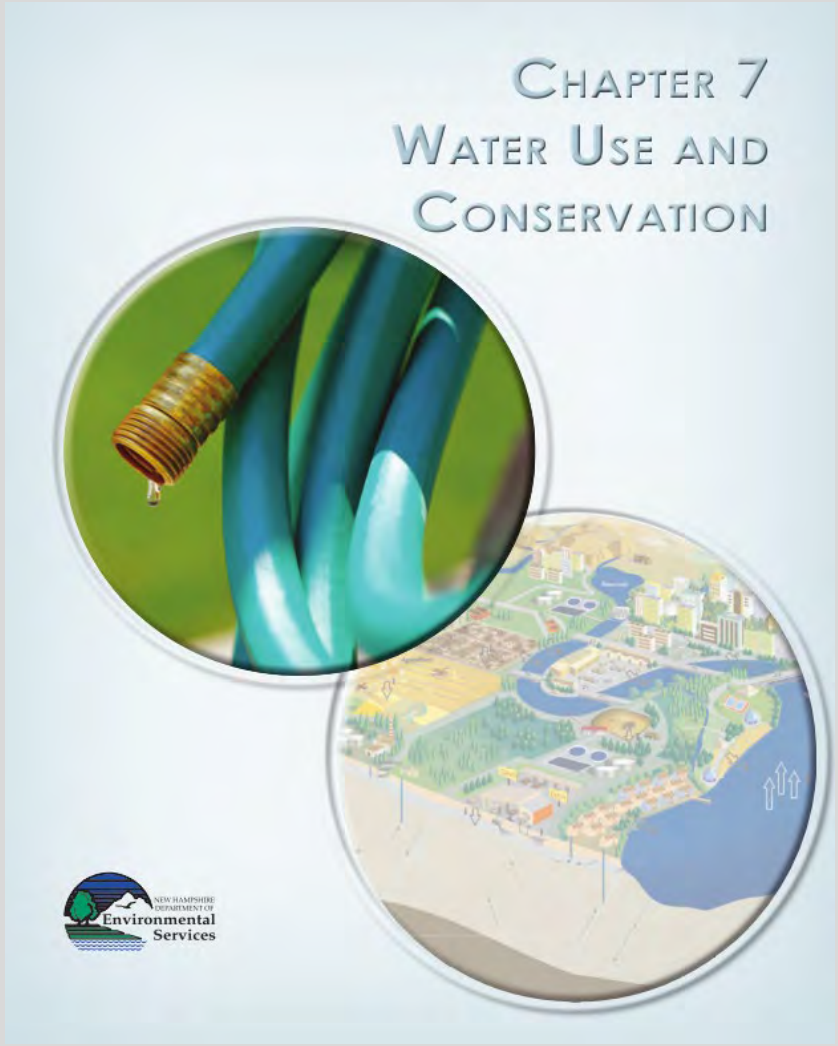
- There is value in tracking both production and consumption volumes
- That value can include improvements in operations, money savings, and better resource management



Approaches to Assess Water Balance and Performing Annual Water Audits

- NHDES Water Conservation Rule definition (Env-Wq 2101), which is a simple comparison of:
  - Water distributed to the system versus authorized metered consumption.
  - Meant to be a starting point when assessing the data and provides an indication if a deeper dive into the data through a water audit would be recommended.
- The approach described in the AWWA M36 manual:
  - All water can be accounted for through measurement (ex. meter readings), estimation (ex. SCADA data analysis), or inference (ex. calculation, such as # of events x average water used per event).

New Hampshire DES Water Conservation



New Hampshire Department
of Environmental Services

Water Conservation Plan Guidance Document for Community Water Systems

September 2011

NHDES

TITLE L
WATER MANAGEMENT AND PROTECTION

CHAPTER 485
NEW HAMPSHIRE SAFE DRINKING WATER ACT

Rules for Water Conservation

Section 485:61

485:61 Rules for Water Conservation. –

I. The department shall adopt rules, pursuant to RSA 541-A, for water conservation practices for water users. These rules shall strike a reasonable balance between environmental, energy, and economic impacts and be consistent with current industry standards and practices for different types of water users.

II. The water conservation rules in paragraph I of this section shall apply to all new permit applicants and applications for water withdrawals subject to the provisions of RSA 485:3, RSA 485:48, RSA 485-C:21 and section 401 of the Clean Water Act.

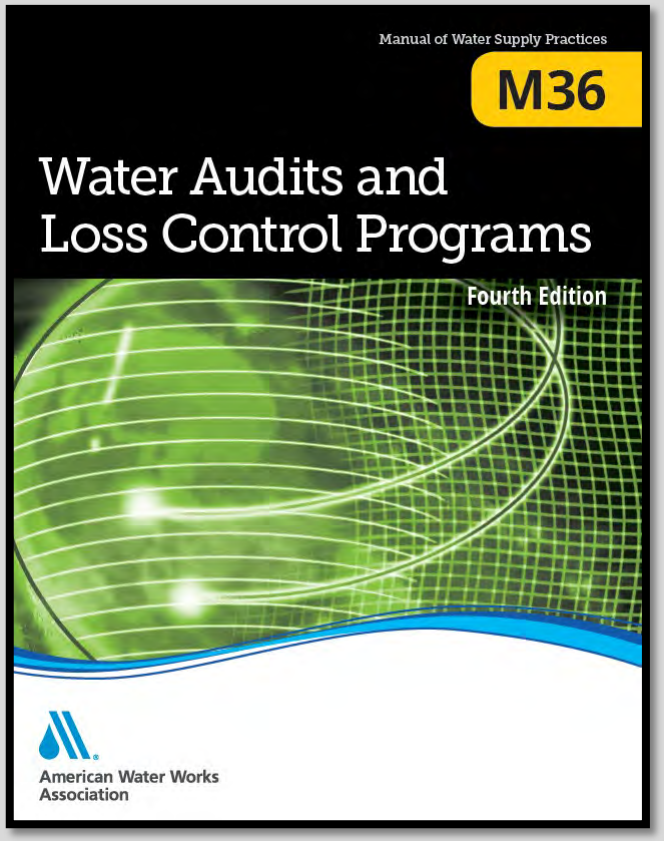
III. Water conservation rules shall be consistent with applicable state or federal rules and regulations.

Source. 2002, 142:2, eff. July 12, 2002.

Why do a Water Audit?

- AWWA's M36 manual and water audit software are great tools to assist the system with that analysis
- NHDES recommends that systems complete a water audit annually
- A new version of the AWWA water audit software will be released in early December 2020, which should make the tool even easier to use. For example, there will be a better format for data grading. It will also include new key performance indicators.

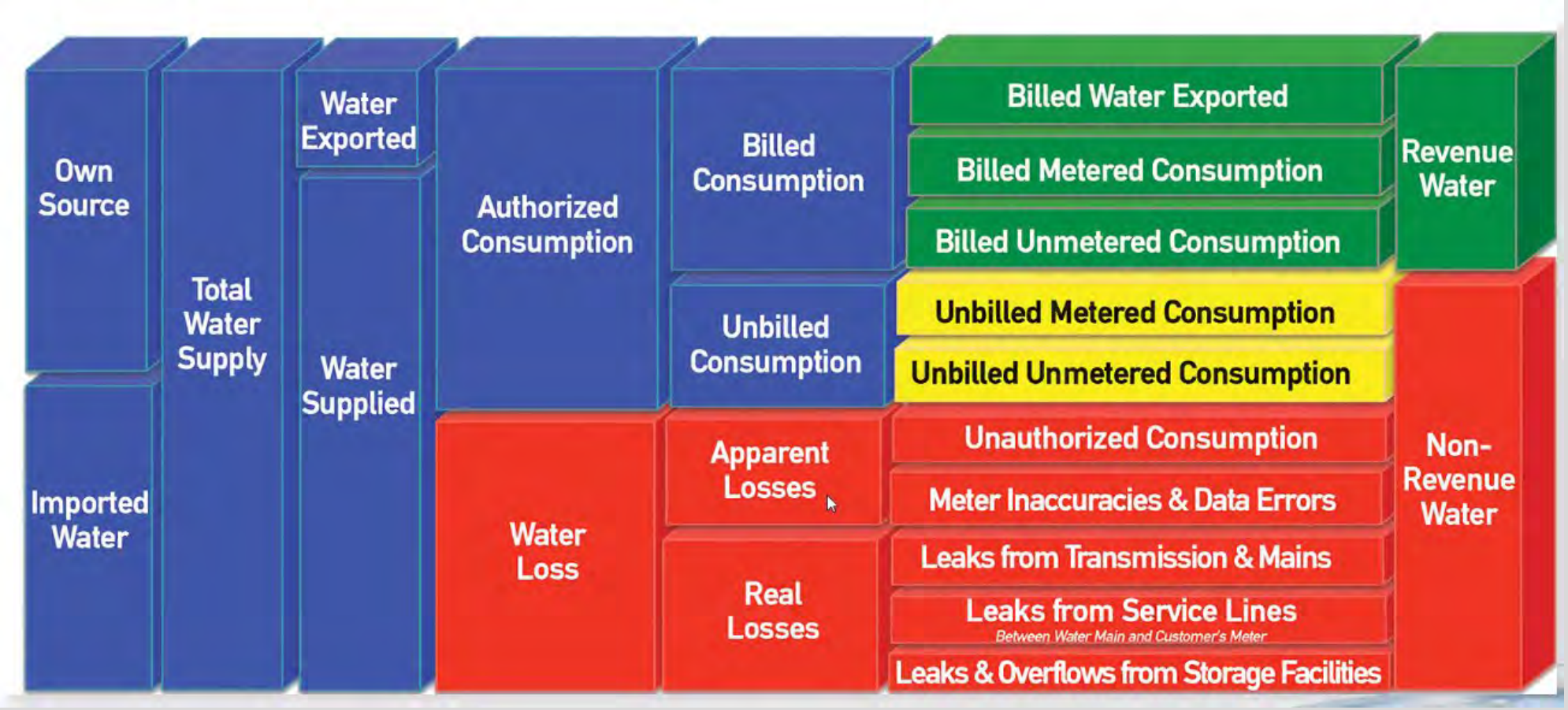
Excerpts from AWWA Water Audits and Loss Control Programs



- Step-by-step procedures to conduct a water audit to assess the efficiency of the water distribution system and water accounting practices;
- Most operators recognize distribution system leakage, categorized under the heading Real Losses, as a primary type of loss.
- However, water suppliers also suffer losses from
  - poor accounting,
  - customer metering inaccuracies, and
  - unauthorized consumption..
- The water balance summarizes these components and provides accountability, as all of the water placed into a distribution system should, in theory, equal all of the water taken out of the distribution system.
- In 2000, the International Water Association (IWA) published the manual Performance Indicators for Water Supply Services (Alegre et al. 2000)

THE WATER BALANCE CALCULATION

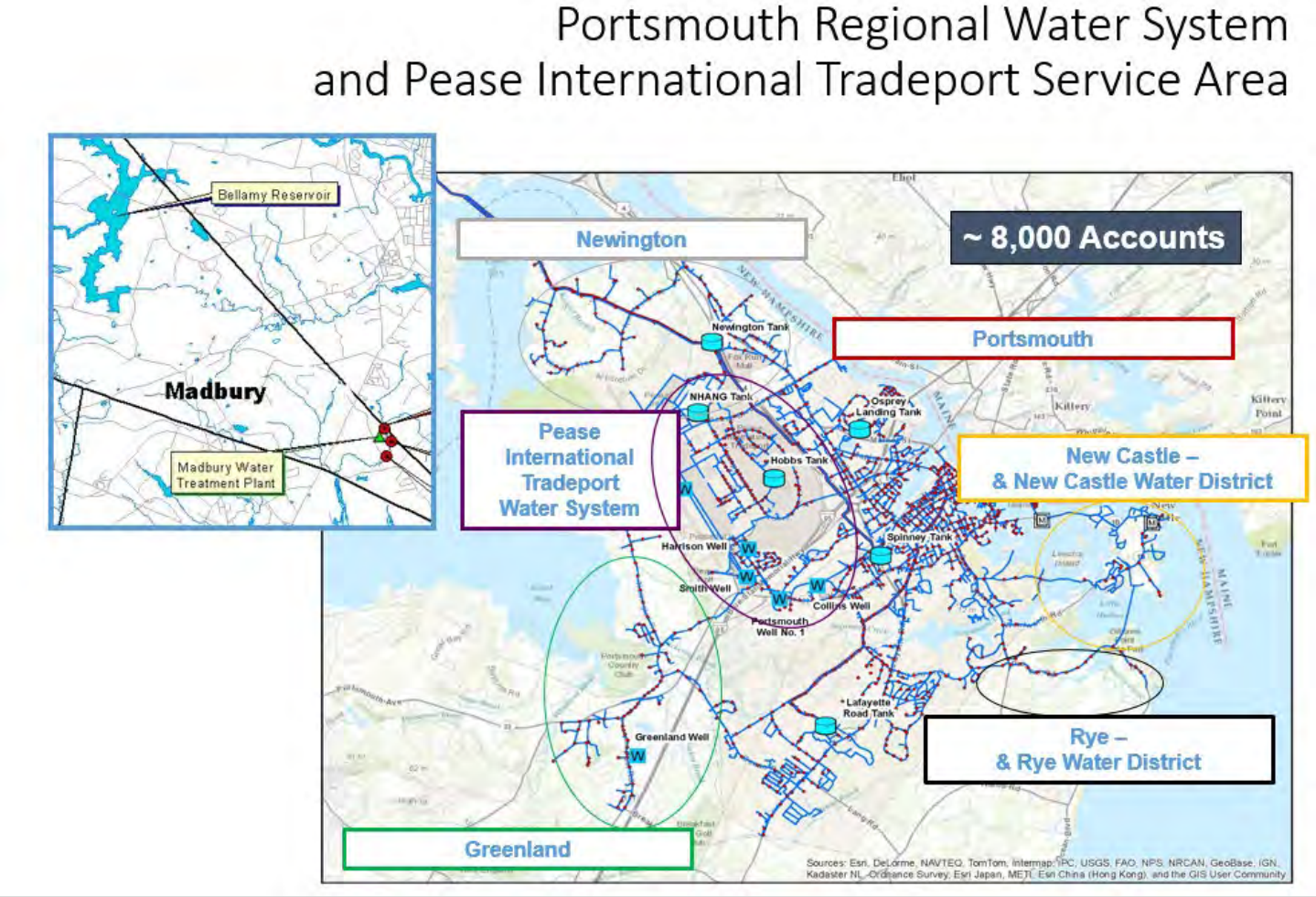
- **“The summary data from the water audit is shown in the water balance, which compares the distribution system input volume with the sum of customer consumption and losses (estimated or known).”**



Authorized Consumption

- Billed water exported
- Billed metered water
- Billed unmetered water
- Unbilled metered water
- Unbilled unmetered water

How is Portsmouth Doing?



Portsmouth Water

- **Bellamy Reservoir**
- **Madbury Water Treatment Facility**
- **6 Active Wells**
- **203 Miles of Pipe**
  - Portsmouth – 117
  - Newington – 30
  - Greenland – 13
  - New Castle – 3
  - Rye – 3
  - Private Lines ~ 30
- **872 Public Fire Hydrants**
  - Portsmouth – 687
  - Newington – 87
  - Greenland – 67
  - Rye – 19
  - New Castle - 12
- **2,612 Valves**
- **3 Storage Tanks**
- **8,370 Metered Customers**

Pease Tradeport Water

- 2 Active Wells (Haven out of Service)
- 2 Storage Tanks
- 1 Treatment Facility (Carbon Filters)
- Booster pumps from Portsmouth system
- 0.4 to 1.1 million gallons per day
- 17 Miles of Pipe
- 168 Public Fire Hydrants
- 228 Valves
- 2 Storage Tanks
- 130 Metered Customers

2019 Portsmouth Water Balance

Portsmouth Water Balance - 2019			
Portsmouth Pease Water Systems		**Million Gallons**	
Source Water	System Inputs	1,460	
Authorized Consumption	Billed Metered Water	1,193	81.68%
Authorized Consumption	Billed Un-Metered Water	0	0.00%
Authorized Consumption	Hydrant Meters	1	0.10%
Unbilled Authorized Consumption	Pease Golf Course	15	1.03%
Unbilled Authorized Consumption	Flushing	26	1.75%
Unbilled Authorized Consumption	Fire Use	3	0.21%
Apparent Water Losses	Unauthorized Consumption	4	0.25%
Apparent Water Losses	Customer Meter Inaccuracies	31	2.12%
Apparent Water Losses	Systematic Data Handling Errors	0	0.00%
Real Losses	Known Leaks/Main Breaks	10	0.68%
Real Losses	Water Storage Leaks and Overflows	0	0.00%
Real Losses	Unavoidable Annual Real Loss	59	4.03%
	Total Accounted for Water	1,341	91.86%
	Other Real Water Loss	**119**	**8.14%**

2019 Portsmouth Water Balance

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84.77%

- Water Balance of Billed Water versus Authorized Consumption = 15.23%
- This triggers the need for a Water Audit to further define where all the water is going

Source Water Tracking

		WTF Finished Water	Mad#2 Well	Mad #3 Well	Mad #4 well	Greenland Well	Port#1 Well	Collins Well	TOTAL WATER Portsmouth	Haven Well	Smith Well	Harrison Well	TOTAL Pease	Rye Water District Interconnection	TOTAL All Systems
2019	Jan	64,497,681	2,558,851	251,002	9,987,646	10,483,620	7,995,520	4,454,230	100,228,550	0	7,353,218	2,621,568	9,974,786	0	**110,203,336**
2019	Feb	63,897,913	14,500	3,076,071	6,673,079	6,418,765	6,407,373	3,975,826	90,463,527	0	5,291,269	5,286,469	10,577,738	0	**101,041,265**
2019	Mar	70,273,979	0	1,286,229	8,480,229	11,737,540	0	5,855,182	97,633,159	0	5,816,668	5,811,268	11,627,936	0	**109,261,095**
2019	Apr	69,904,568	4,900	3,646,407	4,715,828	11,692,420	1,121,325	5,789,193	96,874,641	0	6,006,894	6,150,999	12,157,893	0	**109,032,534**
2019	May	69,027,438	73,000	4,034,806	7,769,828	13,343,250	10,143,704	5,763,692	110,155,718	0	6,784,059	7,265,609	14,049,668	0	**124,205,386**
2019	June	76,636,880	0	5,424,628	4,799,914	16,265,700	8,550,570	4,988,173	116,665,865	0	7,644,942	8,293,923	15,938,865	0	**132,604,730**
2019	July	85,317,756	4,157,918	6,683,991	7,747,538	16,532,083	14,686,772	8,492,847	143,618,905	0	9,248,978	8,868,547	18,117,525	0	**161,736,430**
2019	Aug	90,771,981	8,556,147	8,710,374	2,178,457	15,490,210	12,365,172	6,708,138	144,780,479	0	9,947,197	8,841,945	18,789,142	0	**163,569,621**
2019	Sep	78,680,275	936,614	7,750,037	5,235,954	12,945,580	9,818,765	4,349,751	119,716,976	0	8,322,109	7,448,485	15,770,594	0	**135,487,570**
2019	Oct	69,858,228	60,400	2,195,257	6,406,159	9,217,460	7,053,972	2,457,303	97,248,779	0	7,465,870	7,439,669	14,905,539	0	**112,154,318**
2019	Nov	63,086,119	14,400	3,470,489	3,776,068	10,810,660	9,336,317	2,787,046	93,281,099	0	3,656,840	2,946,144	6,602,984	0	**99,884,083**
2019	Dec	63,446,198	14,800	2,095,050	4,977,592	8,333,160	6,579,364	3,377,916	88,824,080	0	6,118,409	5,840,310	11,958,719	0	**100,782,799**
Gallons		865,399,016	16,391,530	48,624,341	72,748,292	143,270,448	94,058,854	58,999,297	1,299,491,778	0	83,656,453	76,814,936	160,471,389	0	**1,459,963,167**
Million Gal.		**865**	**16**	**49**	**73**	**143**	**94**	**59**	**1,299**		**84**	**77**	**160**	**0**	**1,460**

Source Meter Calibration

- Annual Flow testing if possible
- Compare metered data with SCADA daily reads to assure proper electronic calibration

Water Systems Tracked and Trended 24/7

- Surface and Treatment Flows
- Well pumpage hours and water levels
- Distribution storage tank levels and any overflow alarms
- Pressure indicators
- Trends and alarms alerting operational staff of any unusual supply issues – All in real-time

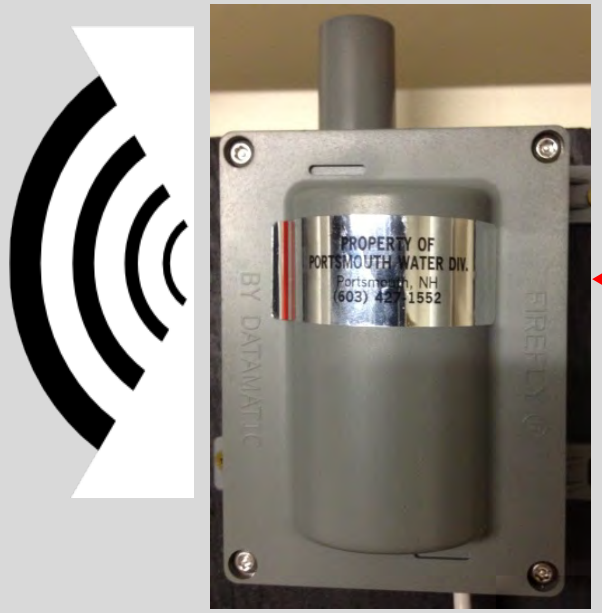
Authorized Consumption

Billed Metered Water

	January	February	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec	
Units	113,506	102,508	111,733	110,234	129,915	145,998	189,542	173,675	159,341	131,920	123,497	102,433	
Gallons	84,902,316	76,675,610	83,576,022	82,454,830	97,176,742	109,206,549	141,777,416	129,908,900	119,187,068	98,676,160	92,375,756	76,619,884	
MG	**85**	**77**	**84**	**82**	**97**	**109**	**142**	**130**	**119**	**99**	**92**	**77**	**1,193**

Metering, Meter Reading and Billing System

Billing System



Radio

Meter

Radios Transmit Meter Register Data to Computerized Meter Reading System. City Staff have continuous access to this data and can identify and track water use patterns.

Benefits of AMR Program:

- System transition has enabled City to go to monthly billing (bills used to go out three times a year)
- Consumers can now see the immediate impact of high water use on their bill
- Leaks identified quickly as water consumption can be compared to prior month or yearly use.
- Leak codes can track these users, allowing our customer service representatives to contact users about high water use.

Customer Meter Replacements and Testing

2019 Metering

- 959 - meters changed out
  - 11% of all meters in system
- 1333 - new meter radios installed
- Converted to new billing system which provides monthly customer historical data – enabling ability to track and notice changes in usage

Water Meter Changeouts

Meter Inventory - 2020 vs. 2011

Meter Size	2011	2020
5/8 Inch	6,611	7,060
3/4 Inch	9	25
1 Inch	743	961
1 ½ Inch	367	295
2 Inch	349	251
3 Inch	54	48
4 Inch	43	39
6 Inch	14	13
8 Inch	11	13
10 Inch	1	1
Total	**8,202**	**8,706**

Increasing the Number of Smaller Meters

Reducing the Number of Larger Meters

Benefits of Downsizing Meters:

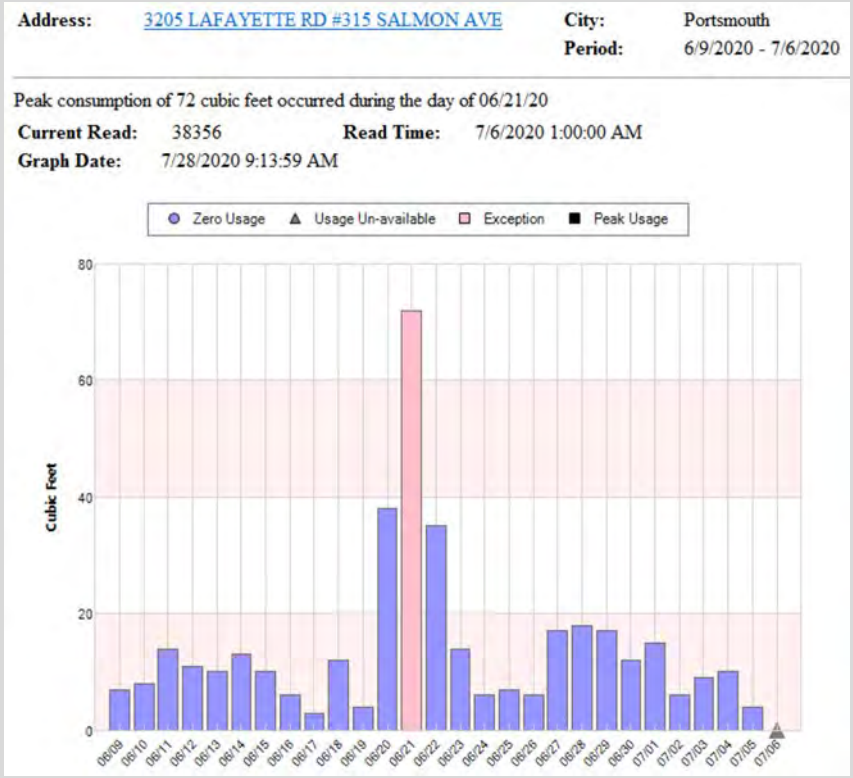
1. Capture more low-flow use
2. Save costs on replacing meters

Meter Downsizing Savings			
	# Meters	Savings per Meter	Total Savings
1 1/2 inch to 1 inch	72	$292	$21,050
2 inch to 1 inch	98	$944	$92,509
			$113,559

Metering/Billing Department Use of Daily Meter Reading Data:

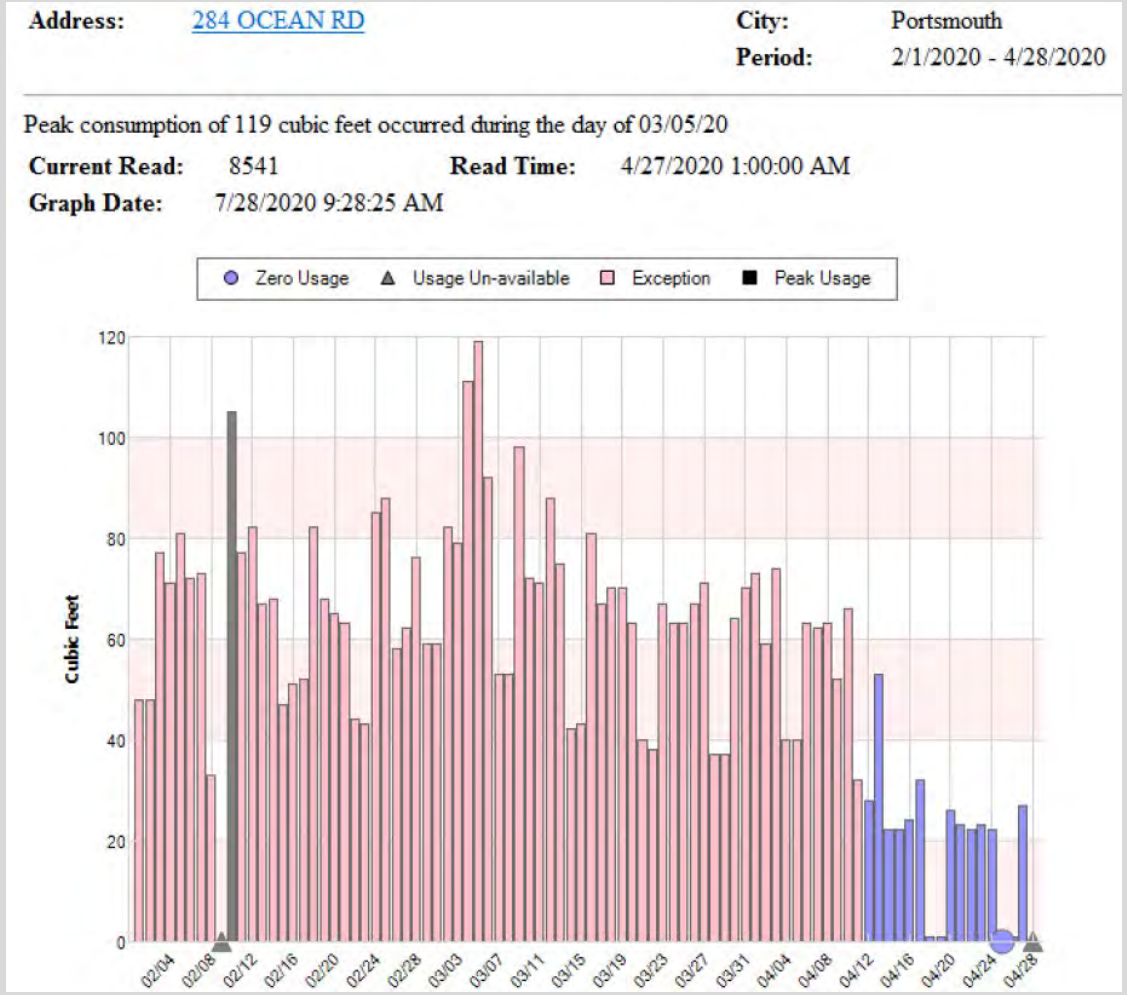
Contacting customers when leak codes occur

- 855 tagged events for Le60 (leak code)
- 223 direct communications with customers notifying of leak
- 561 Unique locations notified in FY20
- Mostly toilets, spiggots and broken irrigation lines (seasonal)

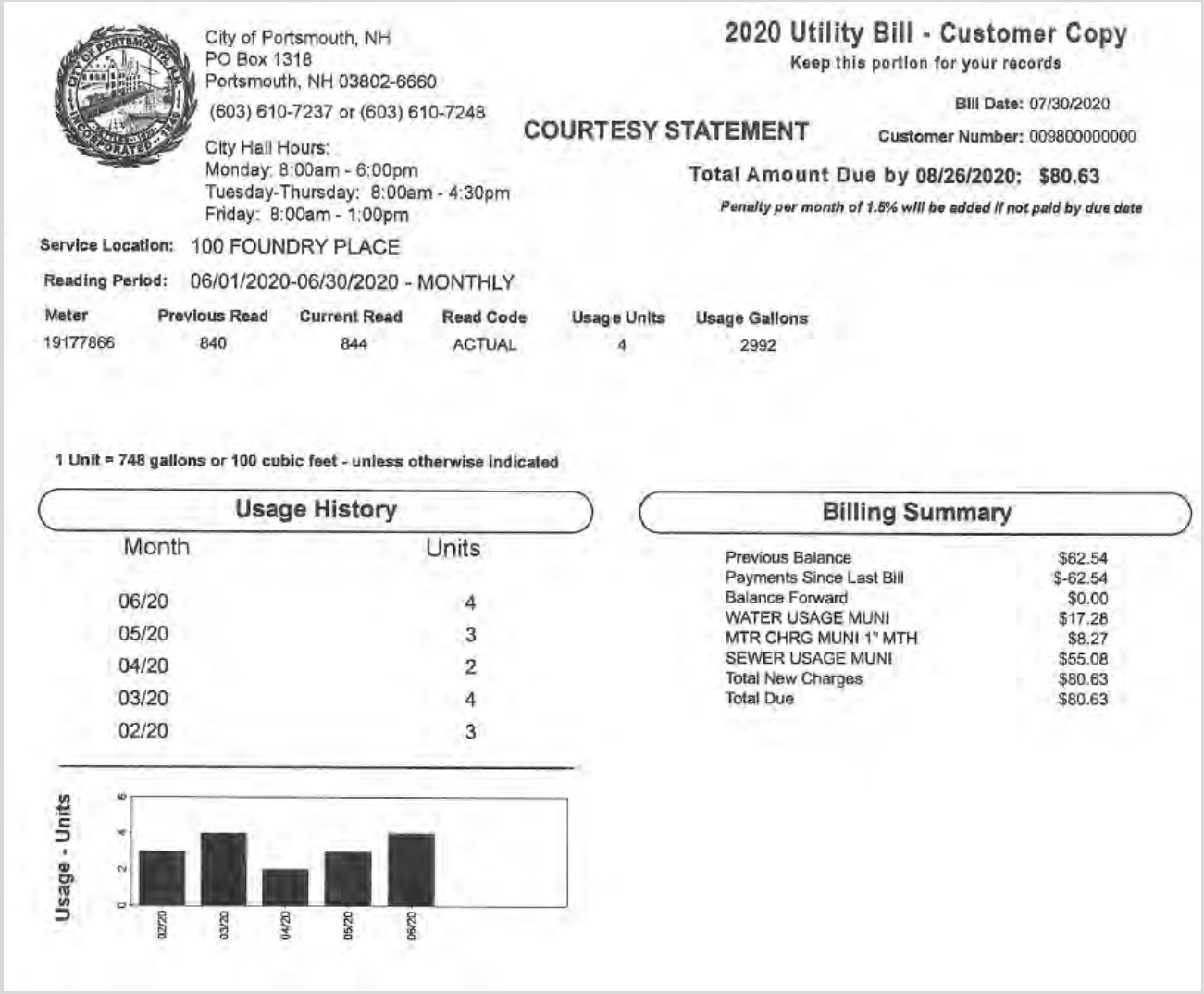


Customer Leak Code Example:

- Owner called about a high consumption water bill,
- We explained the Le60 from the report
- Owner was not convinced it was their issue and pointed at a faulty meter.
- Meter crew visited the site on 4/7 and explained to maintenance about a Le60 and found 1 toilet running, the crew also gave the customer
- As the graph indicates, the leaks were fixed



New Billing Format with Usage History Graph



City of Portsmouth, NH
PO Box 1318
Portsmouth, NH 03802-6660
(603) 610-7237 or (603) 610-7248

City Hall Hours:
Monday: 8:00am - 6:00pm
Tuesday-Thursday: 8:00am - 4:30pm
Friday: 8:00am - 1:00pm

2020 Utility Bill - Customer Copy
Keep this portion for your records

COURTESY STATEMENT

Bill Date: 07/30/2020
Customer Number: 009800000000

Total Amount Due by 08/26/2020: $80.63

Penalty per month of 1.5% will be added if not paid by due date

Service Location: 100 FOUNDRY PLACE

Reading Period: 06/01/2020-06/30/2020 - MONTHLY

Meter	Previous Read	Current Read	Read Code	Usage Units	Usage Gallons
19177866	840	844	ACTUAL	4	2992

1 Unit = 748 gallons or 100 cubic feet - unless otherwise indicated

Usage History

Month	Units
06/20	4
05/20	3
04/20	2
03/20	4
02/20	3

Billing Summary

Previous Balance	$62.54
Payments Since Last Bill	$-62.54
Balance Forward	$0.00
WATER USAGE MUNI	$17.28
MTR CHRG MUNI 1" MTH	$8.27
SEWER USAGE MUNI	$55.08
Total New Charges	$80.63
Total Due	$80.63

Customer Feedback:

August 21, 2019 Call to Water Billing Department:

- “I wanted to share a wonderful conversation I just had with the water customer at 296 Peverly Hill Rd. He wanted to express his appreciation for the City’s “Water Conservation Initiative”. He stated that a “wonderful person” stopped at his home and informed him he may have a leak. He discovered that a toilet he thought he had fixed was still leaking and he was able to correct it. He asked me to pass along his appreciation for the City implementing this program and the positive experience he had.”

February 24, 2020 Email to City’s webmaster:

- address: 188 Union St Portsmouth
- comments: I had a situation where my January water bill seemed way too high. I went into the Water Works Office un-announced. The receptionist called Jim who came down, greeted me and had me up to his office. He had me sit beside him as he went through a day by day, hour by hour, review of my account. He made me feel like I was the only person in Portsmouth who mattered. He spent a solid 45 minutes with me. He diagnosed what the problem was and sent me home with printed graphs showing it. Please pass this to Jim's superiors. He was awesome.

Unbilled Authorized Consumption

Unbilled Authorized Consumption	Pease Golf Course	15	1.03%
Unbilled Authorized Consumption	Flushing	26	1.75%
Unbilled Authorized Consumption	Fire Use	3	0.21%

Flushing: 8 weeks of flushing, 4 nights a week, 400,000 gallons/night = 32 nights ~ 12.8 MG, 2x/year (spring and fall) = 25.6 MG

Fire Use Estimate: based on Fire Dept. and SCADA system info and Fire Dept. Training

Fire Use and Training

State Street Saloon Fire – April 9, 2017

- Water Operations Increased Pumpage to system
  - (4,200 Gallons per Minute)
- 10,000 Gallons-per-Minute delivered at peak of fire fighting
- 800,000 gallons estimated for duration of fire

Apparent Water Losses

Unauthorized Consumption	4	0.25%	Industry standard
Customer Meter Inaccuracies	31	2.12%	Water meter adjustment - per annual water meter testing program
Systematic Data Handling Errors	0	0.00%	No errors we are aware of in 2019

Apparent Water Losses

- Unauthorized Consumption:
  - This category includes theft of water such as illegal connections, unauthorized use of fire hydrants, meter tampering, and any other type of water theft.
  - Water providers should use the default number of 0.25 percent of the Volume from Own Sources unless they can compile accurate water theft data.

Meter Testing

Public Works

Testing Bench

AWWA Standards for Meter Testing

Table 6.5.2 Testing Interval Required By Size of Meter

Size of Meter - Inches	Maximum Interval Between Tests
5/8	10 years
3/4	10 years
1	4 years
1 1/2	4 years
2	4 years
3	2 years
4	1 year
6	1 year

Metered Water Adjustment - 2019

2019 Meter Testing

- 82 - large commercial meters tested
- 232 - 5/8 to 1 inch meters tested in house
- Data analysis shows an overall average accuracy of 98.01%
- = 2.0% Adjustment of customer meter data for Water Balance

Question #1?

What is authorized consumption?

1. Billed water exported
2. Billed metered water
3. Billed unmetered water
4. Unbilled metered water
5. Unbilled unmetered water
6. All of the above

Real Water Losses

Known Leaks/Main Breaks	10	0.68%	Leak Detection Program estimate based on Pyburn's analysis
Water Storage Leaks and Overflows	0	0.00%	No tank overflows in 2019
Unavoidable Annual Real Loss	59	4.03%	calculation below

Water Main Break and Leak Tracking

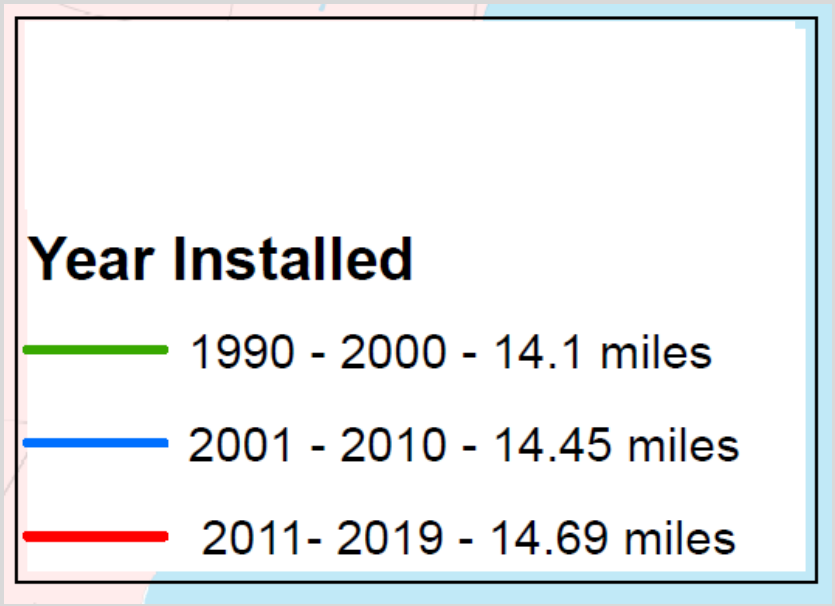
	Date	Location	Job Description
1	1/11/2019	34 CABOT ST	REPAIR 6" MAIN BREAK
2	1/18/2019	4 REGINA RD	REPAIR MAIN FOUND LEAK FOUND DURING LD SURVEY
3	1/19/2019	ORCHARD CT	REPAIR 2" GALV LINE ON ORCHARD CT
4	1/29/2019	34 PATTERSON LN	REPAIR 8" MAIN BREAK
5	2/17/2019	520 SOUTH ST	Repair water main
6	4/18/2019	3510 LAFAYETTE RD	REPAIR MAIN HIT BY CONTRACTOR INSTALLING DRAIN
7	4/23/2019	440 NEWINGTON RD	REPAIR 8" MAIN ON NEWINGTON RD AT HODGDEN FARMTAPPING SADDLEW CORRODED OFF MAIN
8	5/14/2019	ORANGE ST	REPAIR 2' GALV LINE ON ORANGE ST FOUND SLOW LEAK TO SURFACE
9	5/14/2019	837 STATE ST	In responding to an email about a sink hole, we discovered a water break on the 8" main.
10	6/12/2019	168 LITTLE BAY RD	REPAIR 8" MAIN
11	7/3/2019	319 VAUGHAN ST	Parts for water main city prog.
12	7/11/2019	HANOVER ST AT PARKER ST	CUT AND CAP 8" MAIN IN FRONT OF 339 HANOVER ST , HOUSES ON PARKER ST NEED MAIN LIVE TO HAVE WATER, TURN ON WHEN CAPPED
13	8/5/2019	100 COAKLEY RD	REPAIR 6" MAIN ON COAKLEY RD
14	8/7/2019	147 POST RD	REPAIR MAIN FOUND LEAKING DURING DOT EXCAVATION FOR DRAINAGE
15	8/16/2019	CENTRAL AVE	REPAIR 4" MAIN
16	8/21/2019	PORTSMOUTH BLVD	REPAIR MAIN FOUND LEAKING DURING CONTRACTOR BRUSH CLEARING OPERATION.
17	9/16/2019	446 MARKET ST	REPAIR MAIN FOUND LEAKING BY CONTRACTOR INSTALLING CONDUIT ON MARKET ST, NOBLES ISLAND AREA.
18	9/26/2019	50 CLOUGH DR	REPAIR 6" MAIN BREAK, CUT AND CAP BEHIND SCHOOL.J ROBERGE SHUT OFF AT 600AM, CALL OUT OT.
19	10/18/2019	BARBERRY LN.	REPAIR 6" WATER MAIN ON BARBERRY LN
20	11/20/2019	35 AIRPORT RD	REPAIR WATER MAIN BREAK
21	11/30/2019	46 AIRPORT RD	Repair (2) water main breaks.
22	12/12/2019	32 NIMBLE HILL RD	RADIAL CRACK ON 8' WATER MAIN ON NIMBLE HILL RD,REPAIRED IT WITH 8' REPAIR BAND
23	12/12/2019	409 MILLER AVE	REPAIR 10" MAIN BREAK ON SOUTH ST SIDE OF INTERSECTION.
24	12/15/2019	20 MECHANIC ST	REPAIR 8" WATER MAIN

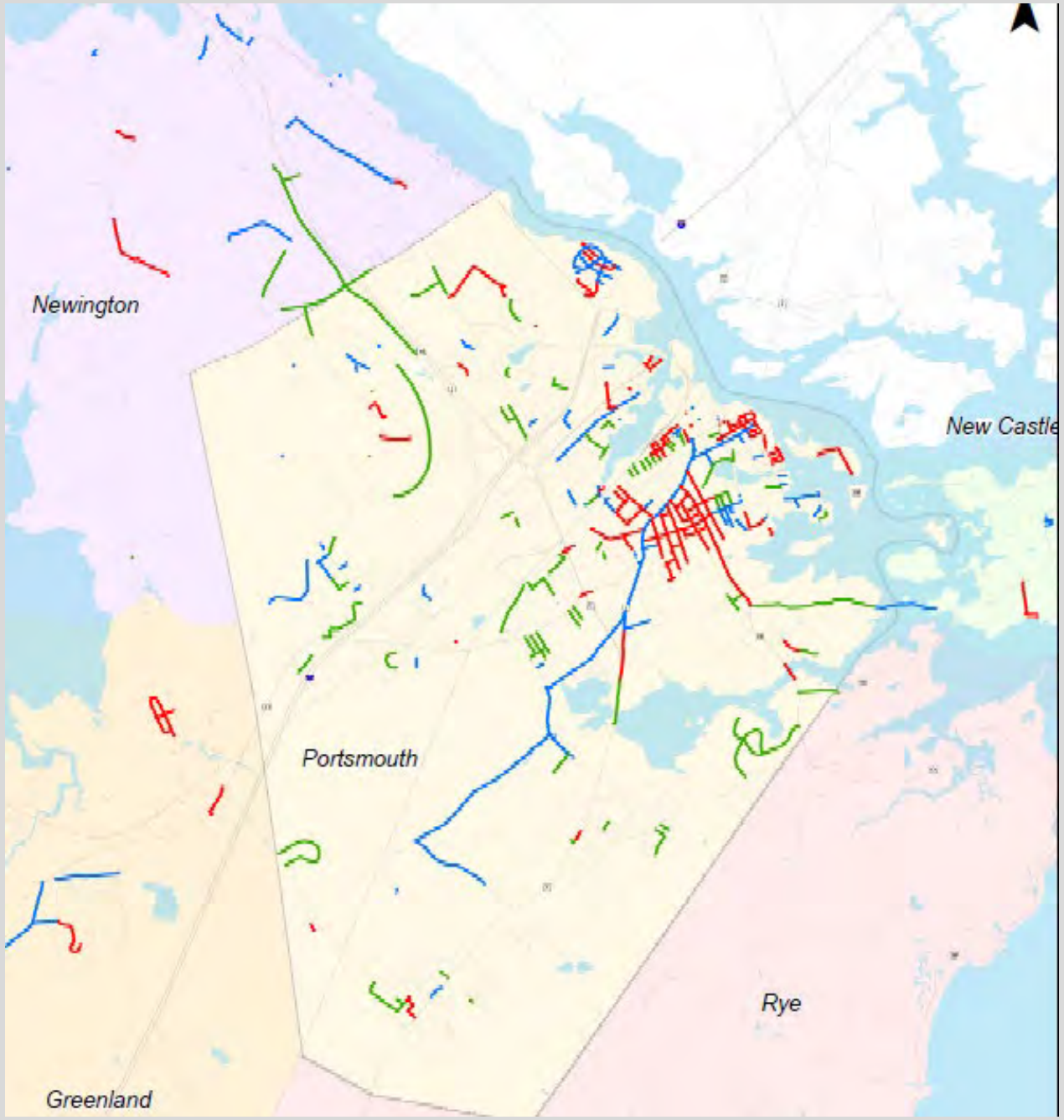
Airport Road in Newington – Replacement underway in summer 2020

Newington – Airport Road Waterline Replacement

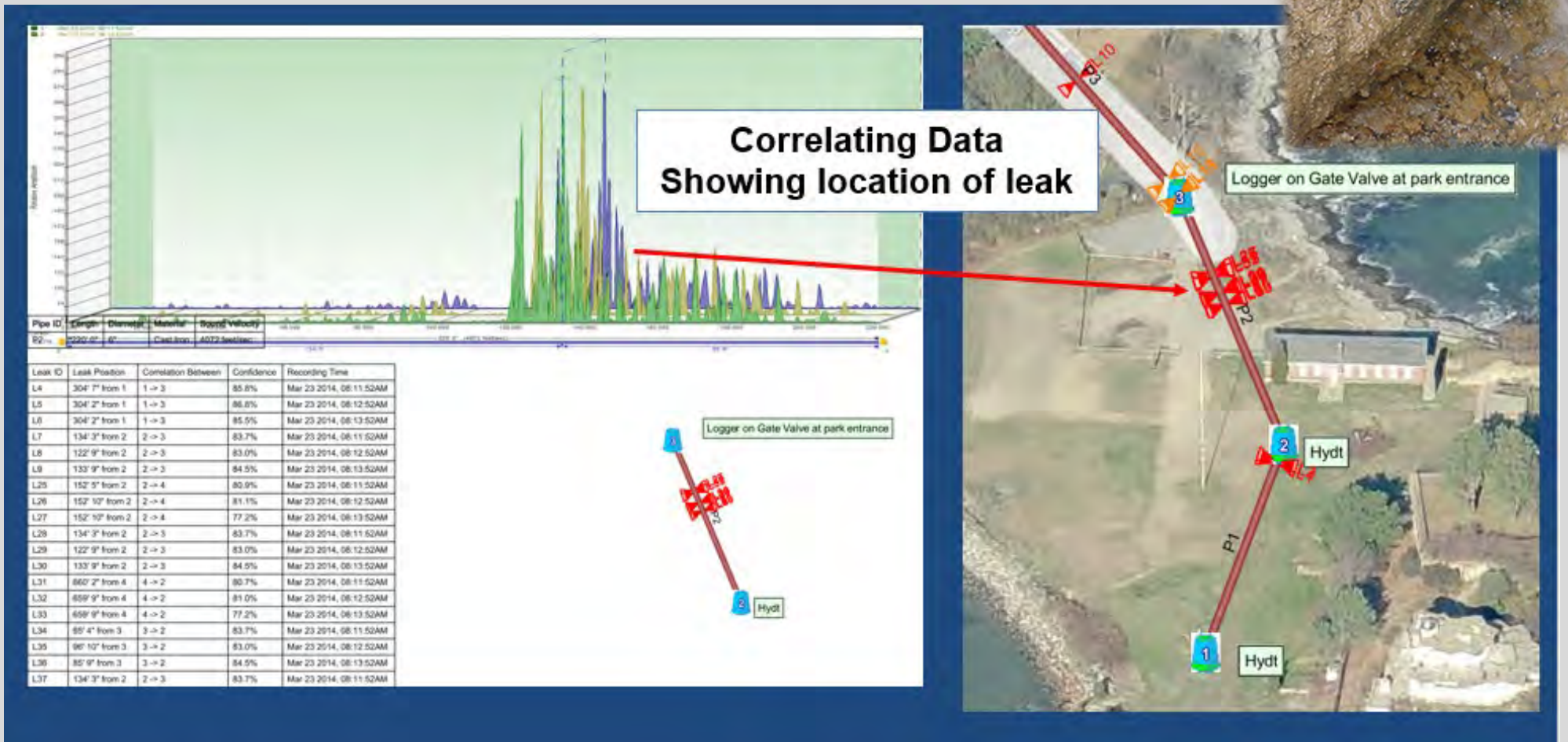
Water Main Replacements

- 43 Miles replaced since 1990
- Approx. 1.5 miles/year
- Currently budgeting $500,000/year in replacements



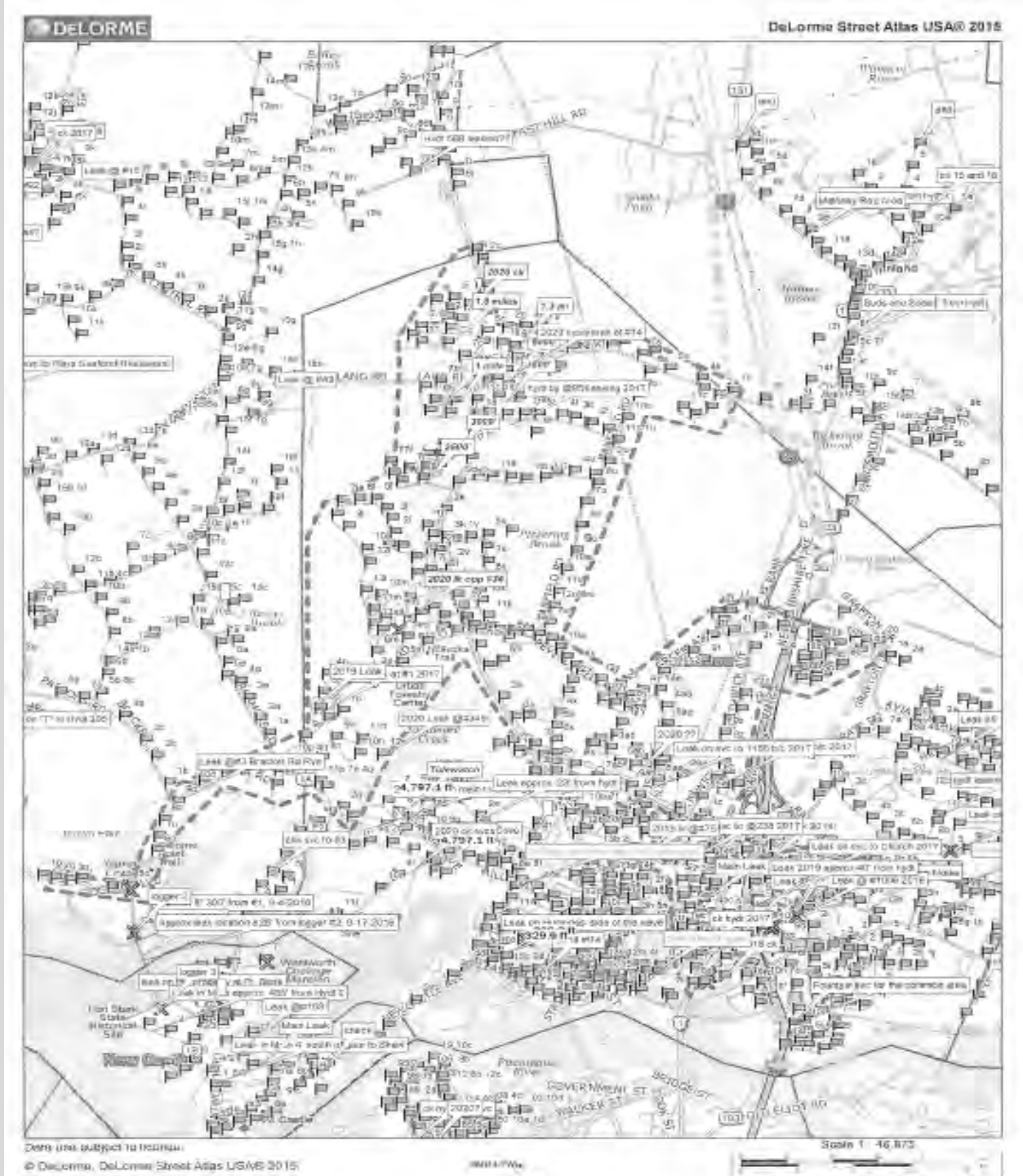


Electronic Data Loggers
- Leak Detection



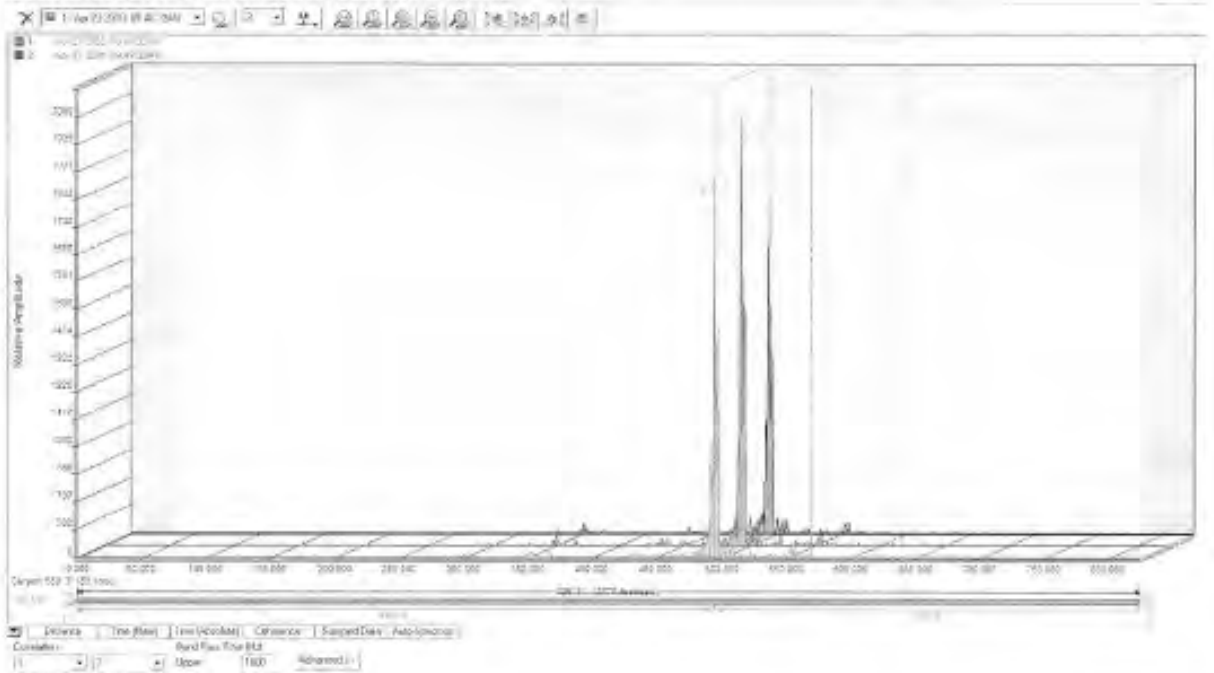
Leak ID	Leak Position	Correlation Between	Confidence	Recording Time
L4	304' 7" from 1	1 -> 3	85.8%	Mar 23 2014, 08:11:52AM
L5	304' 2" from 1	1 -> 3	86.8%	Mar 23 2014, 08:12:52AM
L6	304' 2" from 1	1 -> 3	85.5%	Mar 23 2014, 08:13:52AM
L7	134' 3" from 2	2 -> 3	83.7%	Mar 23 2014, 08:11:52AM
L8	122' 9" from 2	2 -> 3	83.0%	Mar 23 2014, 08:12:52AM
L9	133' 9" from 2	2 -> 3	84.5%	Mar 23 2014, 08:13:52AM
L25	152' 5" from 2	2 -> 4	80.9%	Mar 23 2014, 08:11:52AM
L26	152' 10" from 2	2 -> 4	81.1%	Mar 23 2014, 08:12:52AM
L27	152' 10" from 2	2 -> 4	77.2%	Mar 23 2014, 08:13:52AM
L28	134' 3" from 2	2 -> 3	83.7%	Mar 23 2014, 08:11:52AM
L29	122' 9" from 2	2 -> 3	83.0%	Mar 23 2014, 08:12:52AM
L30	133' 9" from 2	2 -> 3	84.5%	Mar 23 2014, 08:13:52AM
L31	660' 2" from 4	4 -> 2	80.7%	Mar 23 2014, 08:11:52AM
L32	659' 9" from 4	4 -> 2	81.0%	Mar 23 2014, 08:12:52AM
L33	659' 9" from 4	4 -> 2	77.2%	Mar 23 2014, 08:13:52AM
L34	95' 4" from 3	3 -> 2	83.7%	Mar 23 2014, 08:11:52AM
L35	96' 10" from 3	3 -> 2	83.0%	Mar 23 2014, 08:12:52AM
L36	85' 9" from 3	3 -> 2	84.5%	Mar 23 2014, 08:13:52AM
L37	134' 3" from 2	2 -> 3	83.7%	Mar 23 2014, 08:11:52AM

Survey Area
May 2020
49 Miles



One of the Leaks Detected

Date: 5/25/20
System Name: Portsmouth, NH
Location: 34 Harrison Ave, Main Leaking
Approx. Size: 20 gpm Type of Surface Cover: Asphalt
Leak class: 1
Date and time of detection on correlation



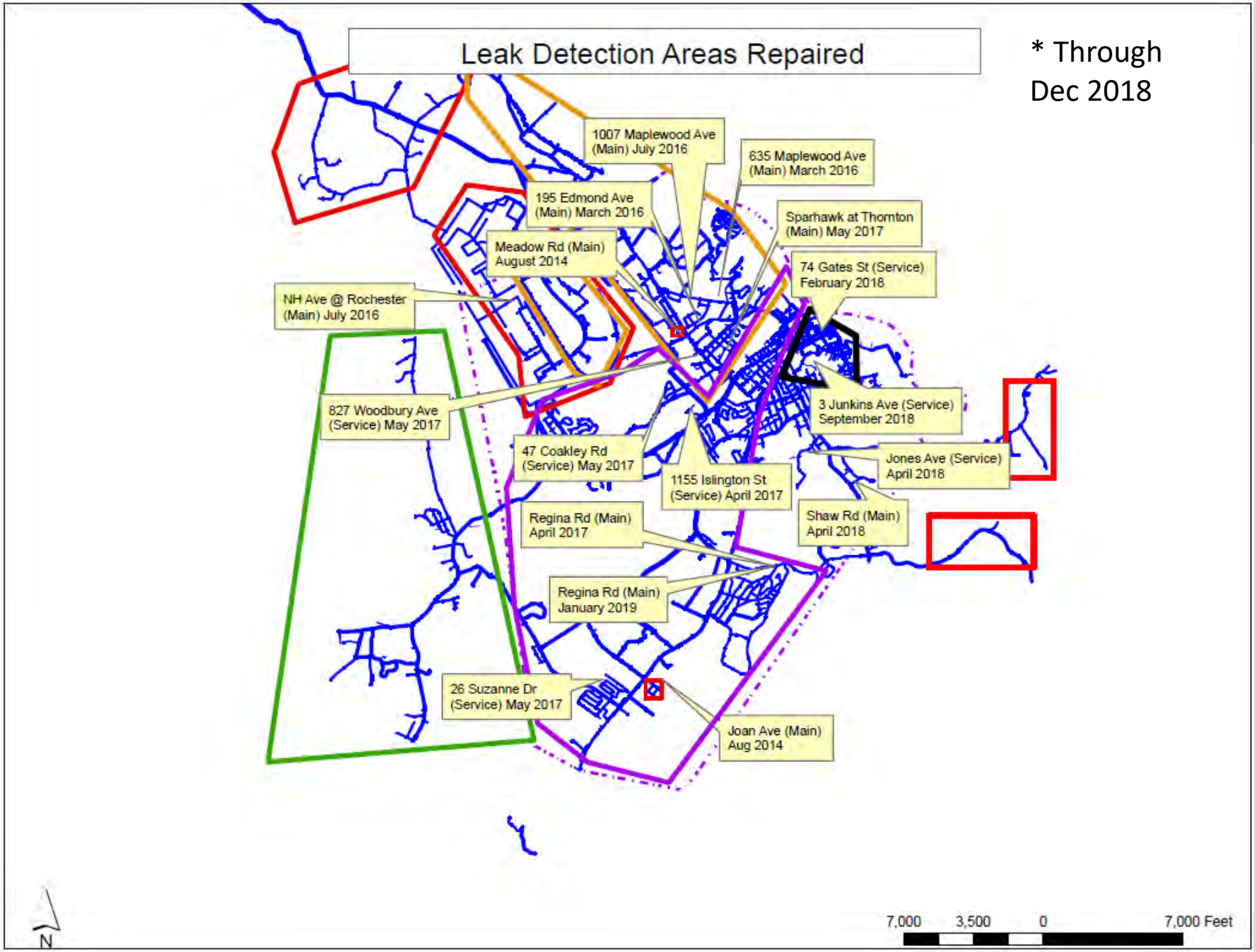
2020 Leak Detection Summary

Summary Table Below;

Classification	Number of Leaks	Estimated Leakage GPM	Estimated Leakage GPD	Estimated leakage GPY
1	2	50	72,000	26,280,000
2	2	10	14,400	5,256,000
3	1	4	5,760	2,102,400
Totals	5	64	92,160	33,638,400

Source of Leakage	Number of Leaks	Estimated Leakage GPM	% of Total Number	% of Total Estimated GPM
Mains	3	55	60	86
Services	2	9	40	14
Hydrants	0	0	0	0
Totals	5	64	100	100

Type of Survey:	**Correlation**	**Grade 1 (C)**	**15 to + GPM**
Miles of Main Inspected:	**49**	**Grade 2 (B)**	**5 to 14 GPM**
Number of Leaks Located:	**5**	**Grade 3 (A)**	**1 to 4 GPM**

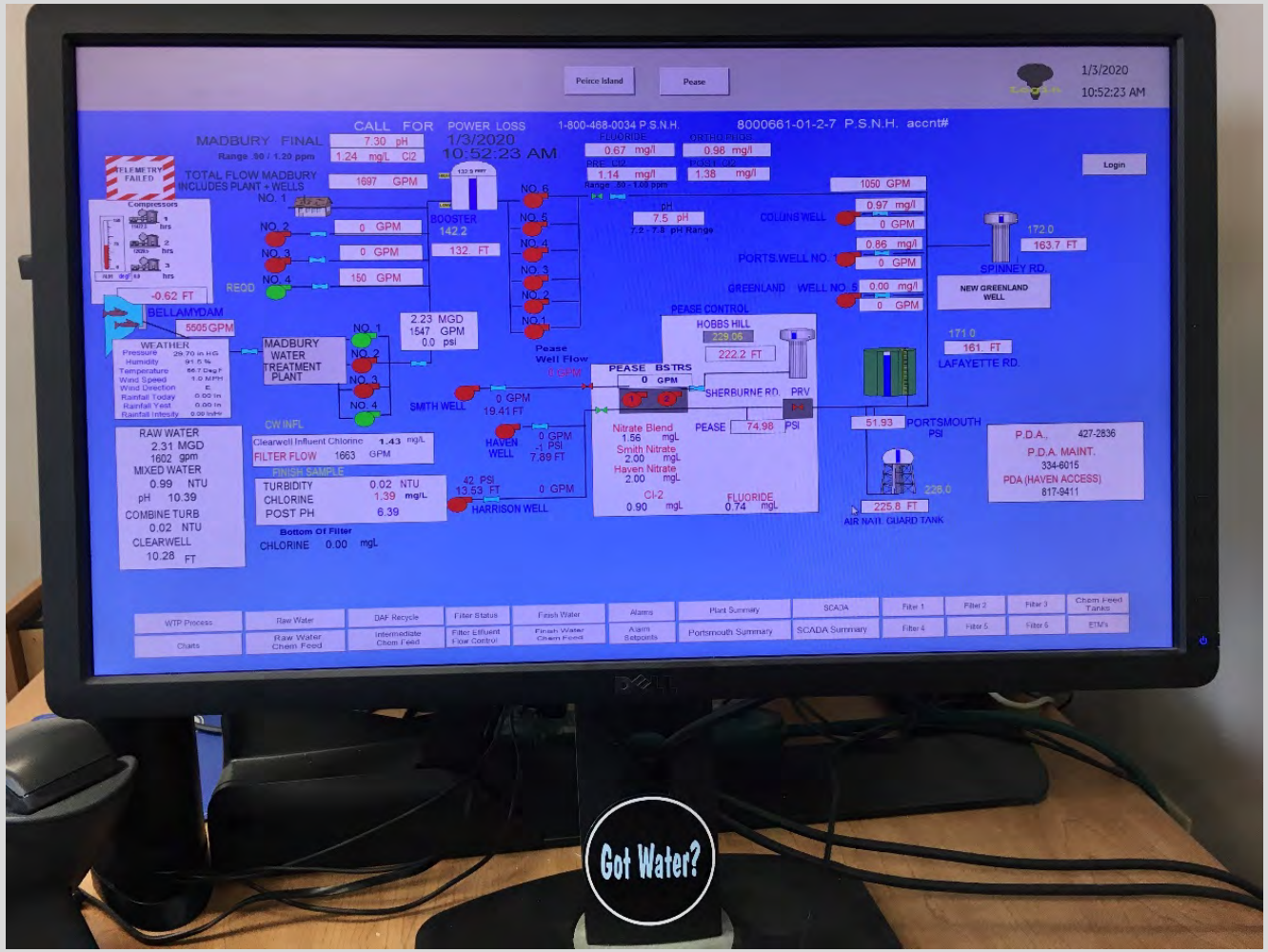

Leak Detection Areas Repaired
* Through Dec 2018
1007 Maplewood Ave (Main) July 2016
635 Maplewood Ave (Main) March 2016
195 Edmond Ave (Main) March 2016
Sparhawk at Thornton (Main) May 2017
Meadow Rd (Main) August 2014
74 Gates St (Service) February 2018
NH Ave @ Rochester (Main) July 2016
827 Woodbury Ave (Service) May 2017
3 Junkins Ave (Service) September 2018
47 Coakley Rd (Service) May 2017
Jones Ave (Service) April 2018
1155 Islington St (Service) April 2017
Shaw Rd (Main) April 2018
Regina Rd (Main) April 2017
Regina Rd (Main) January 2019
26 Suzanne Dr (Service) May 2017
Joan Ave (Main) Aug 2014
N
7,000 3,500 0 7,000 Feet

SCADA SYSTEM TRACKING: Water Main Break – June 29, 2018

SCADA System Tracking of Spinney Tank Level – Alerting Operators of Main Break

Pleasant Street area of Main Break

Water System Operations:
January 3, 2020 @ 10:52 AM



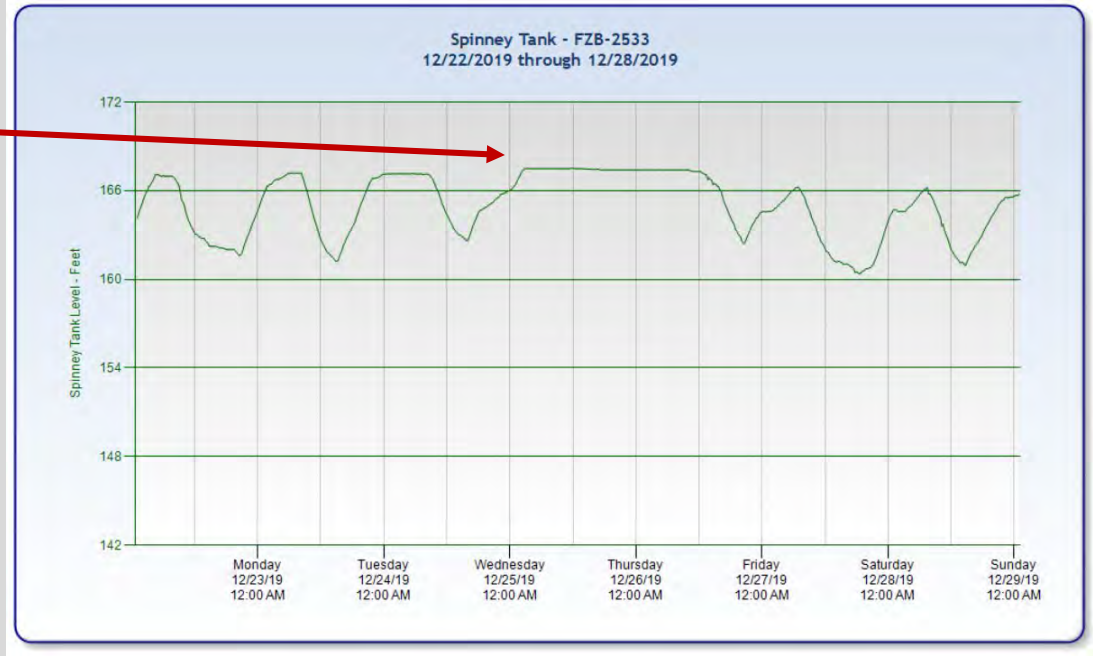
- Water Treatment Facility Running at 65% of capacity
- Madbury Wells at 10% of capacity
- Greenland Well – off
- Portsmouth Well – off
- Collins Well – off
- Harrison Well – off
- Smith Well – off

Detecting Leakage During Low Pumpage Days:

Water System Total Pumpage

- Dec 24 – 3.14 MG
- Dec 25 – 2.53 MG
- Dec 26 – 2.71 MG
- **This was the lowest pumpage period in 10 years**
- Evidence that not much background leakage occurring

Spinney Tank Level – Full on December 25, 2019

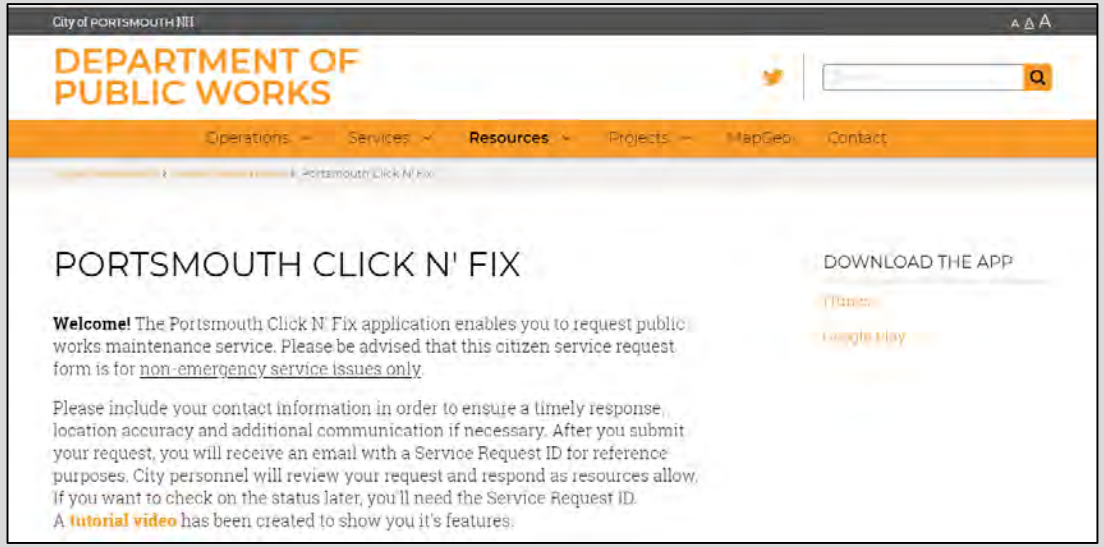


Question #2?

How often should master meters from water sources be calibrated?

1. Monthly
2. Only when needed
3. Annually

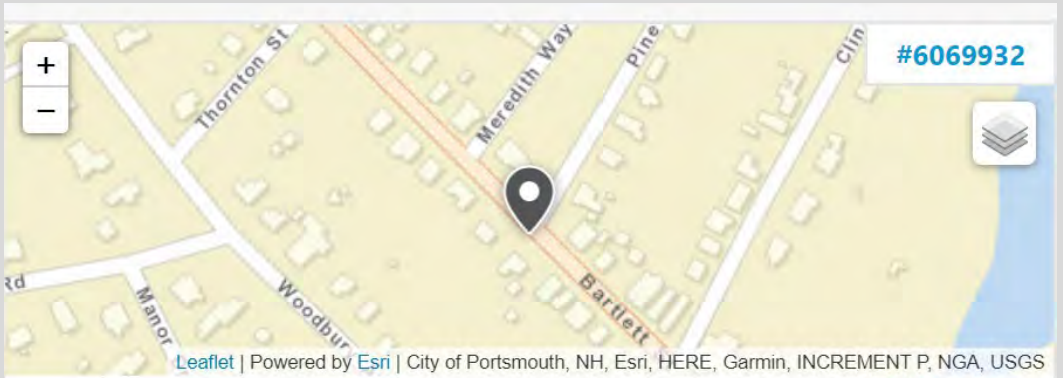
Water Leak Reporting Via City's Click N' Fix Reporting Tool on Website and Apps



- People can report problems, including water main breaks, any time on City's website or through downloadable apps
- Information is forwarded to appropriate staff for a response

Click N'Fix Submission: Leaking Water Main

- Reported and Acknowledged on June 21, 2019
- Repaired on June 25, 2019



43.0729908217146, -70.7745037033673 Edit Location

Water

Created Date:
06/21/2019 7:07 PM

63–199 Pine St Portsmouth 03801, United States

Details

Water main dumping water

City of Portsmouth | Verified Official
Acknowledged

The City of Portmouth has received this issue. It is registered as service request #0621196.

06/21/2019 7:08 PM

City of Portsmouth | Verified Official
Closed

The City of Portmouth has addressed this issue, service request #0621196.

06/25/2019 2:40 PM

Click N'Fix Submission: Leaking valve report

- Reported and Acknowledged on February 15, 2020
- Repaired on February 26, 2020

43.0399210734431, -70.7699174404085 Edit Location

Water

222 Mckinley Rd Portsmouth 03801, United States

Created Date:
02/15/2020 7:32 PM

Looks like a water line leak? Liquid water on the street, seems to be coming out of a "water" valve (marked as such on the 8 inch access cover). I'm marking it as a main break, but it's not gushing... there is liquid on the surface, and it hasn't been above freezing today.

02/15/2020 7:32 PM

City of Portsmouth | Verified Official
Acknowledged

The City of Portmouth has received this issue. It is registered as service request #0215202.

02/15/2020 7:50 PM

City of Portsmouth | Verified Official
Closed

The City of Portmouth has addressed this issue, service request #0215202.

02/26/2020 8:21 AM

Unavoidable Annual Real Losses -

Unavoidable Annual Real Losses	Background Leakage					
	gal/mi/hr	Miles or #	Gal/Hr	Gal/Day	Gal/Year	MG/Year
Mains or Pipelines (our system plus private lines)	8.5	220	1,870	44,880	16,381,200	16
Service Connections to curb stop	0.33	9,800	3,234	77,616	28,329,840	28
Fire Hydrant Connections	0.33	1,040	343	8,237	3,006,432	3
Service Connections curb to meter	0.13	9,800	1,274	30,576	11,160,240	11
Reference: IWA Approach to Calculating Uavoidable Annual Real Losses taken from "Water Loss in North America"					TOTAL	**59**

Note: AWWA Water Loss Committee working on updating these metrics. Recent data shows that background leakage may be significantly higher than the metrics used for this calculation.

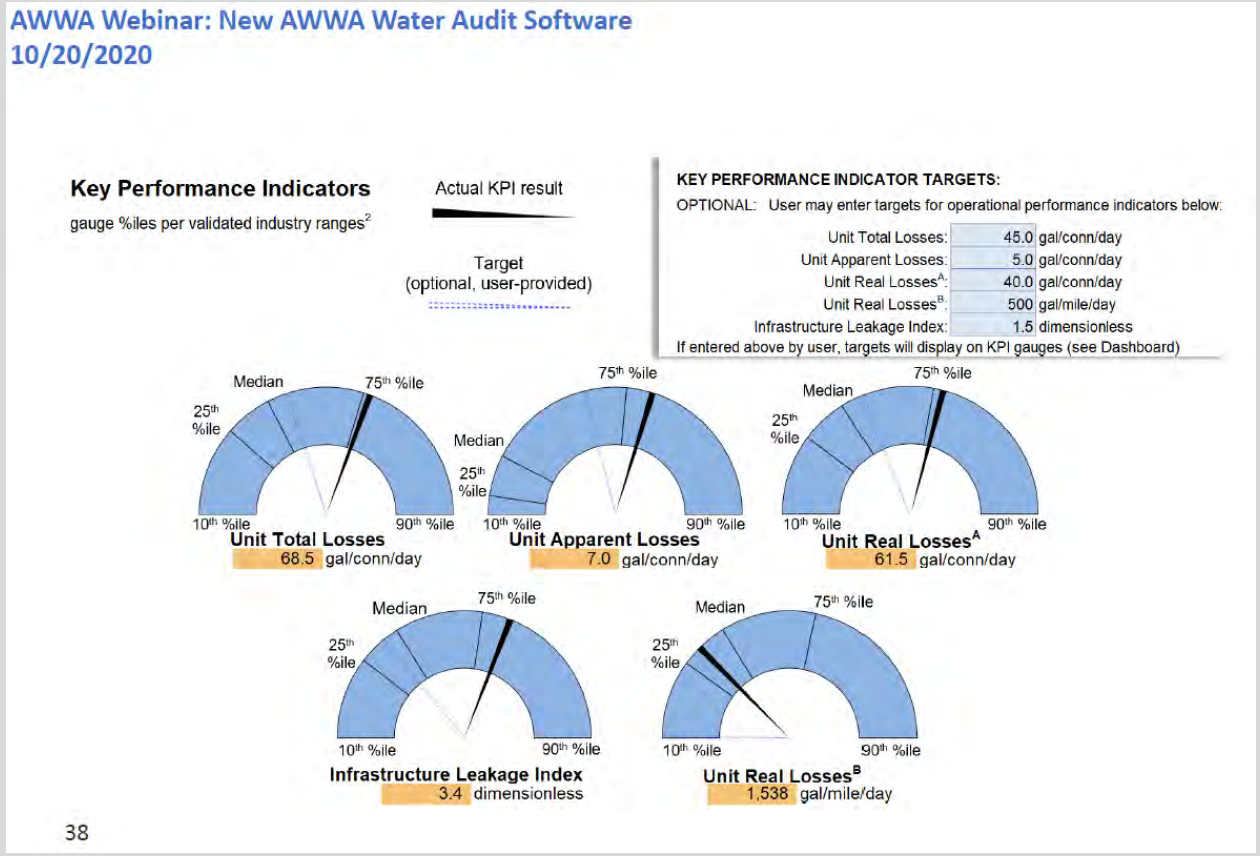
2019 Portsmouth Water Balance

Portsmouth Water Balance - 2019			
Portsmouth Pease Water Systems		**Million Gallons**	
Source Water	System Inputs	1,460	
Authorized Consumption	Billed Metered Water	1,193	81.68%
Authorized Consumption	Billed Un-Metered Water	0	0.00%
Authorized Consumption	Hydrant Meters	1	0.10%
Unbilled Authorized Consumption	Pease Golf Course	15	1.03%
Unbilled Authorized Consumption	Flushing	26	1.75%
Unbilled Authorized Consumption	Fire Use	3	0.21%
Apparent Water Losses	Unauthorized Consumption	4	0.25%
Apparent Water Losses	Customer Meter Inaccuracies	31	2.12%
Apparent Water Losses	Systematic Data Handling Errors	0	0.00%
Real Losses	Known Leaks/Main Breaks	10	0.68%
Real Losses	Water Storage Leaks and Overflows	0	0.00%
Real Losses	Unavoidable Annual Real Loss	59	4.03%
	Total Accounted for Water	1,341	91.86%
	Other Real Water Loss	**119**	**8.14%**

Looking Forward

- Continued calibrations at all sources of supply
- Continue with 10-year meter changeouts and annual meter testing program – targeting 10% replacement/year
- Continue leak detection program targeting 1/3rd of system a year and also investigating areas suspected to have leaks
- Replacement of water mains in problem areas
- Improve water flushing data accuracy and work with fire departments to improve their water use reporting
- Incorporate new AWWA metrics in Water Balance assessments

AWWA Recommends Moving Toward Performance Indicators



No Matter What the Metric – The Key is to track production and usage and see how you are doing over time

Challenges

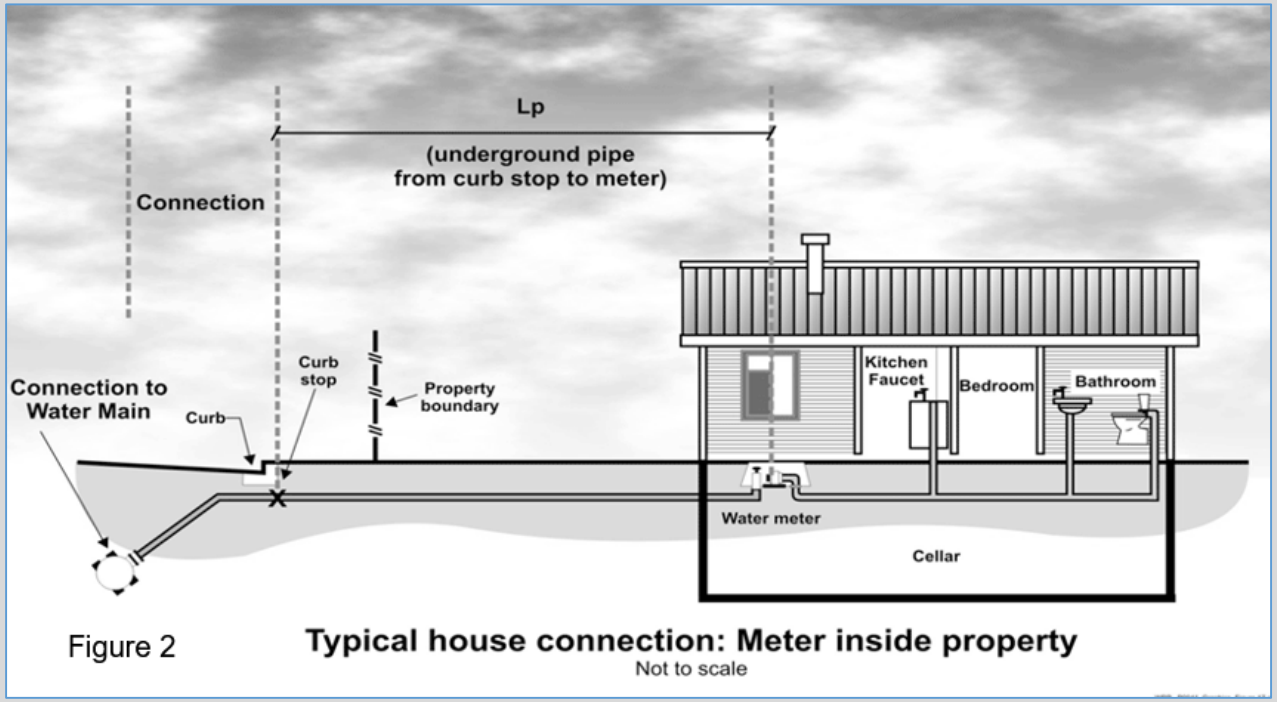


Figure 2 **Typical house connection: Meter inside property**
Not to scale

- Metering is all inside buildings – greater opportunity for undetected water loss from water main to building
- Leak detection of private water lines
  - Potential for unauthorized consumption
- Water main replacements in urban area are complicated and expensive
- Our water system gets another year older every year!

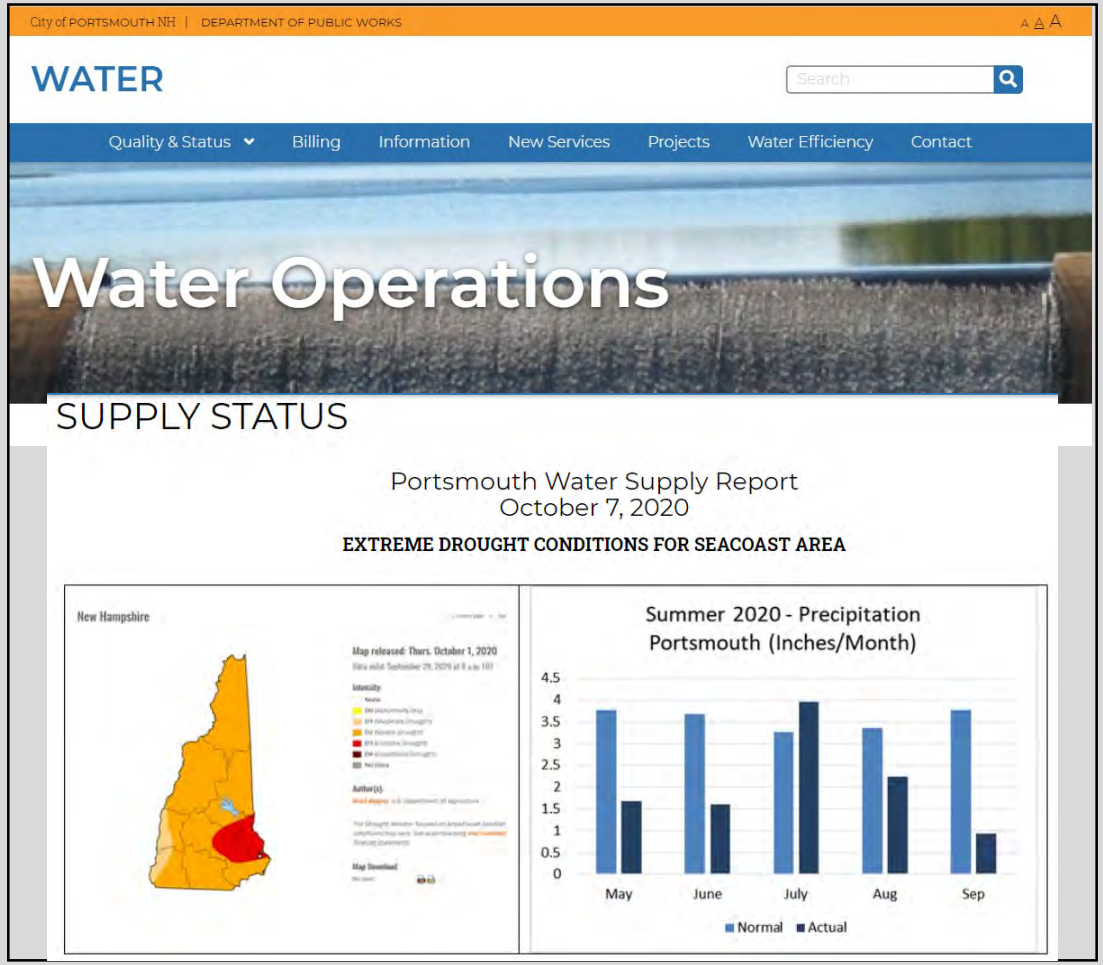
Bonus Question?

What is exported water?

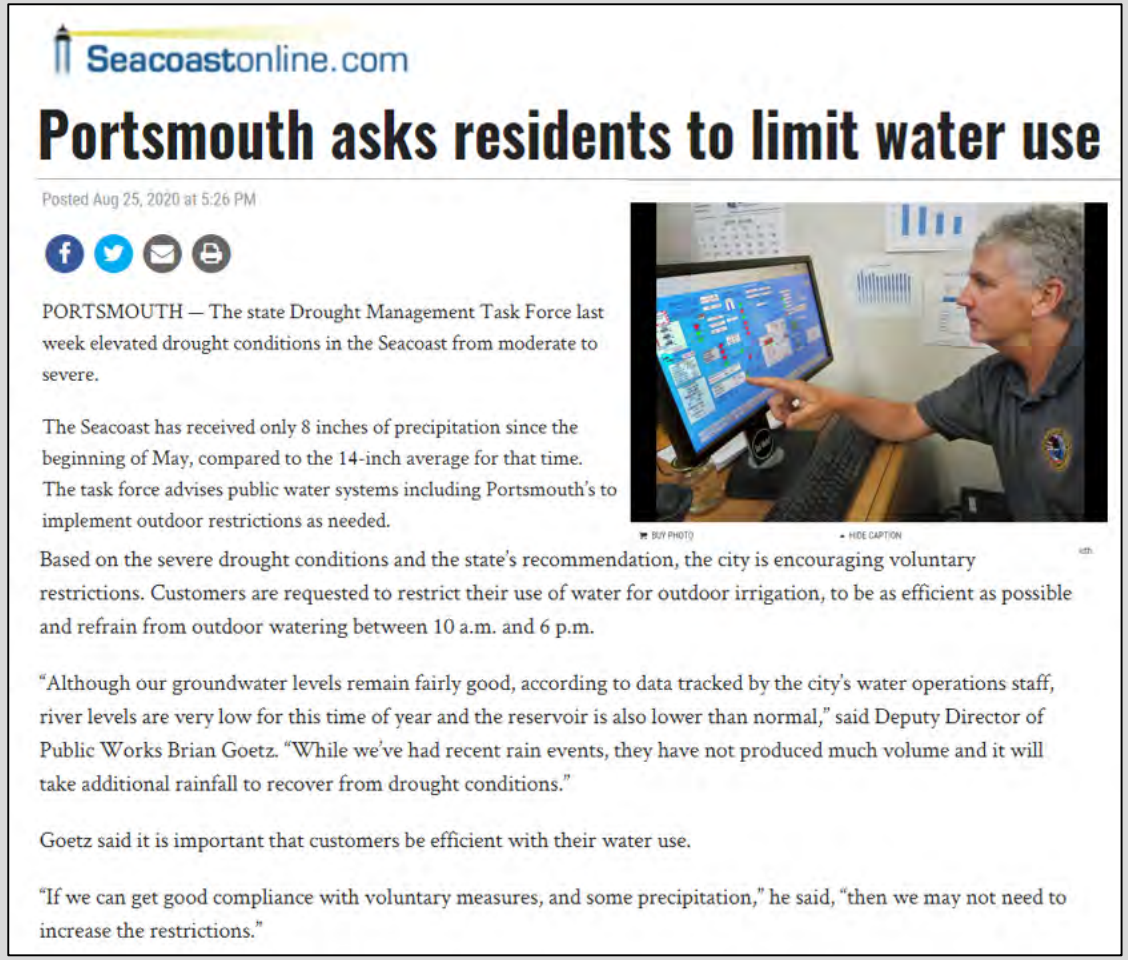
1. Water sold to another country
2. Water you don’t want any more
3. Bulk water conveyed or sold by the water utility to neighboring water systems

Public Outreach: Water Supply Updates

Website Updates



News



Seacoastonline.com

Portsmouth asks residents to limit water use

Posted Aug 25, 2020 at 5:26 PM

PORTSMOUTH — The state Drought Management Task Force last week elevated drought conditions in the Seacoast from moderate to severe.

The Seacoast has received only 8 inches of precipitation since the beginning of May, compared to the 14-inch average for that time. The task force advises public water systems including Portsmouth's to implement outdoor restrictions as needed.

Based on the severe drought conditions and the state's recommendation, the city is encouraging voluntary restrictions. Customers are requested to restrict their use of water for outdoor irrigation, to be as efficient as possible and refrain from outdoor watering between 10 a.m. and 6 p.m.

"Although our groundwater levels remain fairly good, according to data tracked by the city's water operations staff, river levels are very low for this time of year and the reservoir is also lower than normal," said Deputy Director of Public Works Brian Goetz. "While we've had recent rain events, they have not produced much volume and it will take additional rainfall to recover from drought conditions."

Goetz said it is important that customers be efficient with their water use.

"If we can get good compliance with voluntary measures, and some precipitation," he said, "then we may not need to increase the restrictions."

Public Outreach:

Save Water for Earth Day 2016

This April 22nd marks the 46th anniversary of Earth Day, and what better way to celebrate than saving water in the great outdoors? You can get started with some of the outdoor water-saving tips below while you reconnect with nature and give back to the earth by saving water in your lawn or garden this spring.

Here are six simple tips to preserve this precious resource:

1. **Check the time:** Water your yard in the morning or evening to avoid losing water to evaporation in the heat of the day.
2. **Get in the "hydro" zone:** Group the plants in your garden according to their water needs, also known as using "hydrozones," which reduce the risk of over watering your plants.
3. **Use mulch:** Adding mulch in your garden helps reduce evaporation, inhibit weed growth, moderate soil temperature, and prevent erosion.
4. **Keep control:** Upgrade to a WaterSense labeled controller, which acts like a thermostat for your sprinkler system using actual local weather conditions to tailor your watering schedule.
5. **Compost:** Instead of sending organic waste from your kitchen down the garbage disposal with water, add them to a compost pile. You can then use the compost as nutrient-rich soil to add to your garden.

I'm for Water

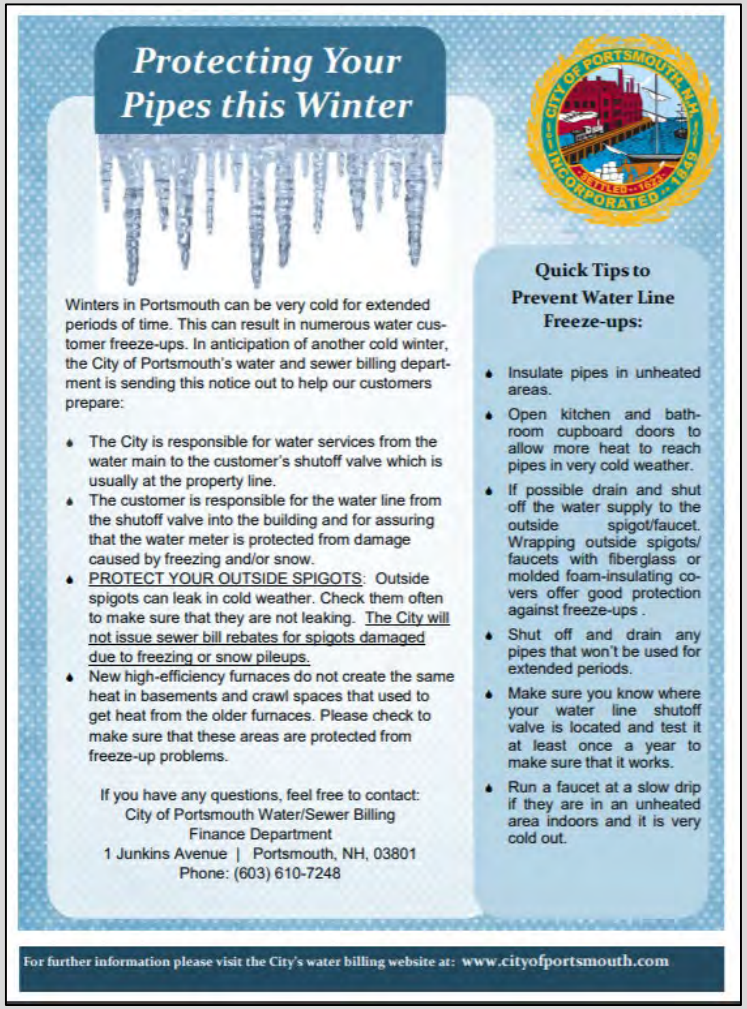
Commit to save water!

WaterSense

Take the US EPA Watersense ***"I'm for Water"*** pledge and use their "***2016 monthly resolutions checklist***" to extend your Earth Day water conservation to a year-round effort at:

epa.gov/watersense/pledge

For more information please visit the City's water website at: www.cityofportsmouth.com/publicworks



Protecting Your Pipes this Winter

Winters in Portsmouth can be very cold for extended periods of time. This can result in numerous water customer freeze-ups. In anticipation of another cold winter, the City of Portsmouth's water and sewer billing department is sending this notice out to help our customers prepare:

- The City is responsible for water services from the water main to the customer's shutoff valve which is usually at the property line.
- The customer is responsible for the water line from the shutoff valve into the building and for assuring that the water meter is protected from damage caused by freezing and/or snow.
- PROTECT YOUR OUTSIDE SPIGOTS: Outside spigots can leak in cold weather. Check them often to make sure that they are not leaking. The City will not issue sewer bill rebates for spigots damaged due to freezing or snow pileups.
- New high-efficiency furnaces do not create the same heat in basements and crawl spaces that used to get heat from the older furnaces. Please check to make sure that these areas are protected from freeze-up problems.

If you have any questions, feel free to contact:
City of Portsmouth Water/Sewer Billing
Finance Department
1 Junkins Avenue | Portsmouth, NH, 03801
Phone: (603) 610-7248

Quick Tips to Prevent Water Line Freeze-ups:

- Insulate pipes in unheated areas.
- Open kitchen and bathroom cupboard doors to allow more heat to reach pipes in very cold weather.
- If possible drain and shut off the water supply to the outside spigot/faucet. Wrapping outside spigots/faucets with fiberglass or molded foam-insulating covers offer good protection against freeze-ups .
- Shut off and drain any pipes that won't be used for extended periods.
- Make sure you know where your water line shutoff valve is located and test it at least once a year to make sure that it works.
- Run a faucet at a slow drip if they are in an unheated area indoors and it is very cold out.

For further information please visit the City's water billing website at: www.cityofportsmouth.com

Public Outreach:

City of PORTSMOUTH NH | DEPARTMENT OF PUBLIC WORKS

A A A

WATER

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Quality & Status | Billing | Information | New Services | Projects | **Water Efficiency** | Contact

City of Portsmouth › Public Works Home › Water › Water Efficiency

WATER EFFICIENCY

WATER EFFICIENCY PROGRAM PROGRESS

We recognize that a gallon of water saved is a gallon that the City doesn't have to find, produce, treat and test the City's water and wastewater systems. Therefore, we have been implementing water efficiency efforts for over ten years now. These efforts have included:

Water Efficiency Rebate Program

Water and Sewer Enterprise Fund

Total Rebates Issued as of: June 30, 2019

Rebate Type	FY16	FY17	FY18	FY19	FY20	TOTAL	Rebate/ each	Total Rebates
High-Efficiency Toilet	**253**	**368**	**161**	**79**	**102**	**963**	$100	$96,300
High-Efficiency Washing Machine	**34**	**24**	**26**	**36**	**68**	**188**	$150	$28,200
	287	**392**	**187**	**115**	**170**	**1151**		**$124,500**

Updated: August 2020

Water Efficiency Timeline

Water Conservation Kits — 2008

Automatic Meter Reading Program — 2010

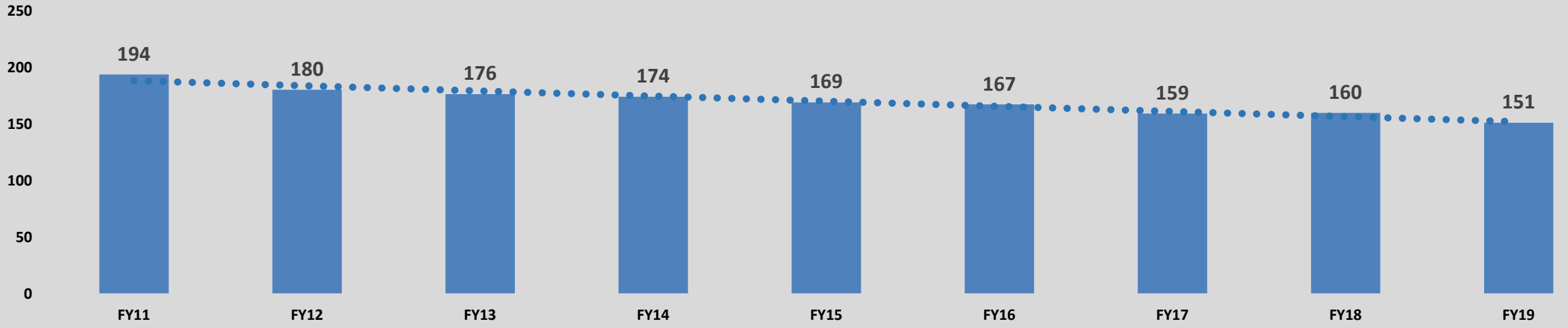
Joined EPA's WaterSense Program — 2014

Toilet and Washing Machine Rebate Program — 2015

WaterSense Irrigation Requirements and Third Tier Irrigation Rate — 2017

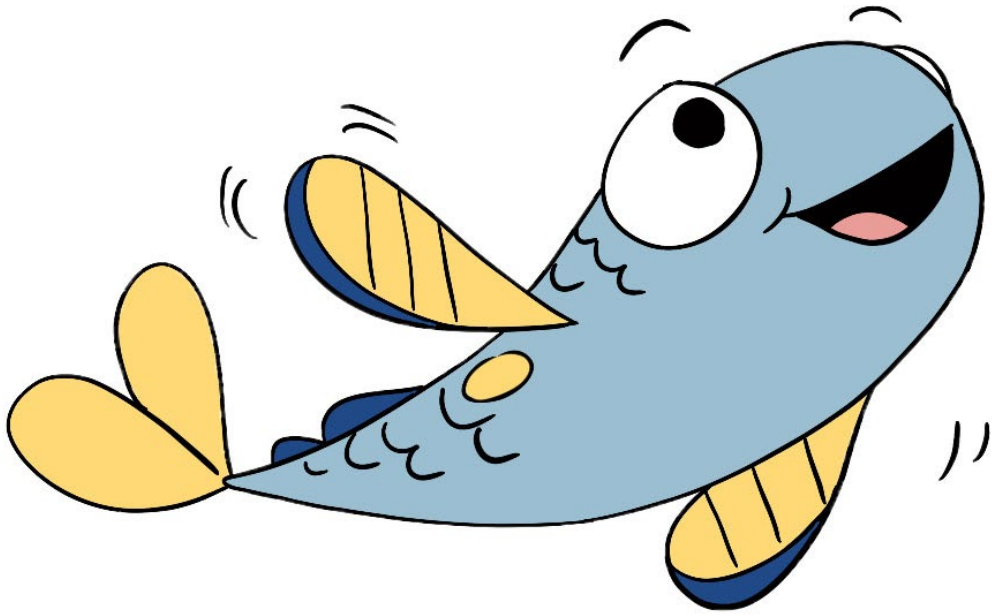
2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020

Trend - Average Residential Water Use Average (gallons per day)



Updated: Aug 2020

Thank You



Think Blue!

Water | Wastewater | Stormwater