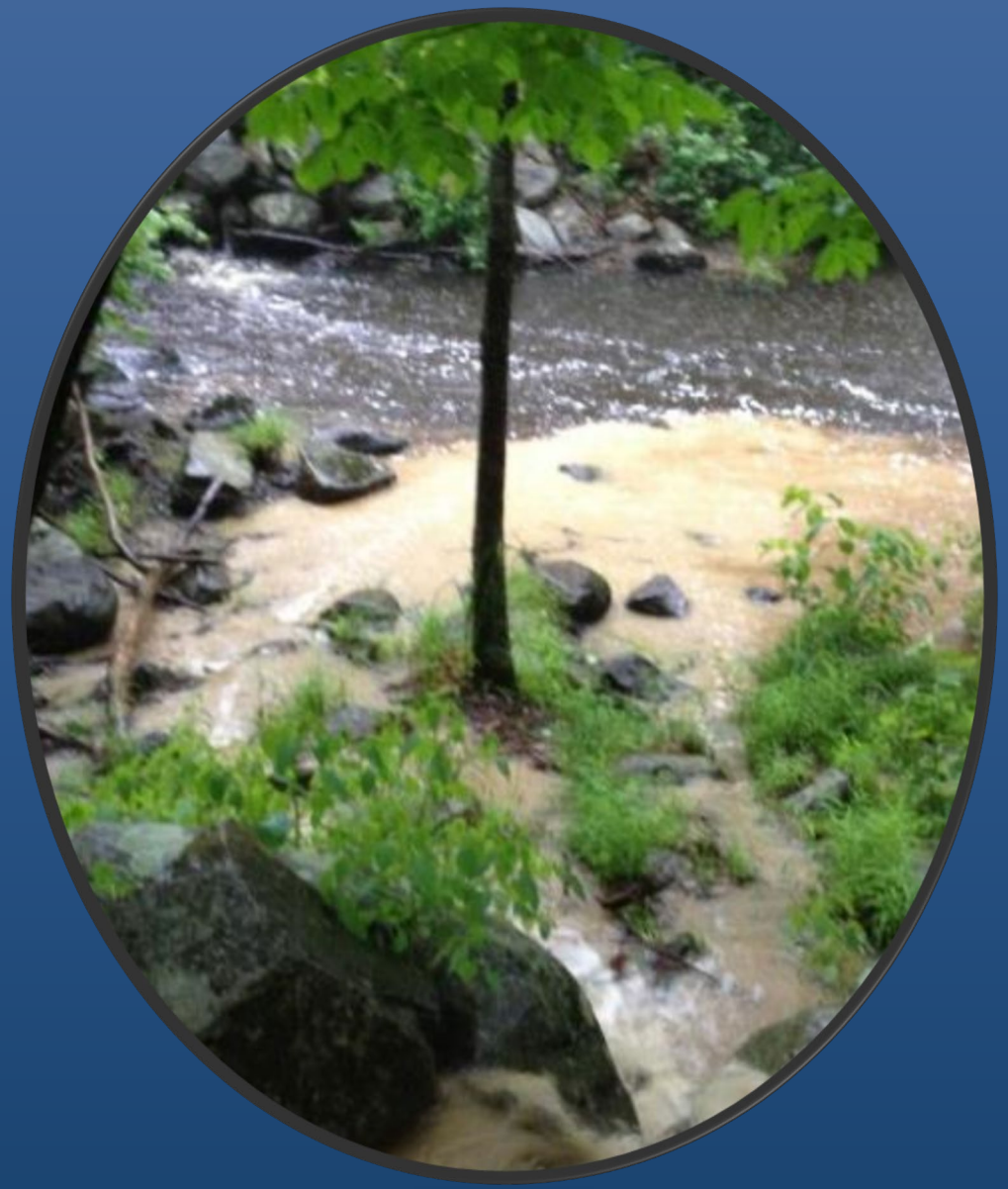
Source: www.cityofportsmouth.com (Nov 18, 2019)

Overview of Tonight's Meeting

- Introduction - Peter Rice – Public Works Director
- Stormwater Permit Components - Bill Arcieri - VHB
- Mapping and GIS Program - James McCarty – GIS Manager
- Field Work - Phoebe Rafferty – GIS Stormwater Specialist
- Program Summary… *and "Think Blue"* - Brian Goetz – Deputy Director of Public Works
- Questions and Discussion

Water is a Good Thing…

… But Uncontrolled Water Can Be a Bad Thing



What is Stormwater?

If your property has a roof, lawn, or driveway, chances are your property creates stormwater.

STORMWATER IS WATER FROM RAIN OR MELTING SNOW THAT DOESN'T SOAK INTO THE GROUND.

Source: www.soaknh.org (NHDES)

Instead it runs through our yards and picks up pollutants like soil, pet waste, fertilizers, and other lawn chemicals.

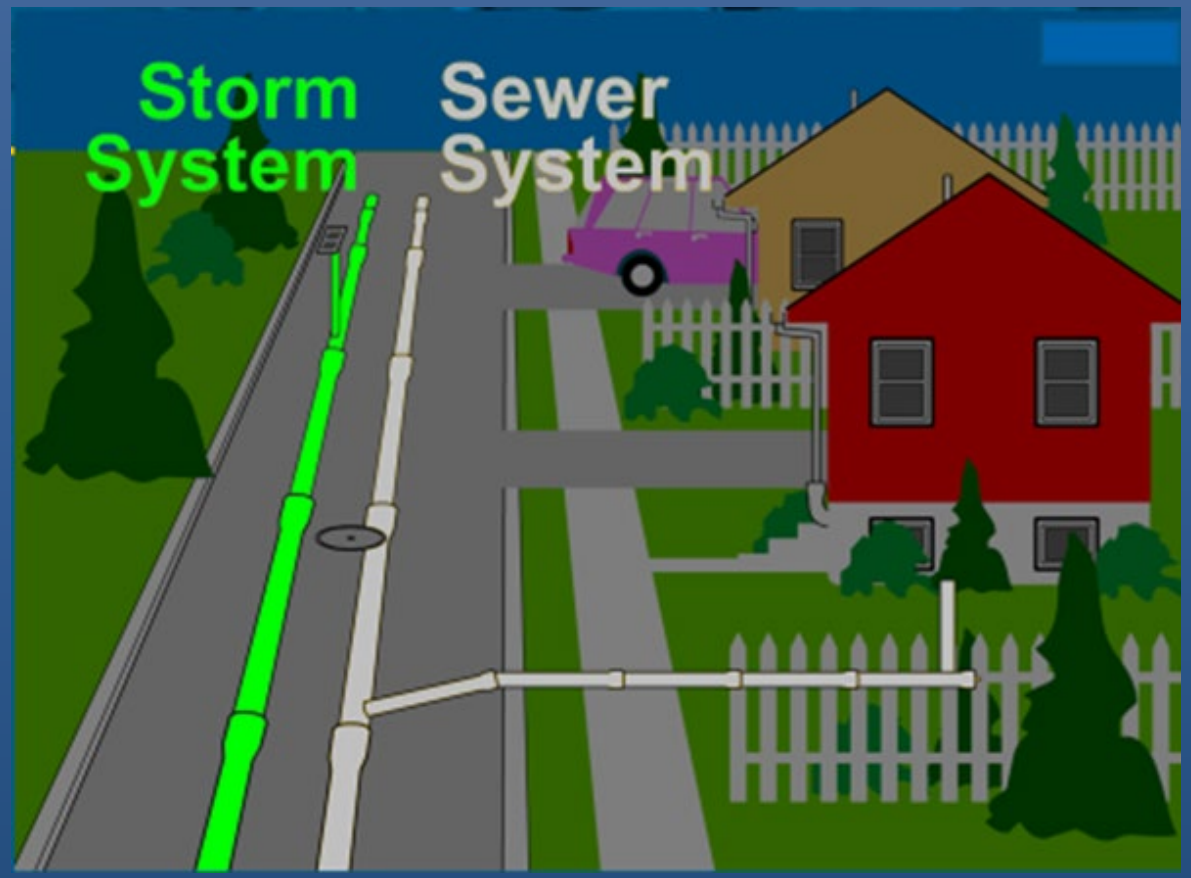
Source: www.soaknh.org (NHDES)

It can cause many different problems including flooding, erosion, and water pollution.

Source: www.soaknh.org (NHDES)

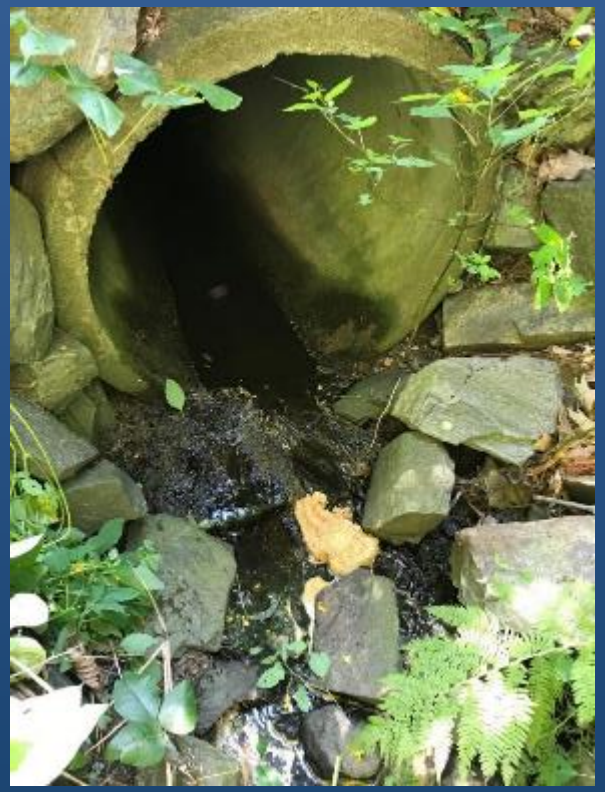
Portsmouth's Stormwater System

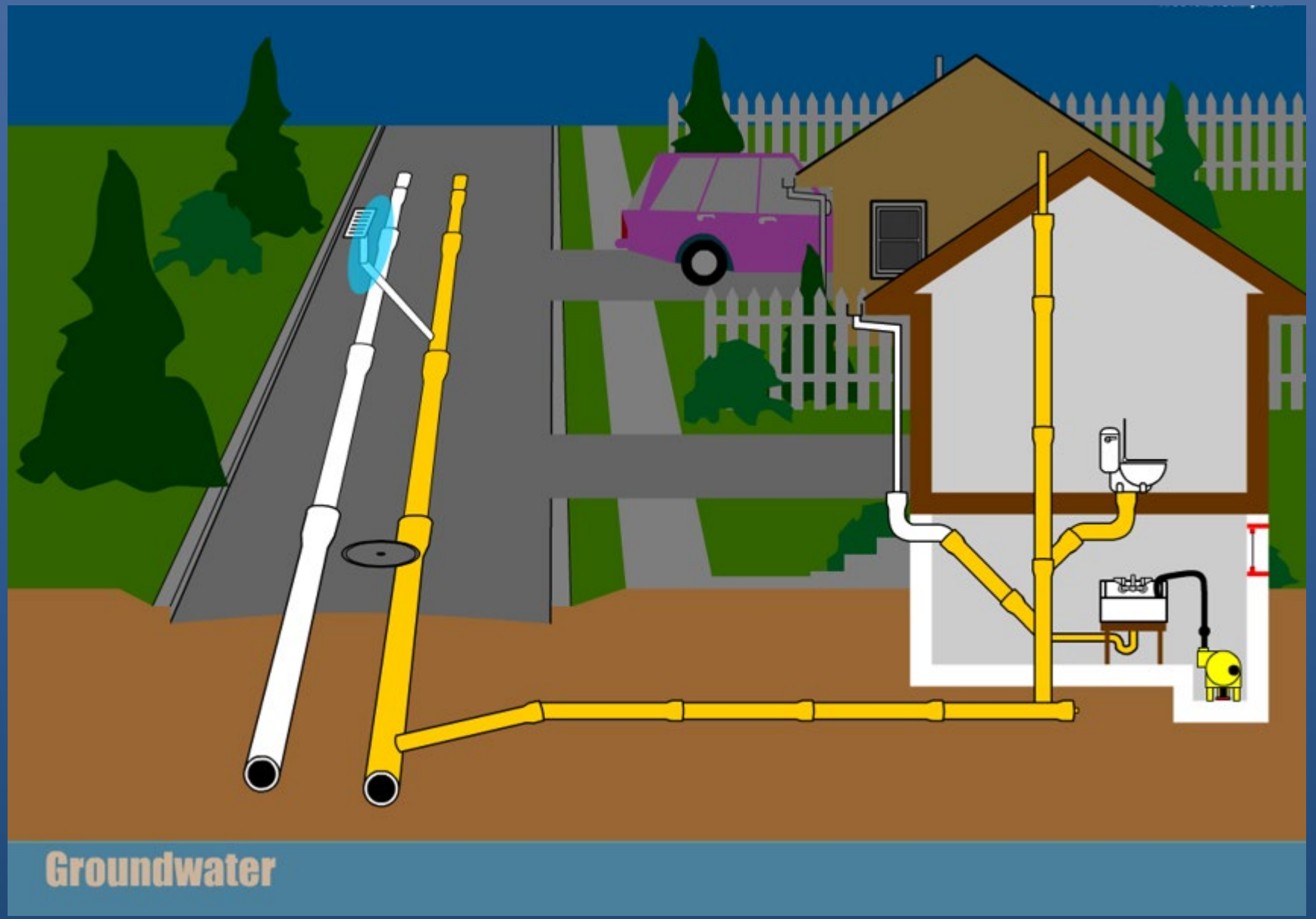
- 64 Miles of piping
- 2,701 Catch Basins
- 676 Manholes
- 74 Stormwater Treatment Units
- 202 Outfalls

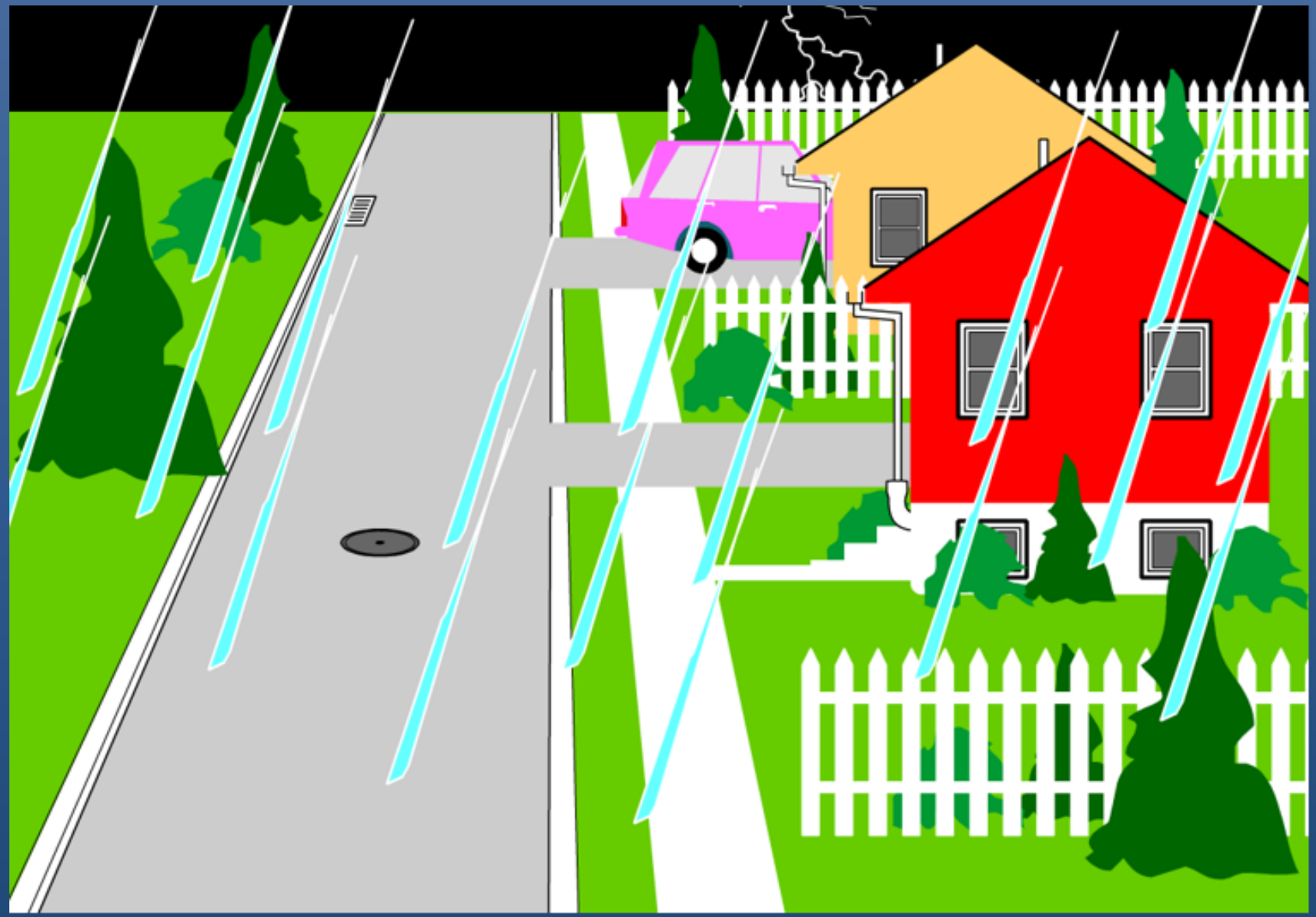


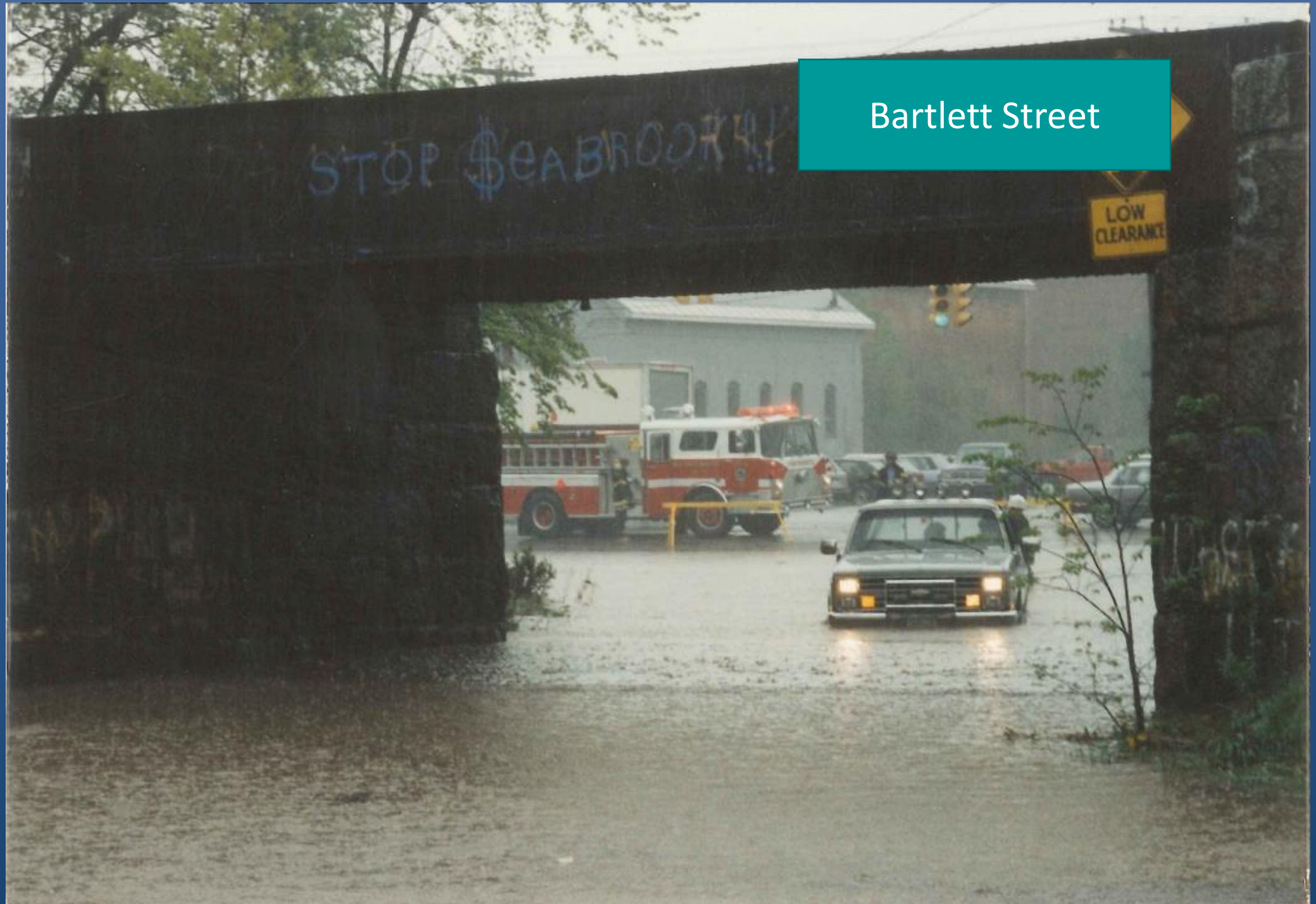
Portsmouth's Stormwater System Tale of Three Utilities

- Stormwater
- Water
- Sewerage




Groundwater



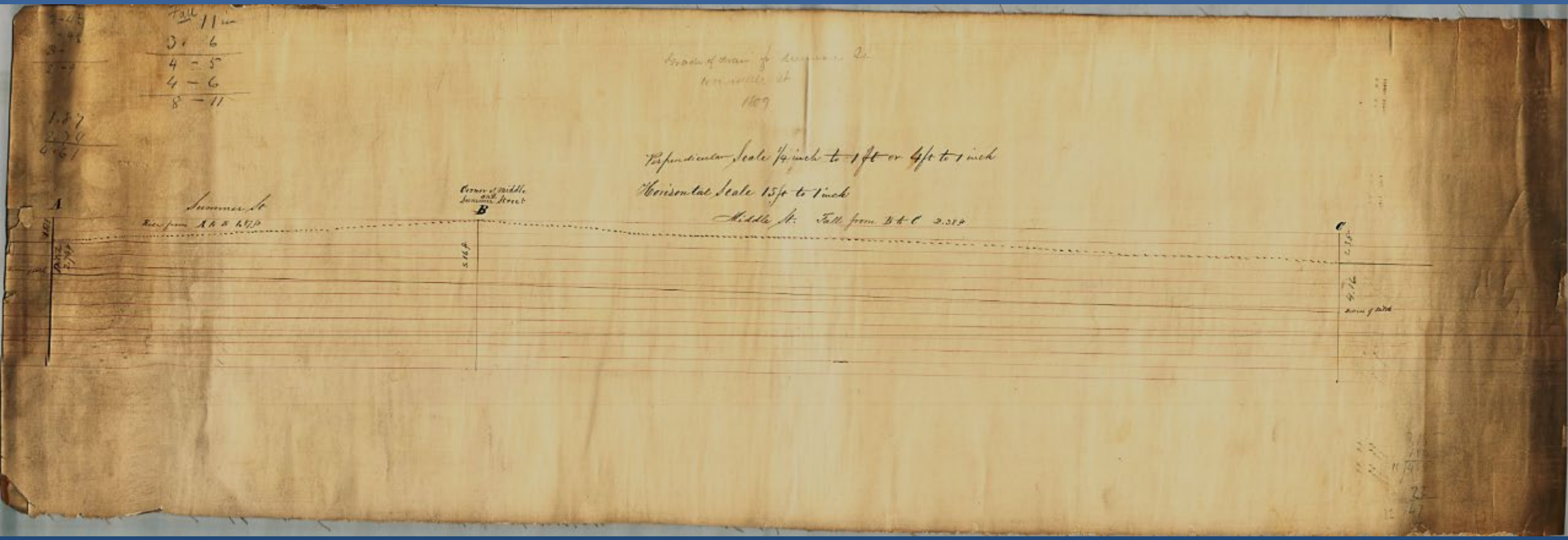


Bartlett Street

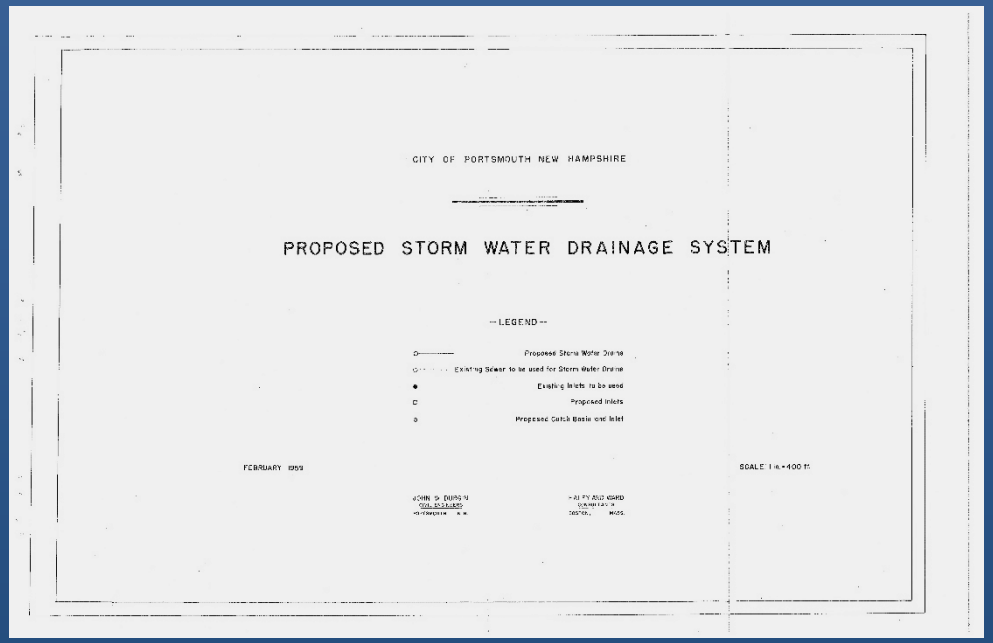

Lovell Street


Basement Back-up

1809 Grade of Drain from Summer to Middle

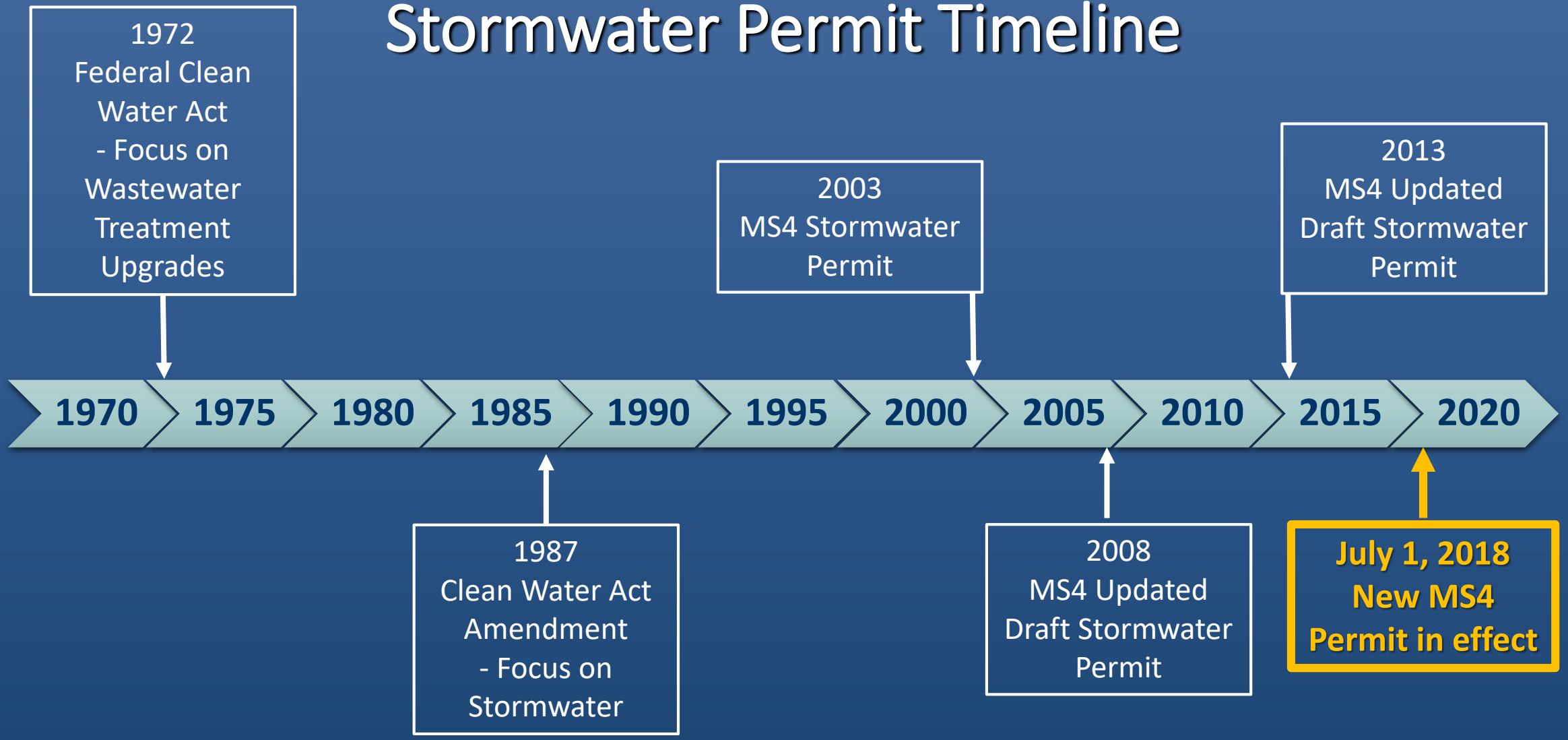


1959 – Portsmouth Designs Separate Stormwater Sewer System



Municipal Separate Stormwater Sewer System (MS4) Permit

Stormwater Permit Timeline



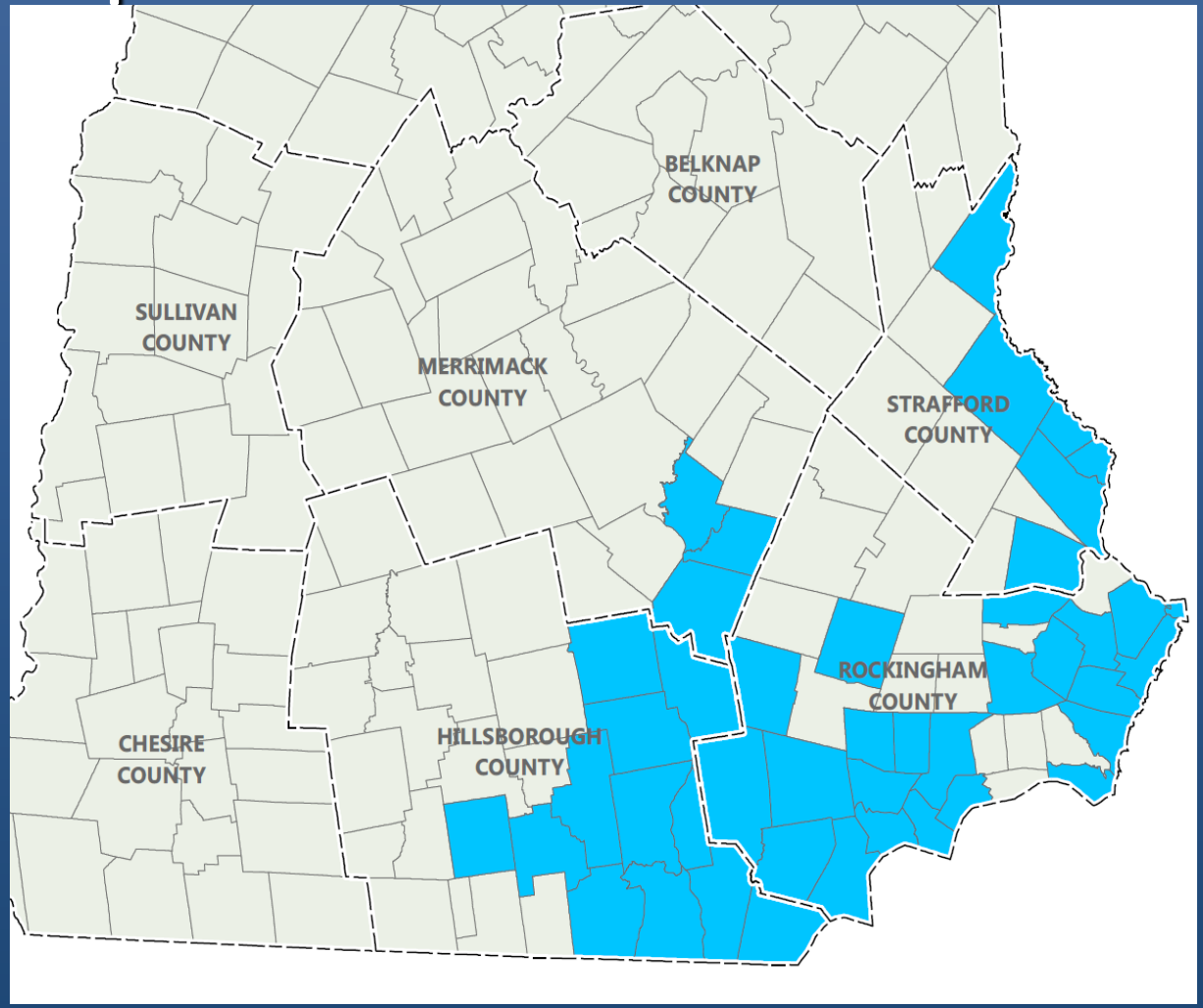
What Has Happened?

- Initial 2003 MS4 Permit limited impact to City Operations (5 Year Permit)
  - Stormwater Master Plan 2007
  - City Council voted to establish Stormwater Ordinance - Chapter 16, Article II
  - Mapping
  - Field Inspections
  - Establish Cleaning and Maintenance Programs
- EPA issued draft MS4 permit in 2008 finally issued in 2017
- Most recent MS4 Permit effective July 2018 significant Impact to City Operations
  - Additional monitoring, studies, data collection and operational changes
  - Reorganization of DPW staffing to address regulatory requirements for stormwater management
  - 2019 City Council created special revenue fund to track stormwater management activity costs

MS4 Regulated Communities in New Hampshire

- **60** Total Communities
  - **44** Subject to Permit
  - **16** with Waivers

- Three Non-Traditional
  - NHDOT
  - UNH
  - Pease International Tradeport



Water Quality-Based Requirements

- Most Recent Approved 303(d) list of Impaired Waters (2016)
  - Nitrogen, phosphorus, chloride, bacteria, metals
- Impaired Waters with Total Maximum Daily Loads (TMDLs);
  - Appendix F – with a TMDL
  - Appendix H – Impaired but no TMDL

Permit Basics
Six Minimum Control Measures

1. **Public Education / Outreach**
2. **Public Participation/Involvement**
3. **Illicit Discharge Detection Elimination**
4. **Construction Erosion Control Regulations**
5. **Post-Construction Stormwater Regulations**
6. **Good Housekeeping - City Operations and Facilities**

Public Education and Outreach

- Two messages/yr to four audiences
  - Residential
  - Commercial/Business
  - Developers
  - Industries
- Add'l Messages for Impaired Waters
  - Nitrogen = fertilizer use, yard waste, etc.
  - Bacteria = Septic Systems
  - Chloride = promote Green SnowPro Certification

Public Involvement

- Annual opportunity to allow public to provide input of stormwater management plan implementation
- All reports made publicly available
  - City website
  - Available at DPW

Illicit Discharge Detection Elimination (IDDE)

- Written IDDE Plan by July 2019 - Complete
- Priority Ranking of Outfalls - Ongoing
- Phased dry weather sampling - Ongoing
- Catchment investigations of system connections
- Map entire storm system over 10 years
- Adequate legal authority to prohibit and investigate illicit connections (i.e., ordinance, by-law, etc.)

Construction Site Runoff Control

- Written procedures for site plan review for new sites > 1 acre
- Written procedures for inspection and enforcement measures
- Regulatory controls for other wastes such as demolition debris, litter, and sanitary wastes

Post-Construction Site Runoff Control

- First 2 years
  - New or Redevelopment: Enhanced stormwater treatment for projects ≥ 1 acre of disturbance
- Within 4 years
  - Update street and parking lot design to promote Low Impact Development and limit impervious cover
  - Inventory all City owned land for future retrofits
- Within 5 years
  - Identify five sites for potential retrofit

Good Housekeeping

- **Within 2 years**: **Develop Plan** for municipal activities, street sweeping, CB cleaning, BMP inspections, etc.
- **Inventory of publicly owned facilities**, including parks and open space, building and facilities, vehicles, and equipment
- **Stormwater pollution prevention plan (SWPPP)** for public works / transfer station facility

Nutrient Impaired Waters

- **Nitrogen Impaired Waters**
  - **4 years:** Nutrient Source Identification Plan
    - Sources, load estimates, remedial measures
    - Targeted educational messages (pet waste and fertilizer management)
    - Enhanced street sweeping
  - **5 years: Identify Potential Stormwater Retrofit Sites**

Photo: DKWR Consulting

Chloride Impaired Waters

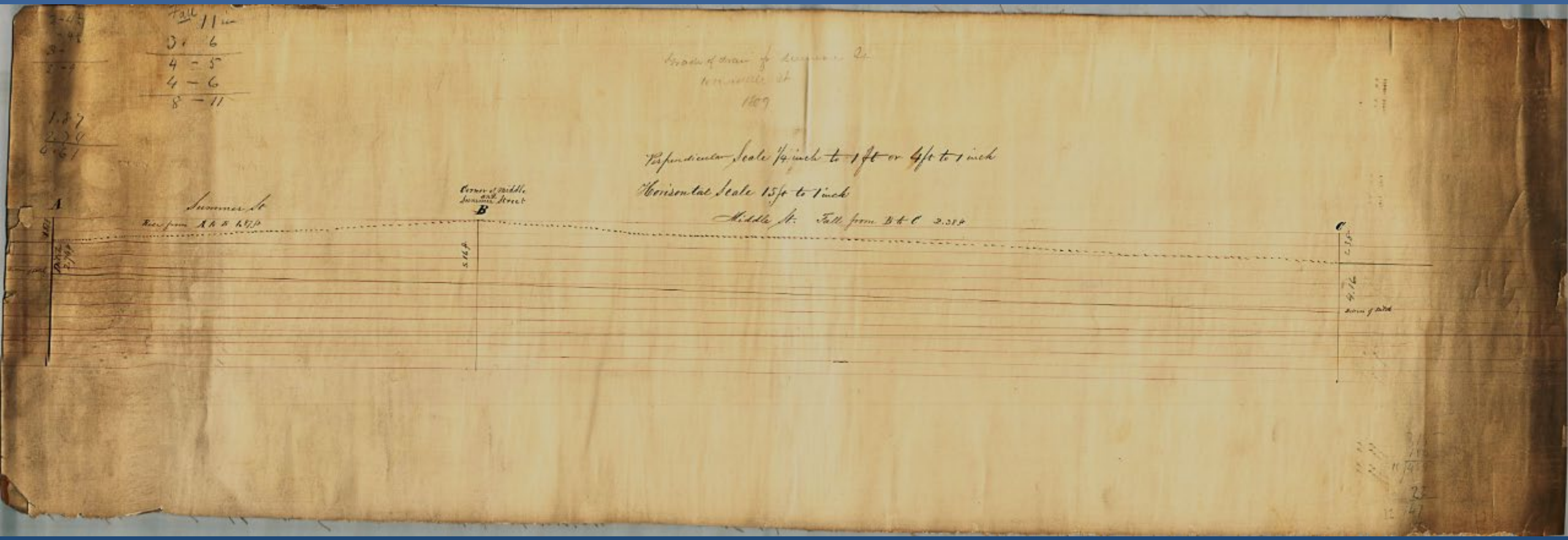
Chloride Impaired (Appendix H)

- **Salt Reduction Plan by Year 3.**
- **Fully implement by Year 5.**
  - Tracking and reporting municipal use
  - Upgrade equipment to increase efficiency
  - Training for municipal staff
  - Update regulations for new and redevelopment to minimize salt usage.
  - Identify private parking lots with 10 or more parking spaces and encourage use Green SnowPro Operators

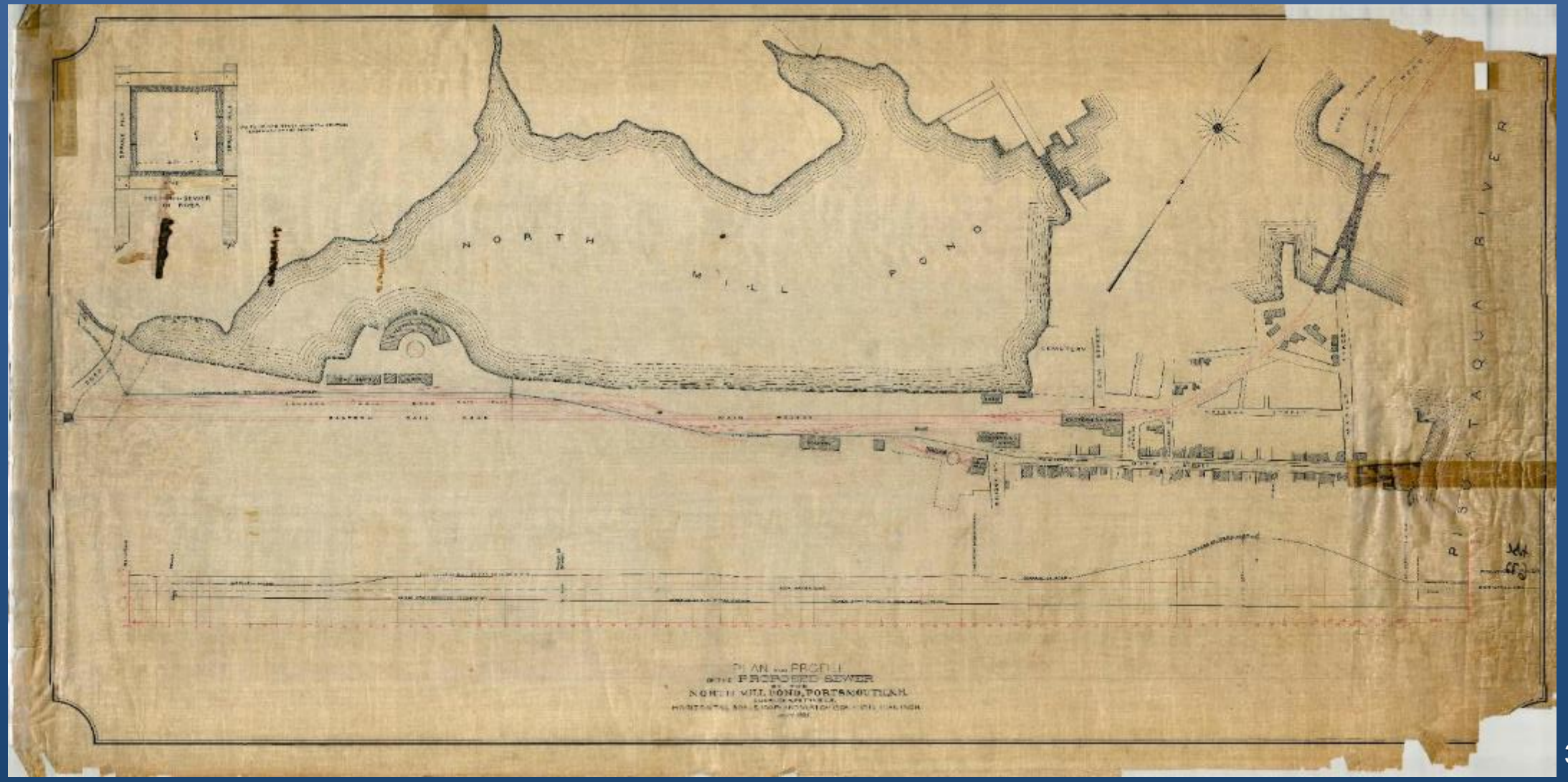
The History of Portsmouth's Mapping System
From Paper to Digital Maps

DPW Map Room - 2019

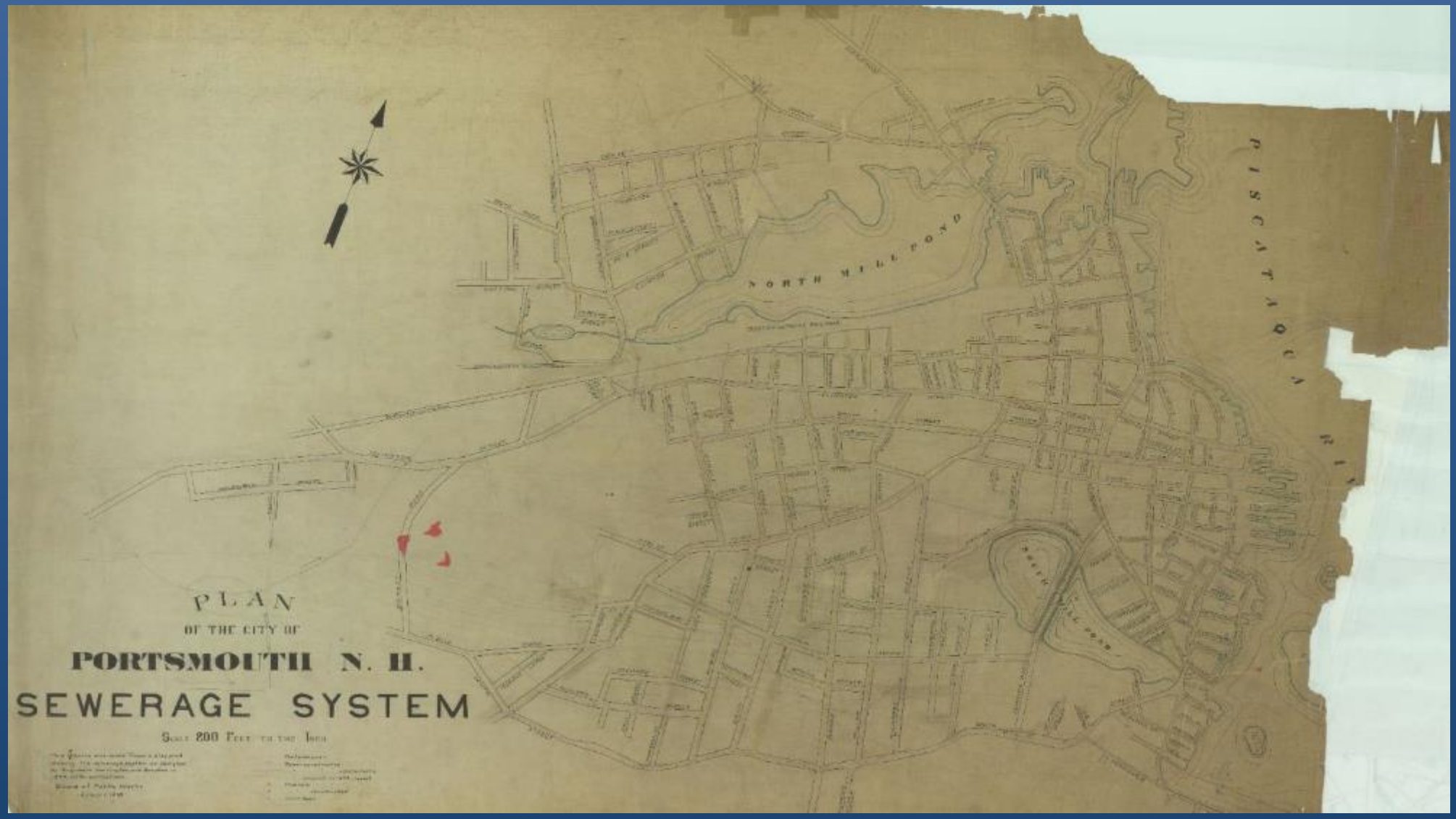
1809 Grade of Drain from Summer to Middle



1885 “Brick Box” Sewer

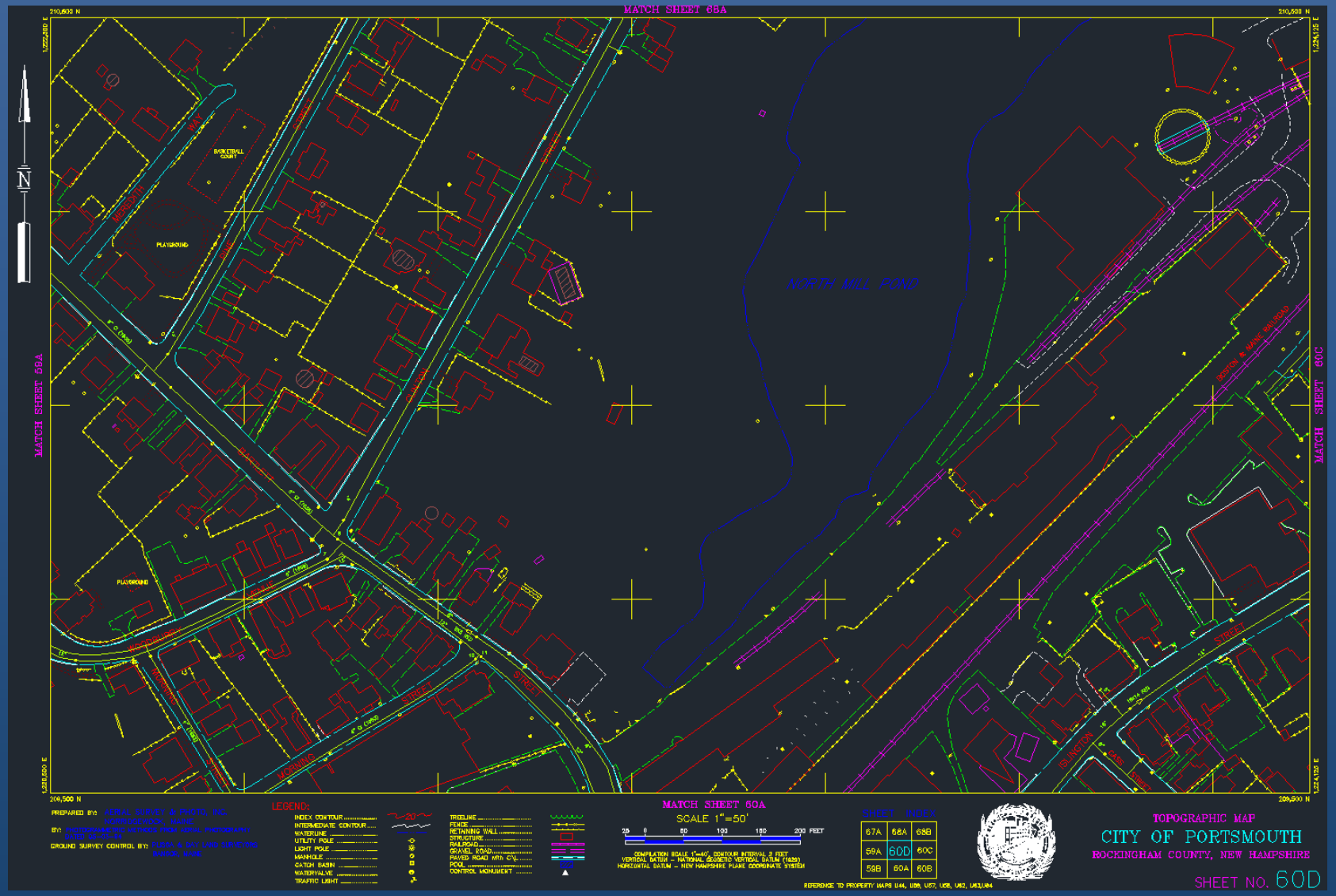


1915 Sewerage System



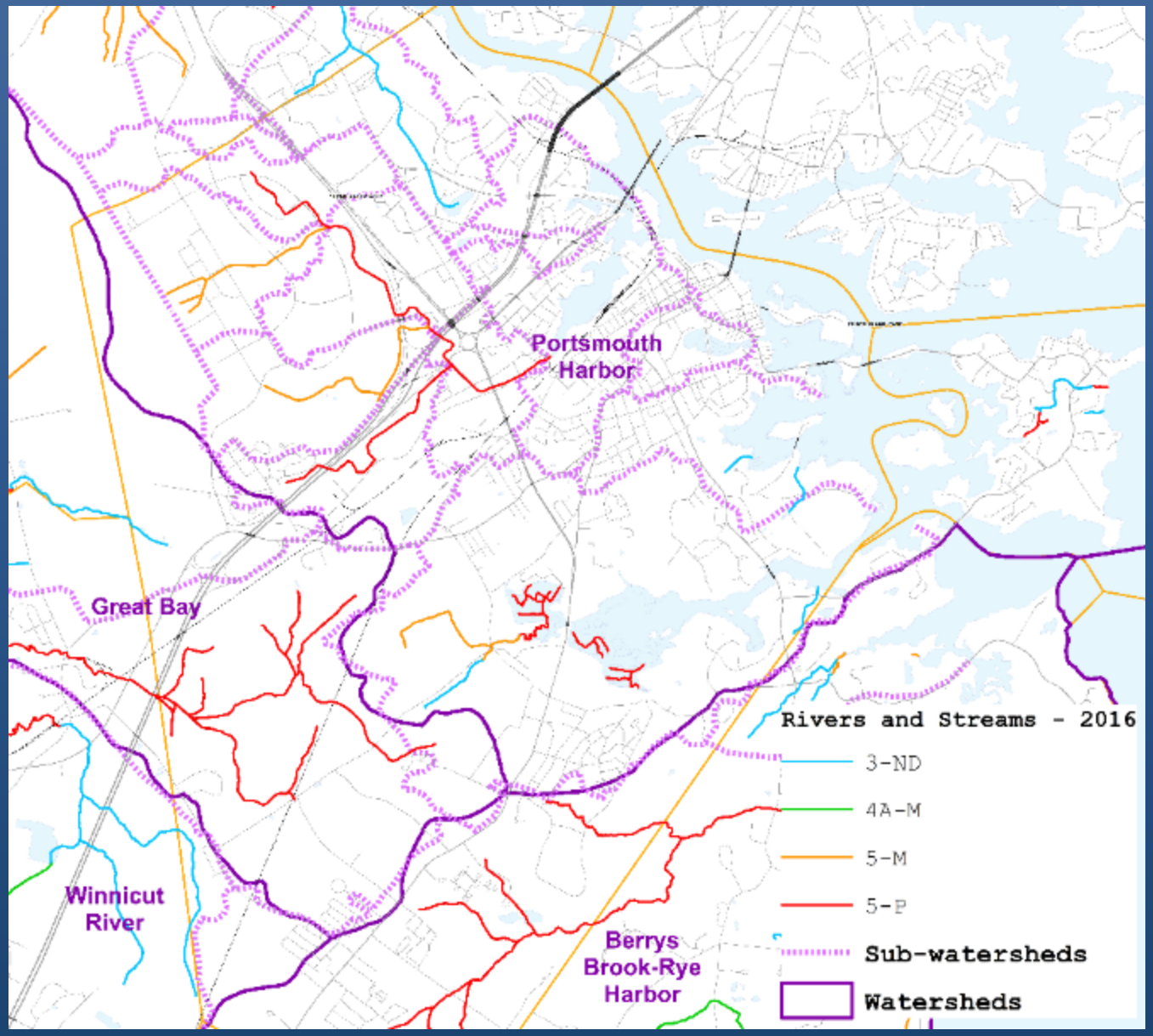
1994 Orthophoto

1994 CAD mapping



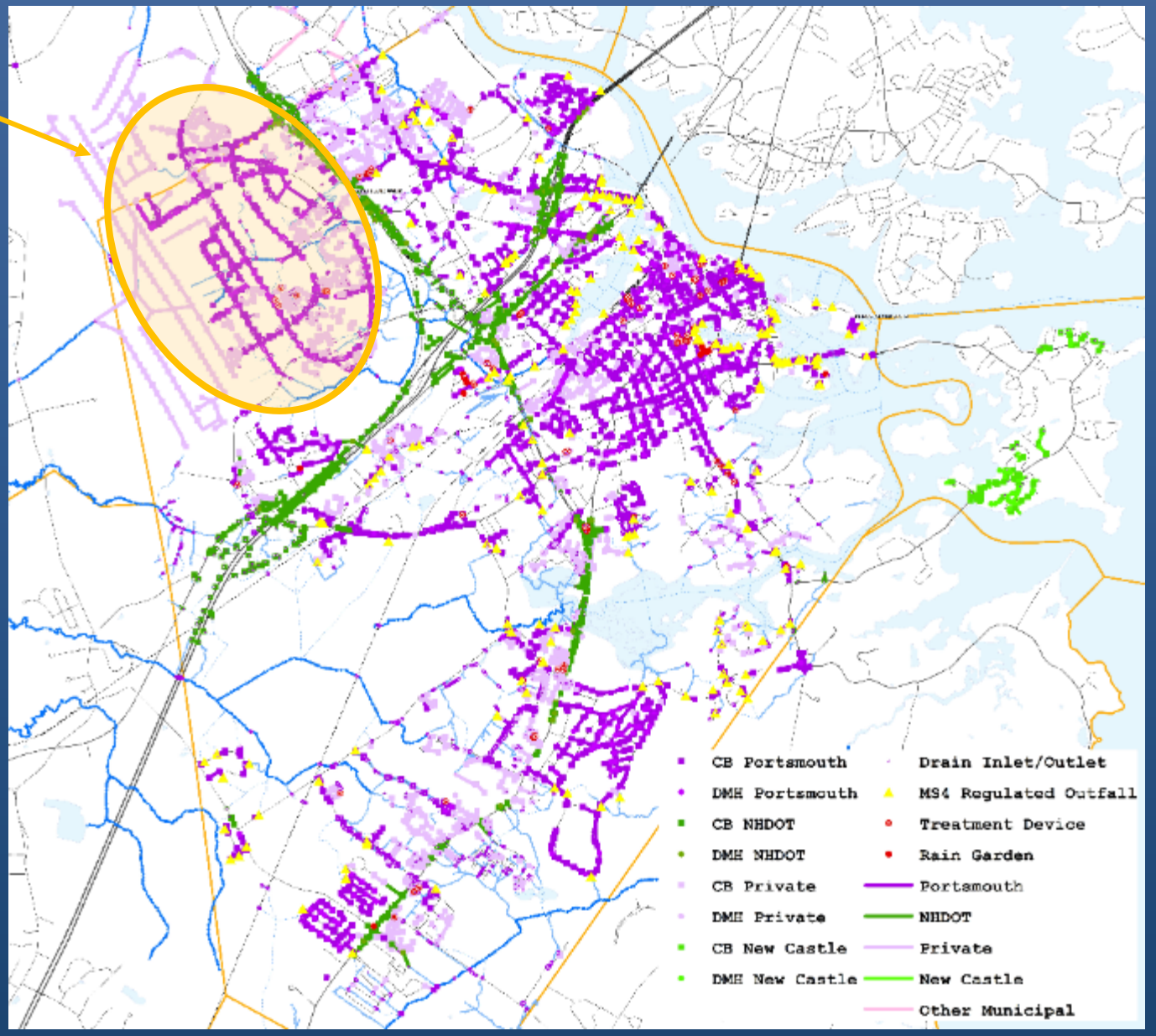
GIS Mapping Today

Watersheds & GIS Mapping

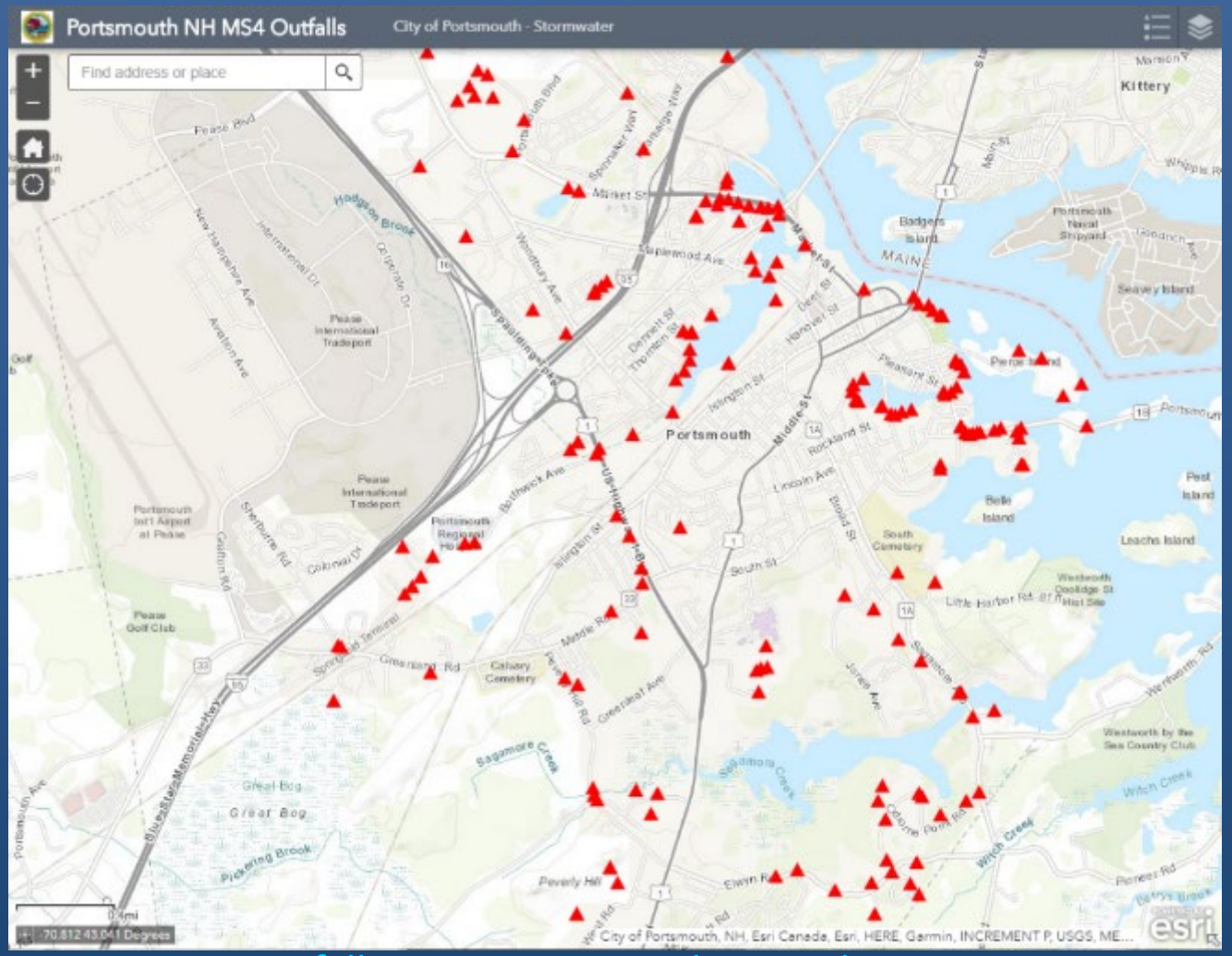


Infrastructure Jurisdictions

Pease – City DPW maintains infrastructure in streets only

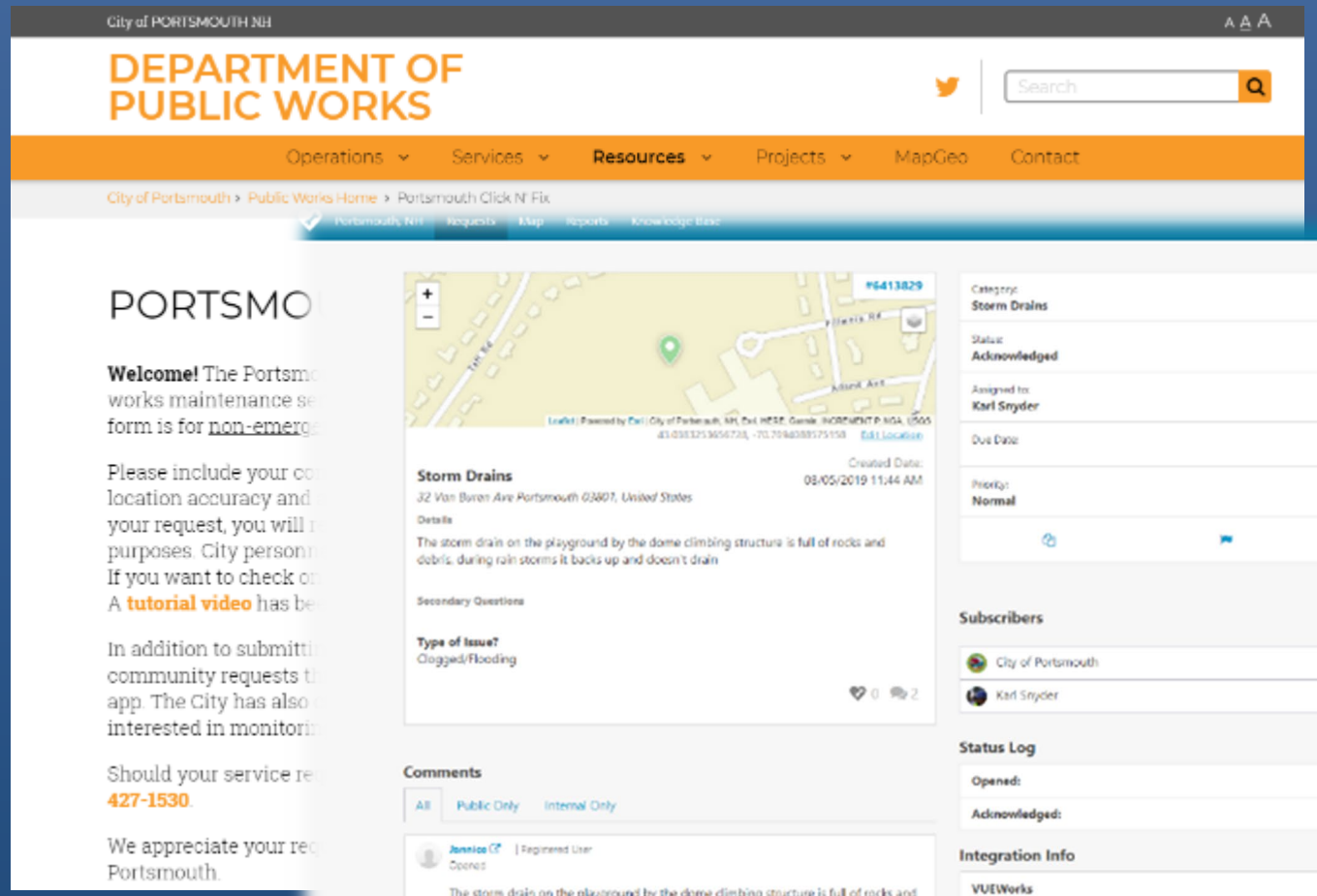


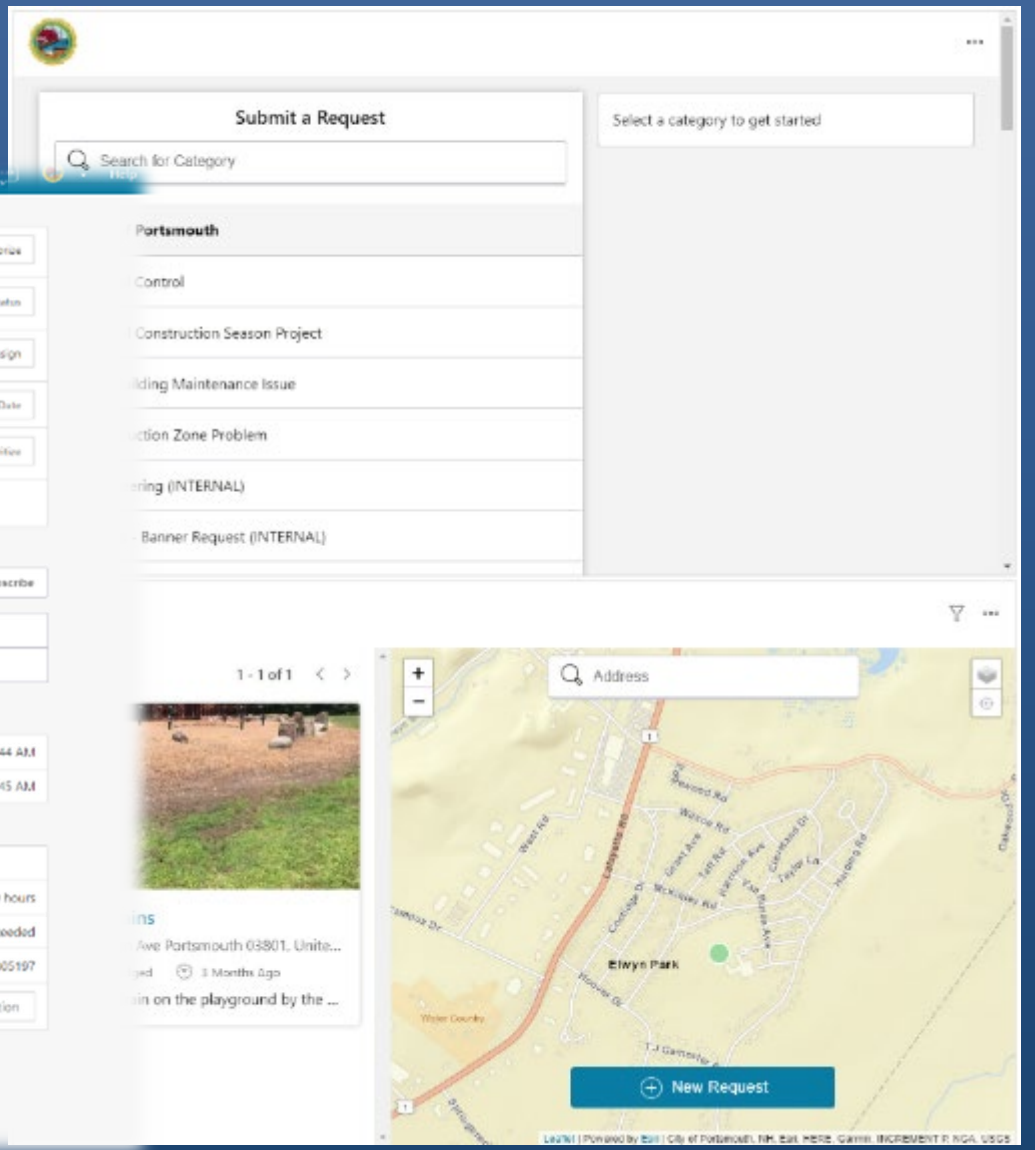
Dynamic Online Outfall Map



[Outfalls Map - ArcGIS Online Application]

Portsmouth Click n’ Fix





Interns
2014 - 2019

The last six years Interns have observed

2014

Initial Storm drains, pipes, and outfall inspections and locations.

2015

Stormwater inspections, Sidewalk evaluations and inventory, street lights, and solid waste/recycling routes.

2016

Continued to update Stormwater infrastructure database, sidewalk inventory, and street lights.

The last six years Interns have observed

2017

Locate private waterlines, double utility poles, update stormwater database

2018

Update stormwater system, double utility pole inventory, update easement information.

2019

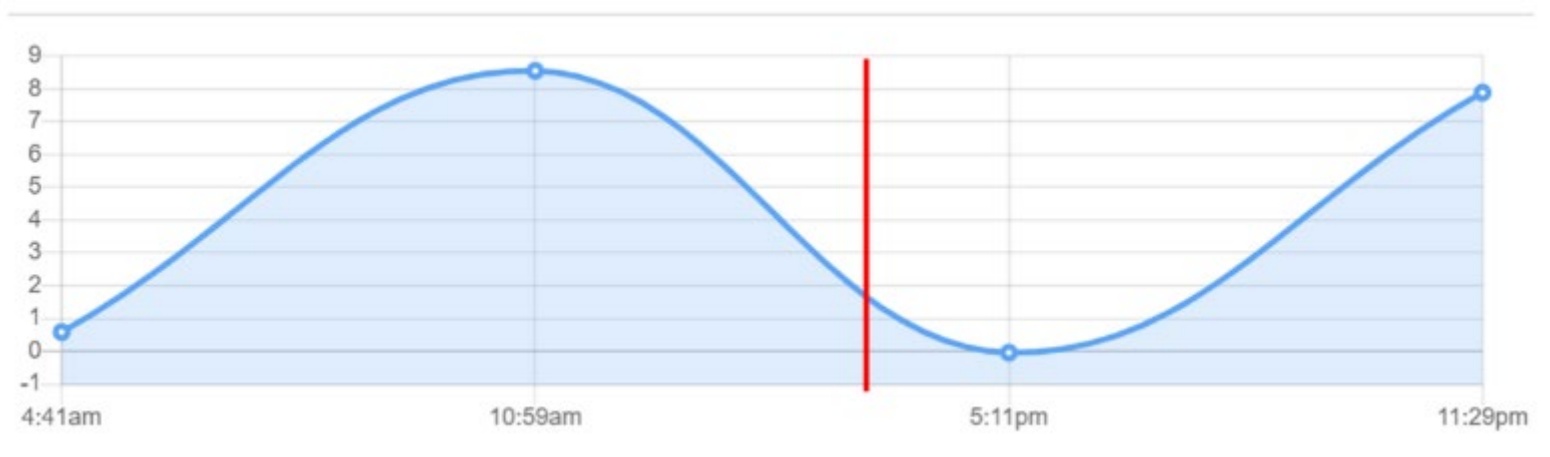
Verified water and sewer lines. Located and sampled 202 MS4 outfalls, updated outfall map.

2019 Focus

- Update outfall inventory and initial ranking
- Stormwater system GIS map updates
- Dry weather outfall screening and sampling
  - Identified and inspected 202 sites
  - Identified 23 sites for dry weather sampling

Dry Weather Flow

- “Dry” weather = 48 hours with less than 0.1 inch of precipitation
- Also have to take into account tides, as many outfalls close to the water can be inaccessible during high tide

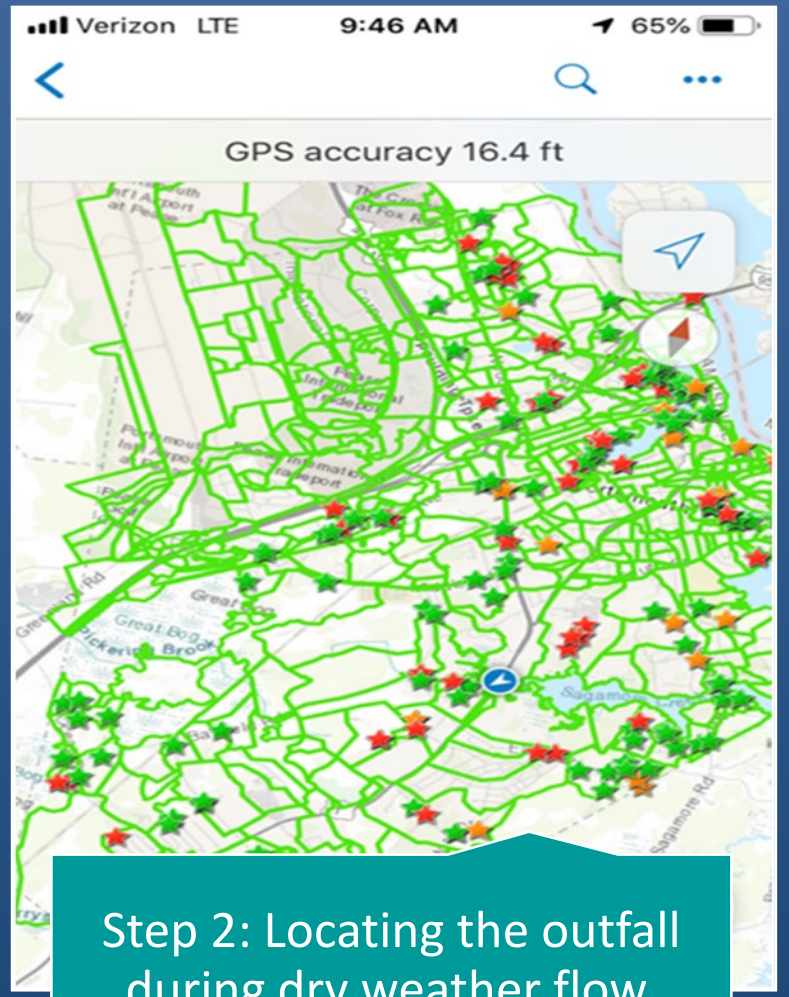


Tides in Portsmouth, NH

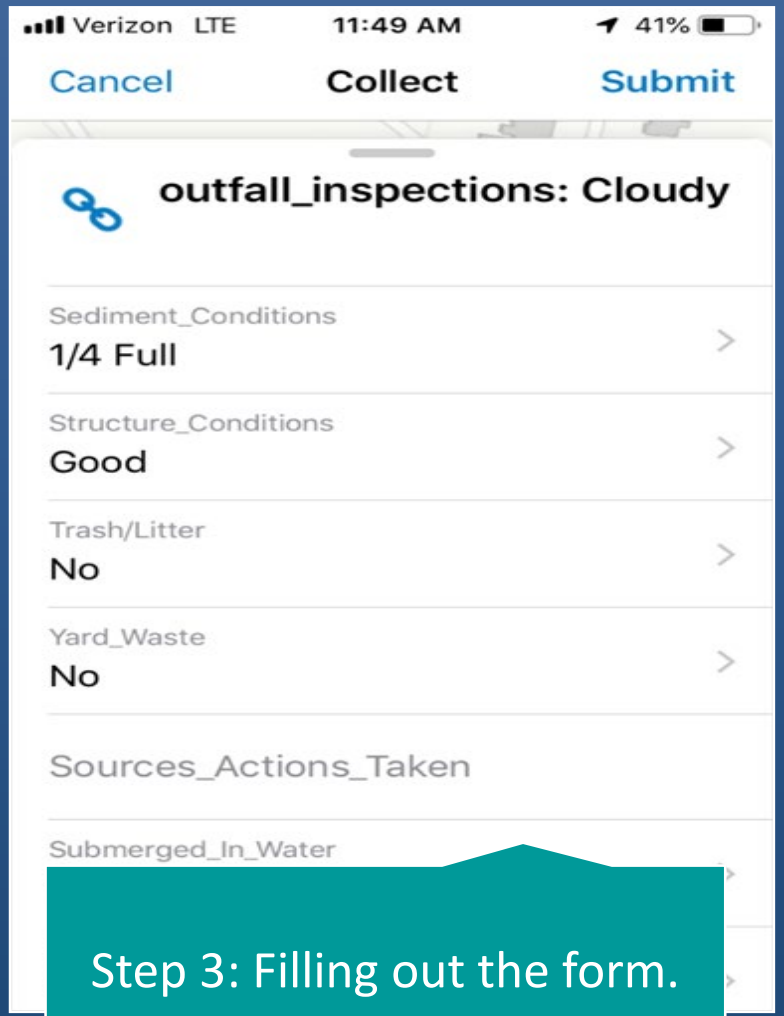
Updating Maps and outfall information

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour Max.	6 hour Min.				altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
01	13:56	W 23 G 33	10.00	A Few Clouds and Breezy	FEW060	55	26	56	50	33%	NA	NA	29.82	1010.0			
01	12:56	W 20 G 33	10.00	A Few Clouds	FEW060	56	27			32%	NA	NA	29.78	1008.7			
01	11:56	W 23 G 45	10.00	A Few Clouds and Breezy	FEW060	55	25			31%	NA	NA	29.74	1007.3			
01	10:56	W 29 G 43	10.00	A Few Clouds and Windy	FEW050	54	27			35%	NA	NA	29.72	1006.7			
01	09:56	W 17 G 33	10.00	A Few Clouds	FEW046	52	30			42%	NA	NA	29.69	1005.6			
01	08:56	W 21 G 26	10.00	Partly Cloudy and Breezy	SCT046	51	33			51%	NA	NA	29.66	1004.6			
01	07:56	W 24 G 32	7.00	Partly Cloudy and Breezy	FEW014 SCT045 SCT090	52	38	71	52	59%	NA	NA	29.59	1002.3			0.09
01	06:56	SW 20 G 33	6.00	Fog/Mist	FEW014 SCT024 BKN070 OVC090	55	49			78%	NA	NA	29.52	999.9	0.03		
01	05:56	W 10	5.00	Light	FEW026	58	53			85%	NA	NA	29.47	998.2	0.04		
01																	0.02

Step 1: Checking how much it rained within the last 48 hours.

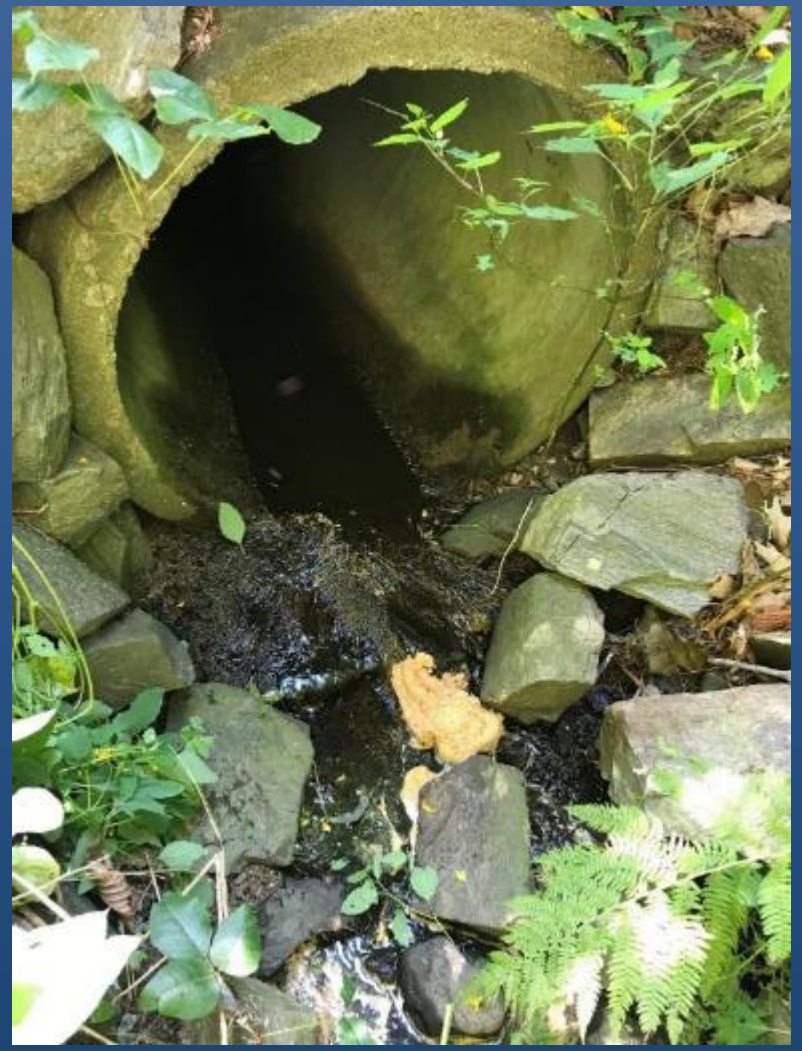


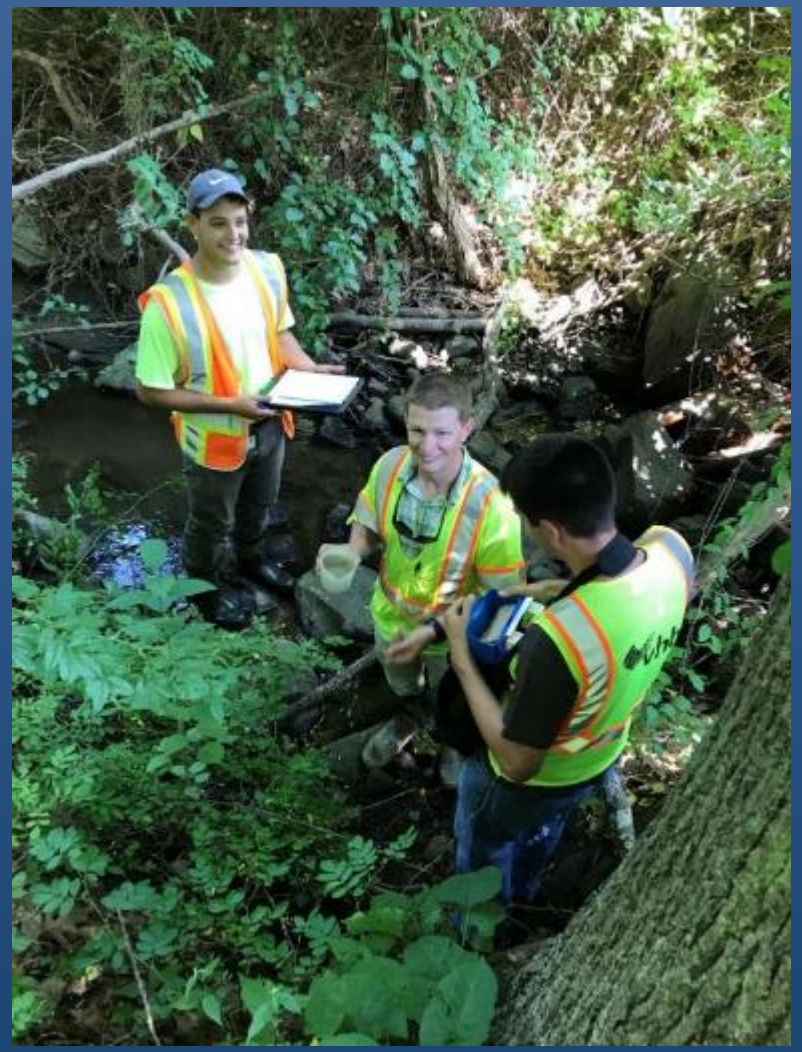
Step 2: Locating the outfall during dry weather flow.



Step 3: Filling out the form.

Dry Weather Sampling





Outfall Screening Parameters

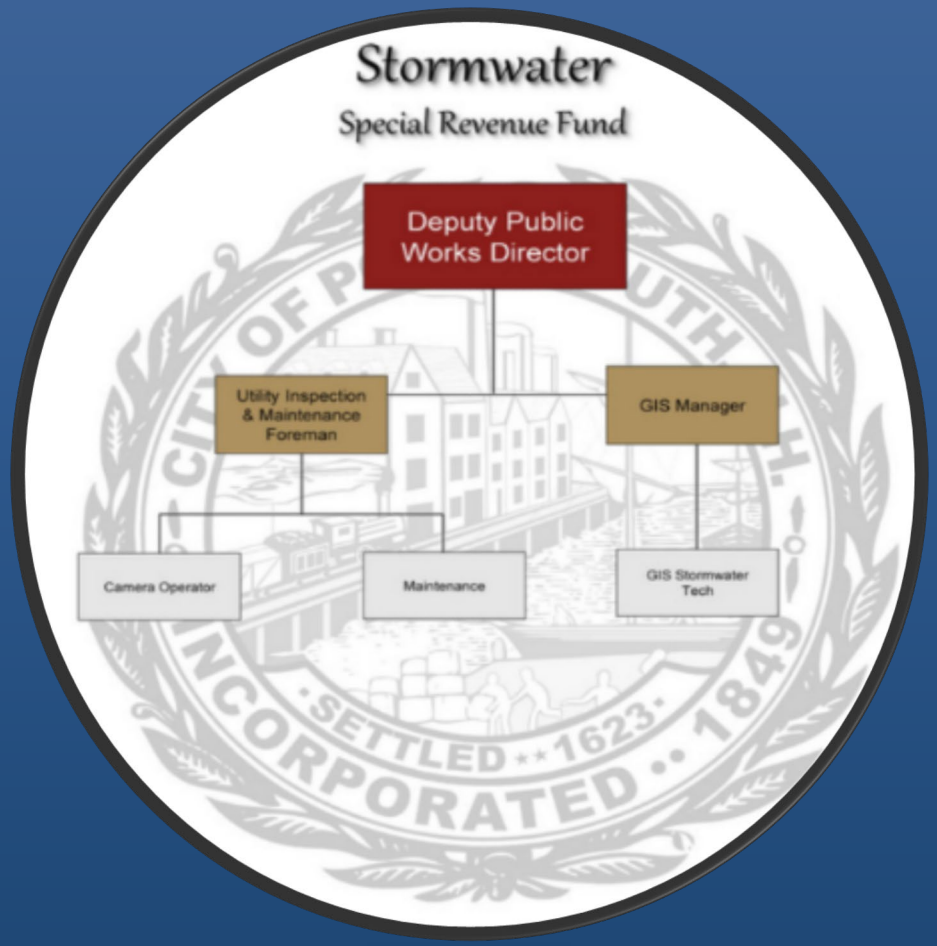
Portsmouth MS4 Outfall Screening

Pollutant Causing Impairment / Monitoring Parameter																		ALL Outfalls with Flow							
			Bacteria		*Chloride*	*DO Saturation*	*Habitat Assessments*	*Macroinvertebrates*	*Estuarine Bioassessments*	*PAH"s*	*Metals*	*Copper*	*Iron*	*Manganese*	*pH*	*DO Saturation*			*Ammonia*	*Chlorine*	*Conductivity*	*Salinity*	Bacteria (Not Impaired)		*Surfactants*	*Temp.*
Assessment Unit ID	Assessment Unit Name	Outfall Count	E. coli	Enterococcus	Chloride	Total Phosphorus			Total Nitrogen		Al, Ar, Cd, Cu, Pb, Ni	Copper, Total	Iron, Total	Total Manganese	pH	Dissolved Oxygen	Temperature	BOD_5					E. coli	Enterococcus		
NHEST600031001-02-02	Lower Piscataqua River - South	30		X					X										X	X	X	X			X	X
NHEST600031001-05	Back Channel	8							X										X	X	X	X		X	X	X
NHEST600031001-09	South Mill Pond	13		X															X	X	X	X			X	X
NHEST600031001-10	North Mill Pond	41		X															X	X	X	X			X	X
NHLAK600031001-01	Unnamed Pond	2																	X	X	X	X	X		X	X
NHRIV600030901-04	Haines Brook - Unnamed Brook	4																	X	X	X	X	X		X	X
NHRIV600030904-06	Pickering Brook	14	X		X	X						X	X				X		X	X	X	X			X	X
NHRIV600030904-07	Unnamed Brook - to Unnamed Marsh	2																	X	X	X	X	X		X	X
NHRIV600031001-02	Unnamed Brook - Piscataqua River	10													not tested			not tested	X	X	X	X	X		X	X
NHRIV600031001-03	Upper Sagamore Creek								X	Upper Sag Creek only	Upper Sag Creek only															
NHRIV600031001-03	Lower Sagamore Creek	47	X		X				X						X	rely on total P			X	X	X				X	X
NHRIV600031001-04	Lower Hodgson Brook	11	X		X	X		X							X		X		X	X	X				X	X
NHRIV600031001-05	Upper Hodgson Brook	1	X		X	X	X	X						X	X		X		X	X	X				X	X
NHRIV600031001-09	Borthwick Ave. Tributary	7	X		X	X							X		X		X		X	X	X	X			X	X
NHRIV600031001-24	Unnamed Brook to Back Channel	2																	X	X	X	X			X	X
NHRIV600031002-01	Berrys Brook	11	X			X									X		X		X	X	X	X			X	X
NHRIV600031002-11	Witch Creek	2																	X	X	X	X	X		X	X
Grand Total		205	91	84	80	44			85			14	21	1	77		44		205	205	205	205	22	8	205	205

Tracking Stormwater Maintenance in 2019

Catch basins cleaned and inspected	1,010
Amount of materials removed from catch basins	266 cu yards or 322 tons
Drain lines cleaned and inspected:	7,800 feet
streets swept:	789 miles

Portsmouth's Stormwater Program



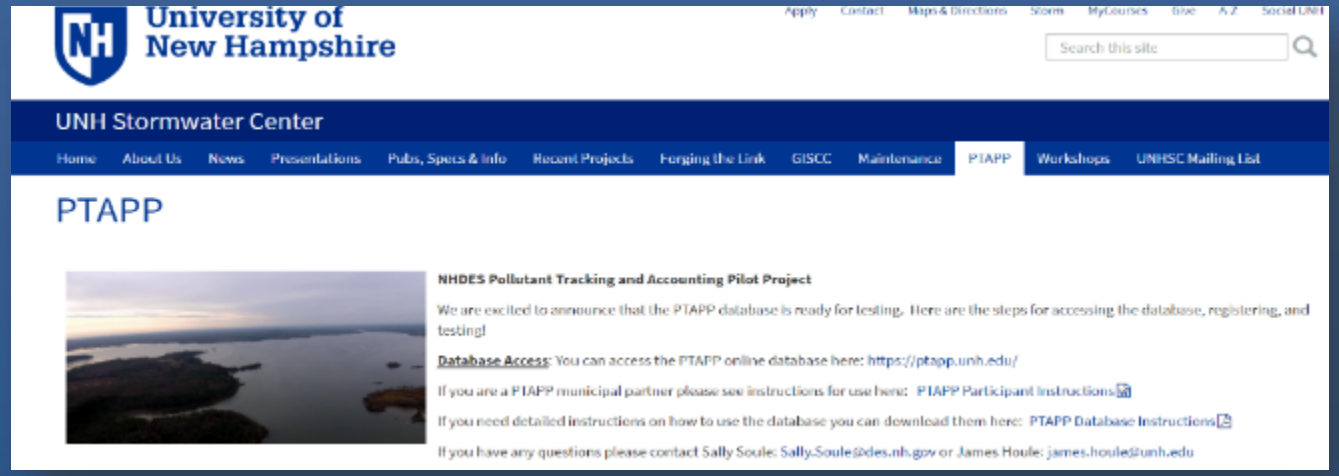
- The City of Portsmouth's Stormwater Program is dedicated to improving water quality in our drainage together with reducing flooding hazards through comprehensive planning, public education, and management of our stormwater and combined sewer/stormwater systems.

Stormwater Funding

- Set up Special Revenue Fund in FY19
  - 50% funding from General Fund, 50% from Sewer Fund
  - Improved Tracking of Work Effort for Regulatory Reporting

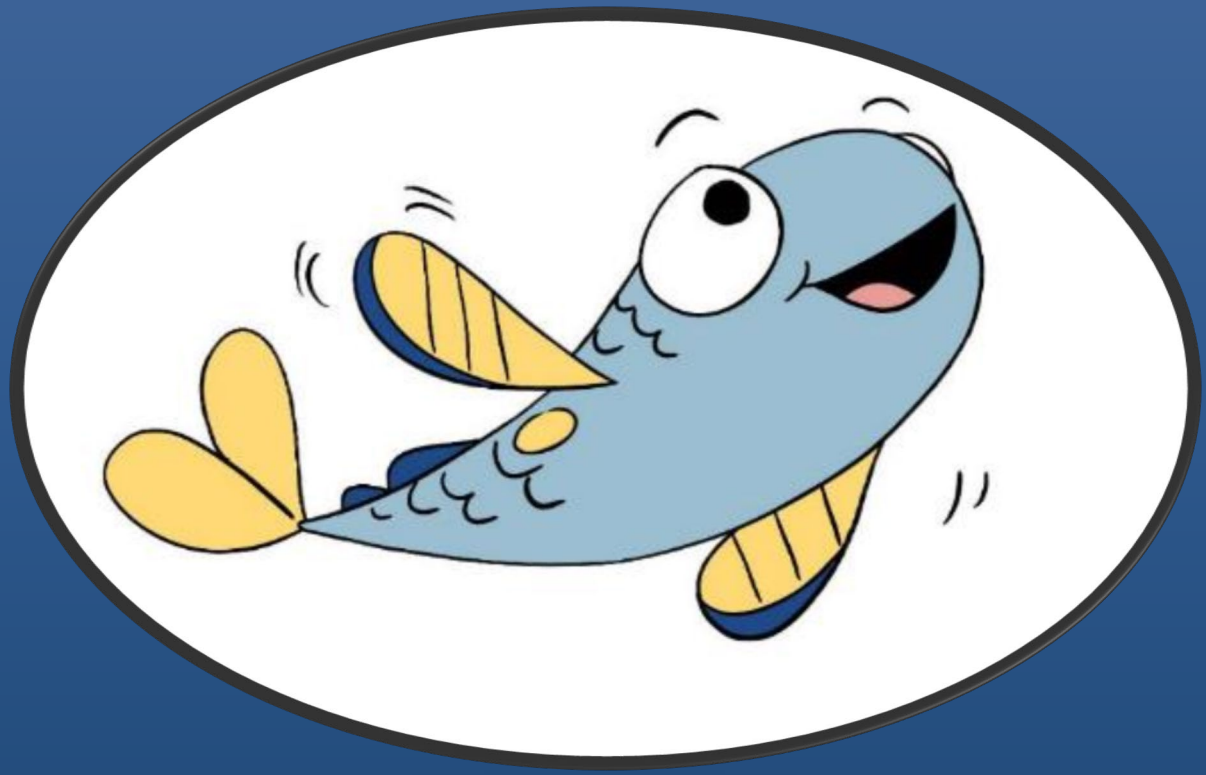
Regional Efforts: Seacoast Stormwater Coalition and UNH Stormwater Center Pollution Tracking Project

- Dover
- Durham
- Exeter
- Hampton
- North Hampton
- **Portsmouth**
- Rochester
- Rollinsford
- Rye
- Seabrook
- Somersworth
- UNH
- DES
- Southeast Watershed Alliance



Projects with UNH Stormwater Center

Cleaner Water =
Happy and Healthy Sea Life



Blue
The Happy Fish!

Cleaner Catch Basins and Pipes = Cleaner Water

Catch Basin Cleaning
- 322 Tons collected

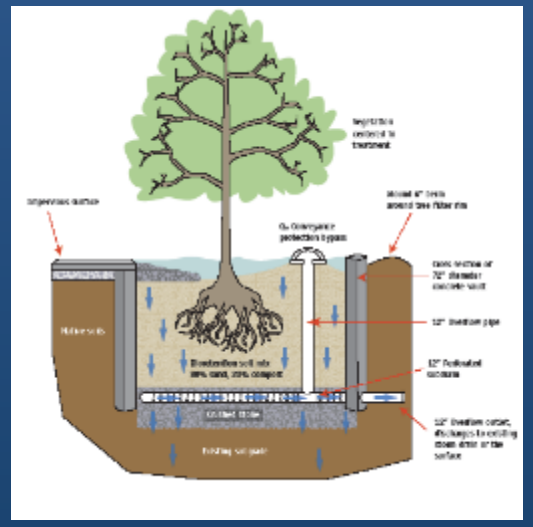
Pipe Inspections and Cleaning
- 7,800 Feet

Cleaner Streets = Cleaner Water

Street Sweeping –
300 Tons swept in 2018

Green Infrastructure = Cleaner Water

Tree Box Filters



State Street Stormwater Interceptor

Sagamore Avenue Porous Pavement

Green Infrastructure Maintenance = Cleaner Water

Infrastructure Upgrades = Cleaner Water

Public Outreach = Cleaner Water

What is Stormwater?

Stormwater is precipitation that runs over the land surface (runoff) and does not infiltrate the ground. In the process it may pick up pollutants and deposit them into surface waters (ex: rivers, lakes and oceans), which may create water quality impacts and siltation that could potentially damage aquatic habitats.

Why should we care? As a result of stormwater and the increase in volume of surface waters, flooding can also occur. With flooding comes property and infrastructure damages. Stormwater pollution creates water quality impacts to swimming, boating and aquatic habitats that can be mitigated or prevented with awareness and new approaches to stormwater management.

Catch Basin of the City's Stormwater System

Direct to Waterways

How can you help?

What can you do as a resident or landowner in Portsmouth and surrounding areas?

- Never pour hazardous materials into a storm drain
- Dispose of used motor oil, gasoline, antifreeze, cleaning agents, pesticides or fertilizers, paint and other hazardous agents in an appropriate manner - such as taking them to Household Hazardous Waste Days (held at Portsmouth's Department of Public Works)
- Do not sweep litter, sand, leaves or other materials into storm drains. Dispose of them in the trash or compost the material
- Never hose down a spill into a storm drain. Use absorbent towels or cat litter to clean up the spill and dispose of the material in the trash if it is not hazardous
- Detergents and chemical cleaners should not be used to wash sidewalks or driveways
- If you see a storm drain that is clogged please contact your respective Public Works Department and dispose of the material in the trash if it is not hazardous

For additional information, please scan the QR code or visit the City's website.
Portsmouth Public Works - 680 Peverly Hill Road - Portsmouth, NH - (603) 427-1520

What is the City doing?

The City has put in place a Stormwater Management Program to address stormwater in Portsmouth:

- Completed a Stormwater Master Plan
- Created Stand Alone Stormwater Ordinance to Protect Our Waterways
- Incorporated Green Infrastructure into City Projects - Examples Below
- Site Review and Zoning Ordinance Revisions That Include Low-Impact Development Requirements

Portsmouth's Stormwater Program: Green Infrastructure

Rain Barrel Program

Rain Garden at Portsmouth High School

Funded with ARRA money, the City was able to get a discount purchasing rain barrels and purchased 1,000 to sell to Portsmouth water customers at a discount. Not only do these barrels reduce storm-water runoff, they provide for reduced water demand during hot summer days.

The City has planted rain gardens throughout Portsmouth to help reduce rain runoff by allowing stormwater to soak into the ground. The plants take up excess water flowing into the rain garden. The water filters through soil layers before entering the groundwater system.

Tree Box Filter

Recent Example: State Street Project

This tree box filter was purchased and installed through a partnership with a local watershed group and the City's Department of Public Works. Tree box filters are mini water quality filters installed beneath trees to control runoff and in turn help irrigate the trees.

A commitment to a number of stormwater improvements helps from an aesthetic standpoint making stormwater infrastructure more attractive, while also helping the City comply with new, more stringent, Stormwater regulations of the Clean Water Act.

Water/Sewer Billing
Insert and Handout at
Household Hazardous
Waste Day

Picking Up Pet Waste = Cleaner Water

Handout with Dog Licenses - 2019

Why It's Important:

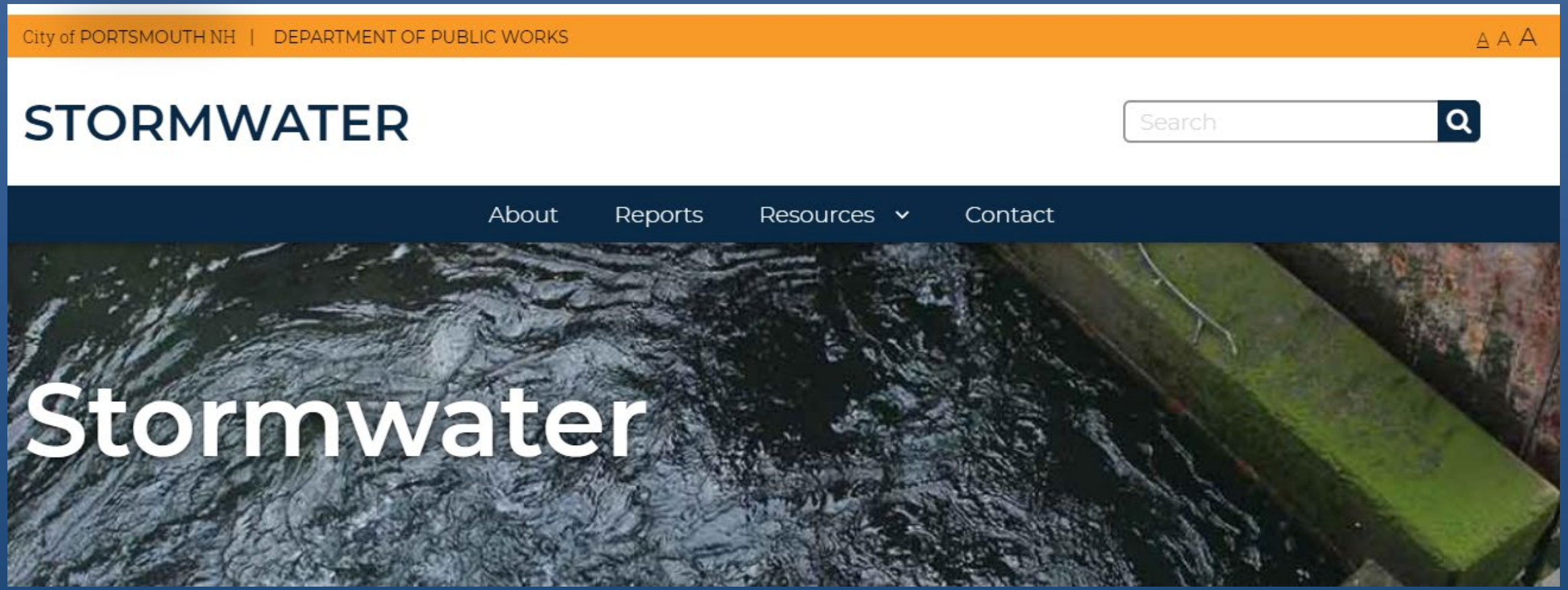
- Dog waste can be contaminated and carry a number of different diseases including giardia, E. coli, salmonella, roundworms and tapeworms that can infect other dogs who come in contact with the contaminated waste
- Contaminated dog waste can make its way into major waterways and pollute the water
- Leaving your dog's waste creates an opportunity for someone to step in it
- Forgotten waste emits an awful stench that will make spending time in the dog park unpleasant for others
- Bugs, parasites and even rats are attracted to areas with forgotten dog waste. This contributes to the spread of parasites to other pets and possibly humans
- Ordinance 9.401 Pooper Scooper Law requires you to clean up after your dog. Ordinance 9.402 results in a $100.00 fine
- Picking up your dog's waste is simply the right thing to do as a courtesy to other dogs, humans and the environment

Leaf Collection = Cleaner Water

Public Participation
Household Hazadous Waste Collection Day
= Cleaner Water

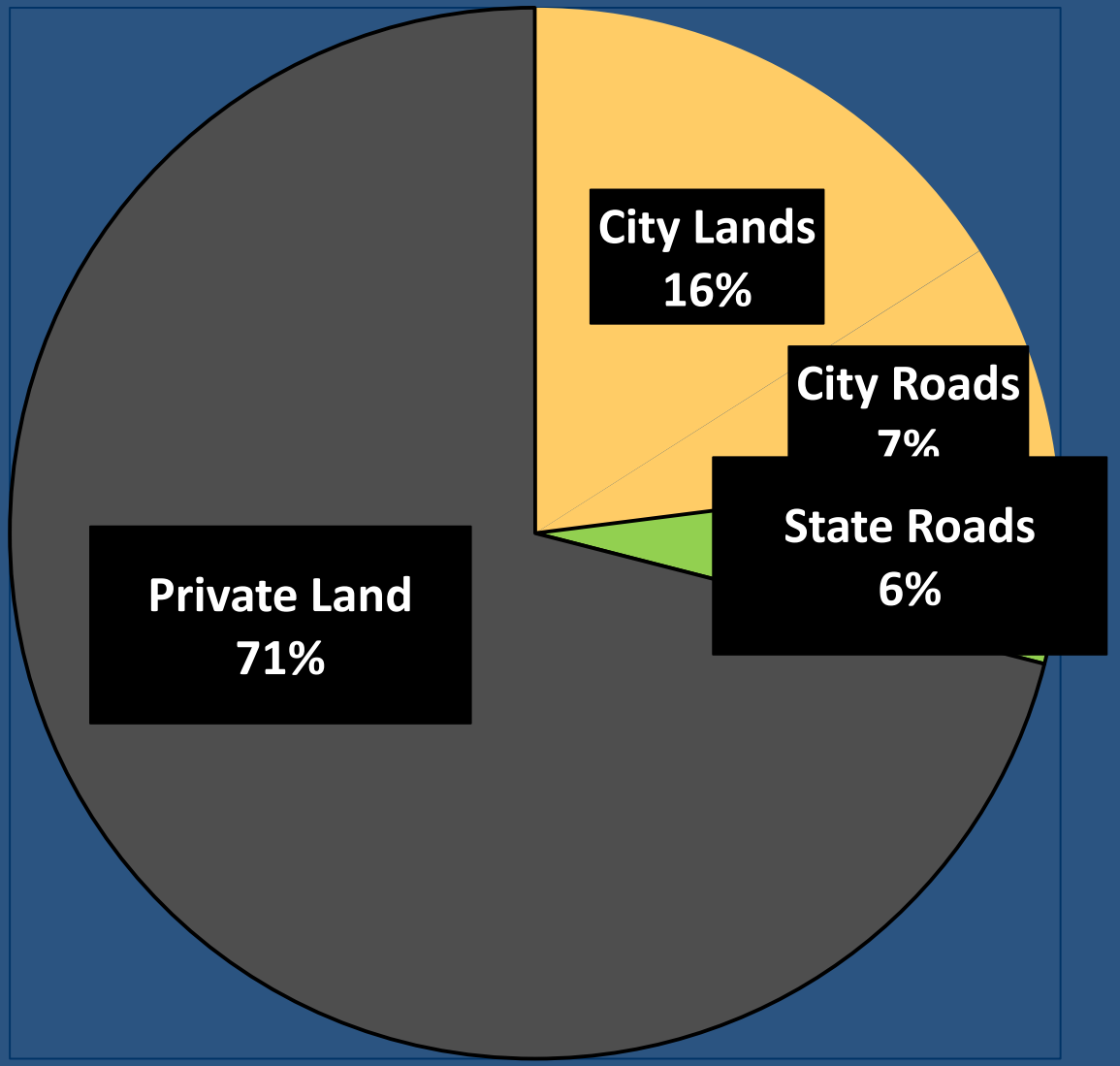
Continued Outreach = Cleaner Water

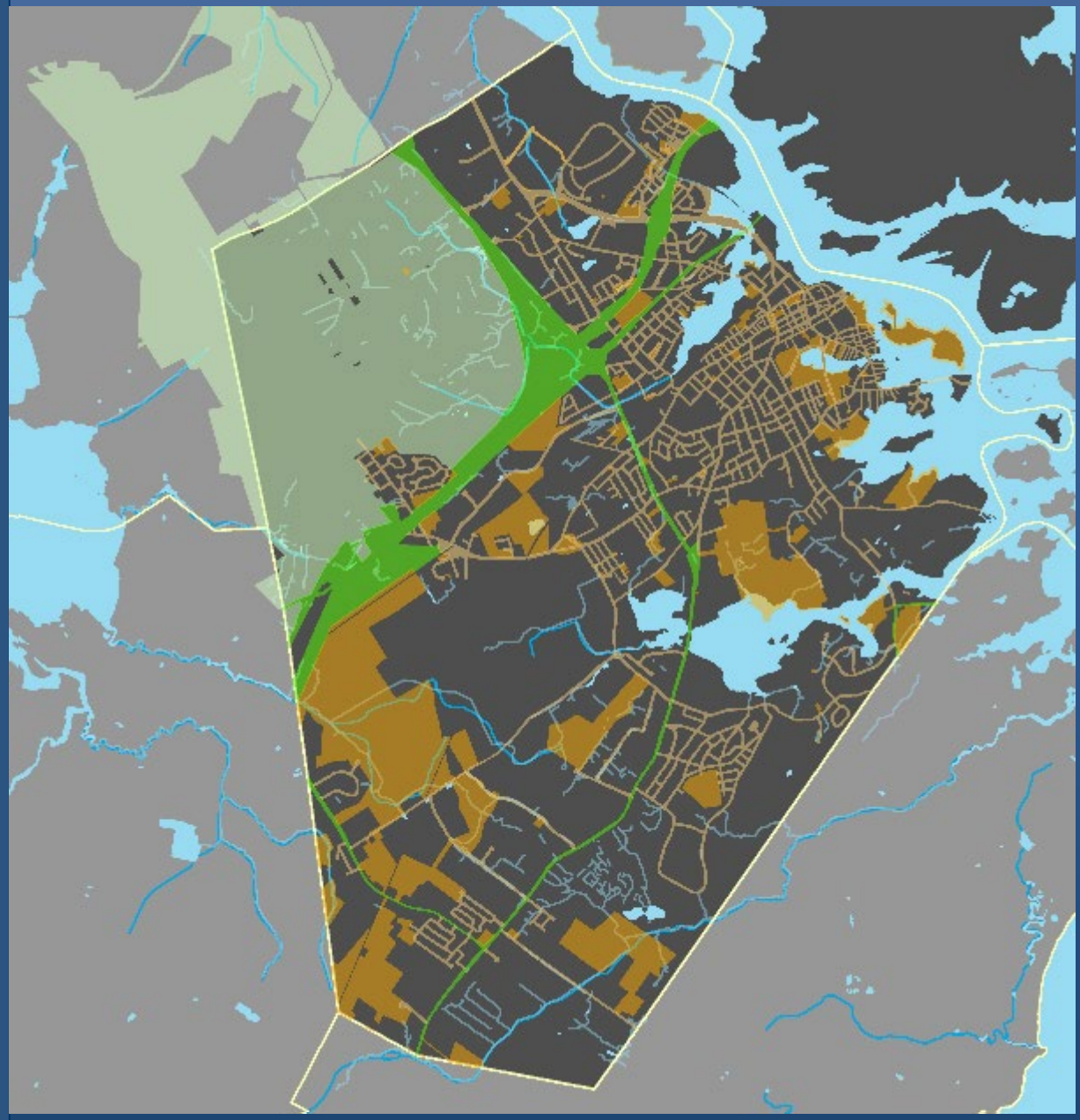
Website Updates



https://www.cityofportsmouth.com/publicworks/stormwater

LAND IN PORTSMOUTH

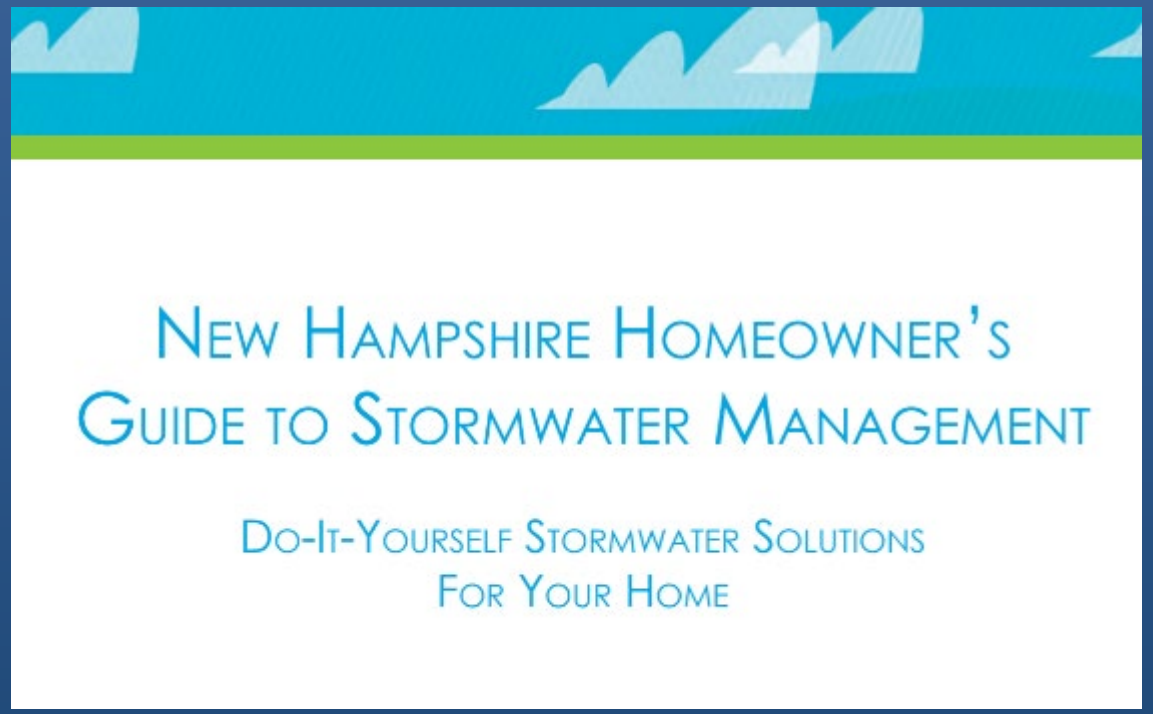




Resources to Help

Soak up the Rain

YOUR LAND. YOUR WATER. YOUR SOLUTION.



Find out more about how you can help protect clean water by soaking up the rain at

www.soaknh.org.

Good Housekeeping Practices

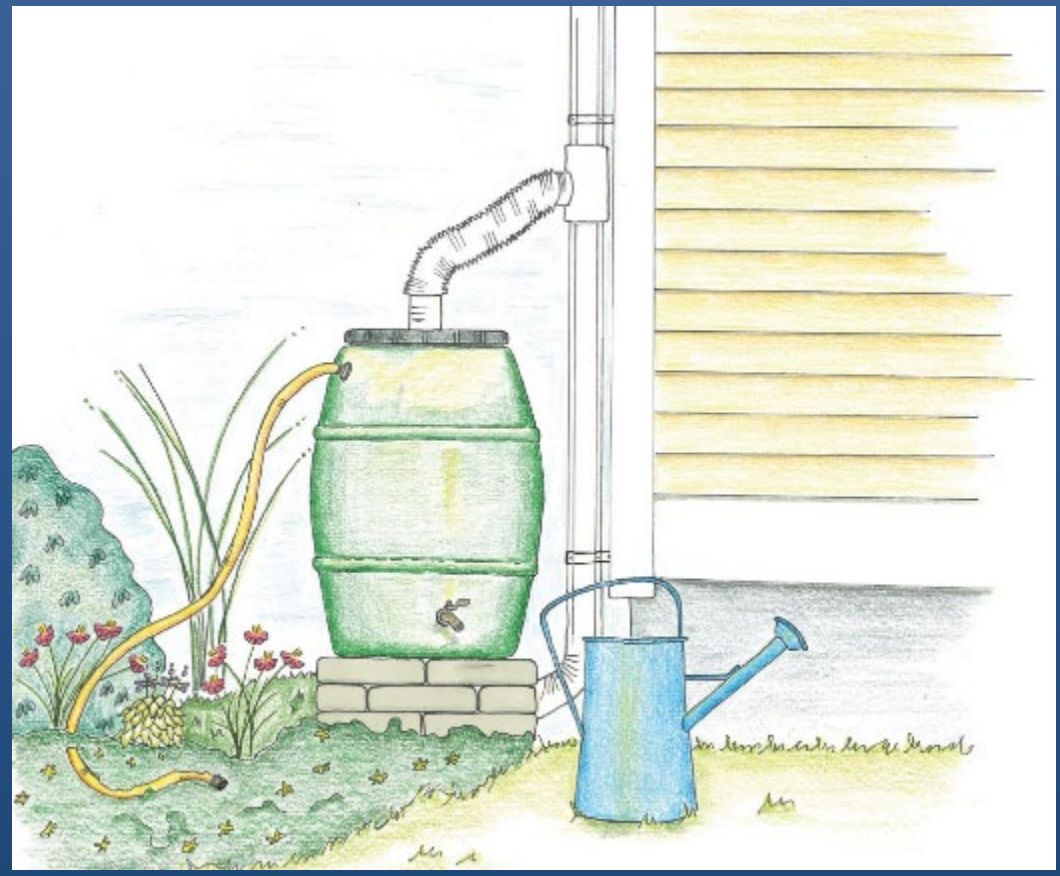
- Don’t over-fertilize lawns and plants
- Be efficient with water use
- Sweep driveway
- Don’t drop waste into catch basins
- Pick up pet waste
- Participate in Household Hazardous Waste Collections

THINK BLUE

Rain Barrel

- Captures rainwater from your roof to reduce runoff from your property and provide you with water for lawns, gardens, and indoor plants to use in dry weather.

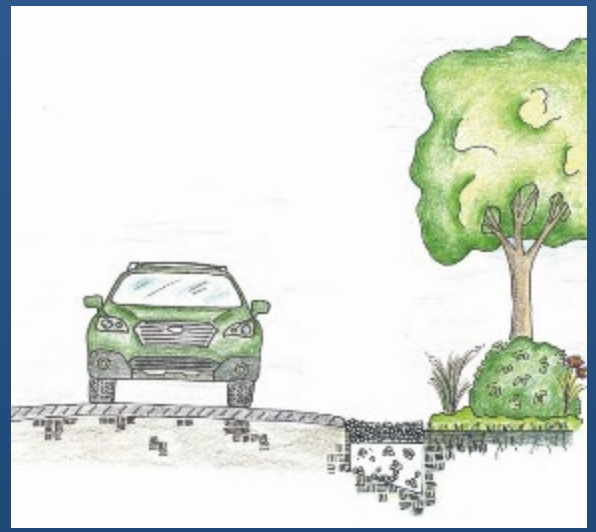
THINK BLUE

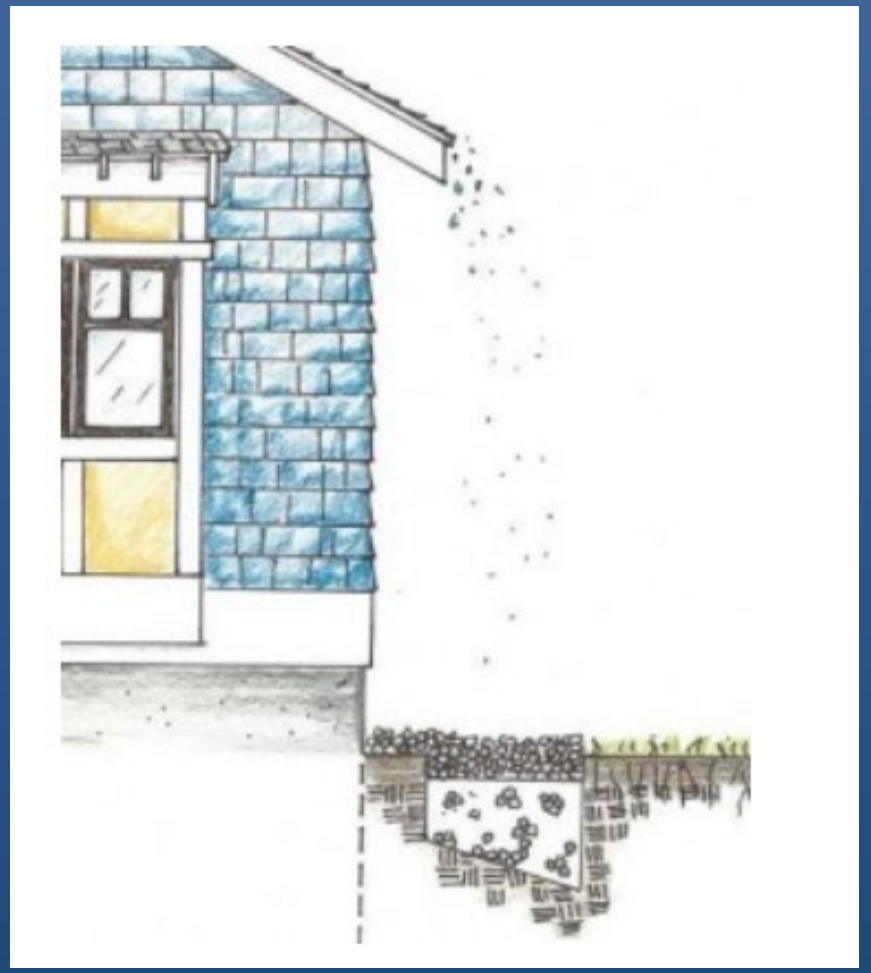


Source: www.soaknh.org (NHDES)

Infiltration Trenches

- Collects and infiltrates stormwater from roofs until it soaks into the ground.



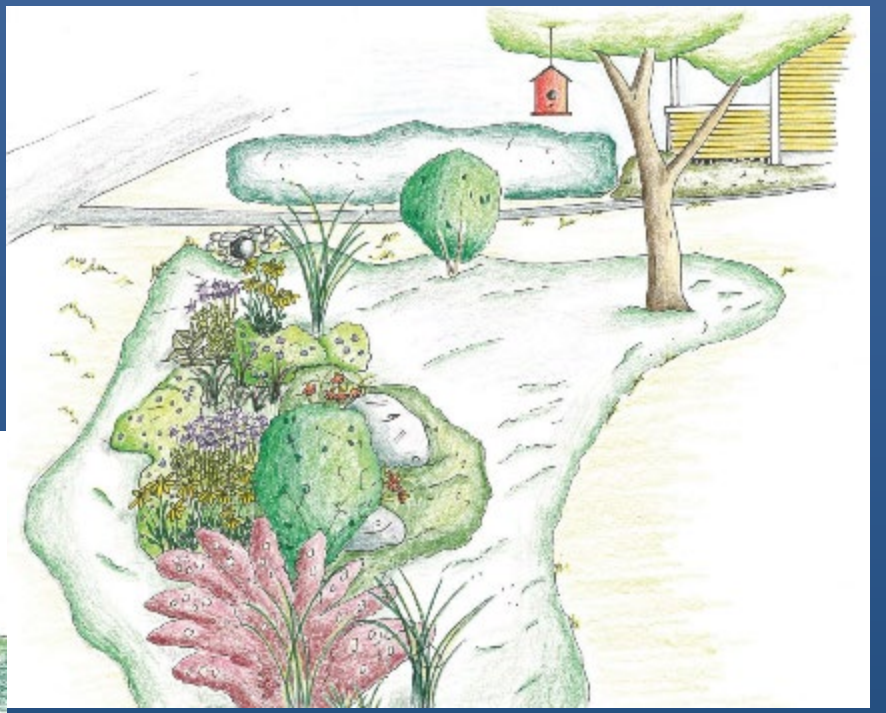


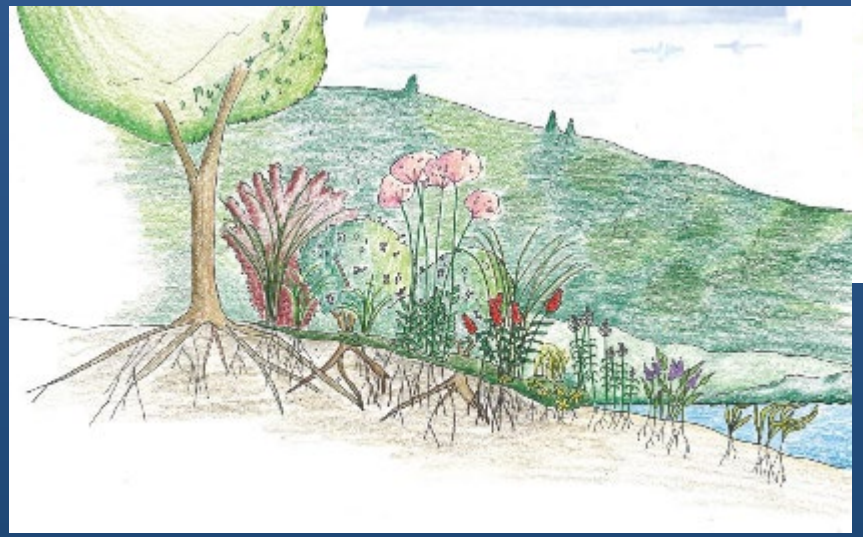
THINK BLUE

Source: www.soaknh.org (NHDES)

Vegetated Swales and Buffers

- Slows runoff and provides shade, stabilizes slopes, and can help slow down and clean stormwater runoff.





THINK BLUE

Source: www.soaknh.org (NHDES)

Rain Garden

- Capture, absorb, and treat stormwater.

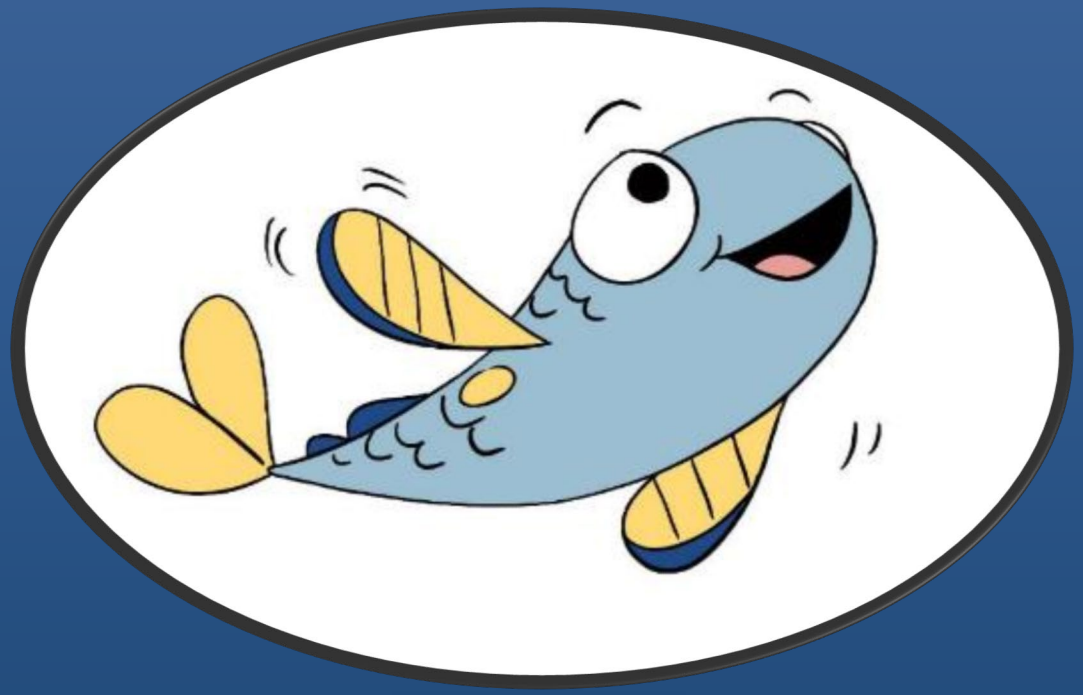
Source: www.soaknh.org (NHDES)

THINK BLUE

Two Examples of Rain Gardens in Portsmouth…

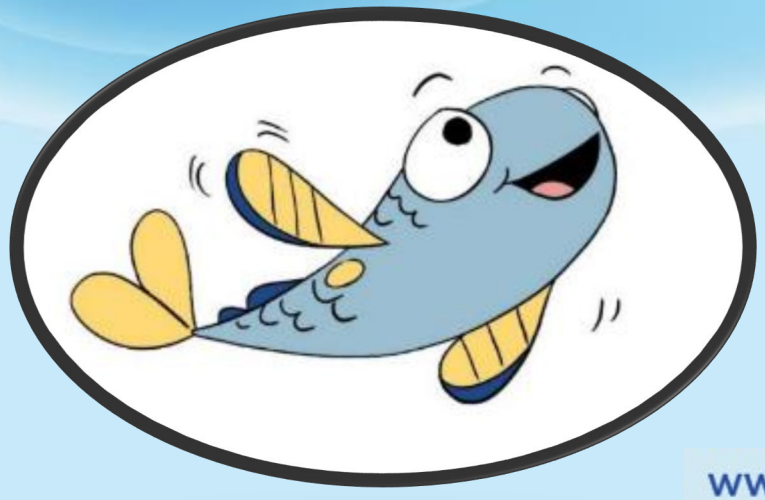
THINK BLUE

City's Stormwater Management + Private PropertyStormwater Management = Happy and Healthy Sea Life



Think Blue

THANK YOU!



Blue the Happy Fish
Graphic by: Jane Almeida

City of Portsmouth
Department of Public Works
Stormwater Division

www.cityofportsmouth.com/publicworks/stormwater