Barnstable Town Council

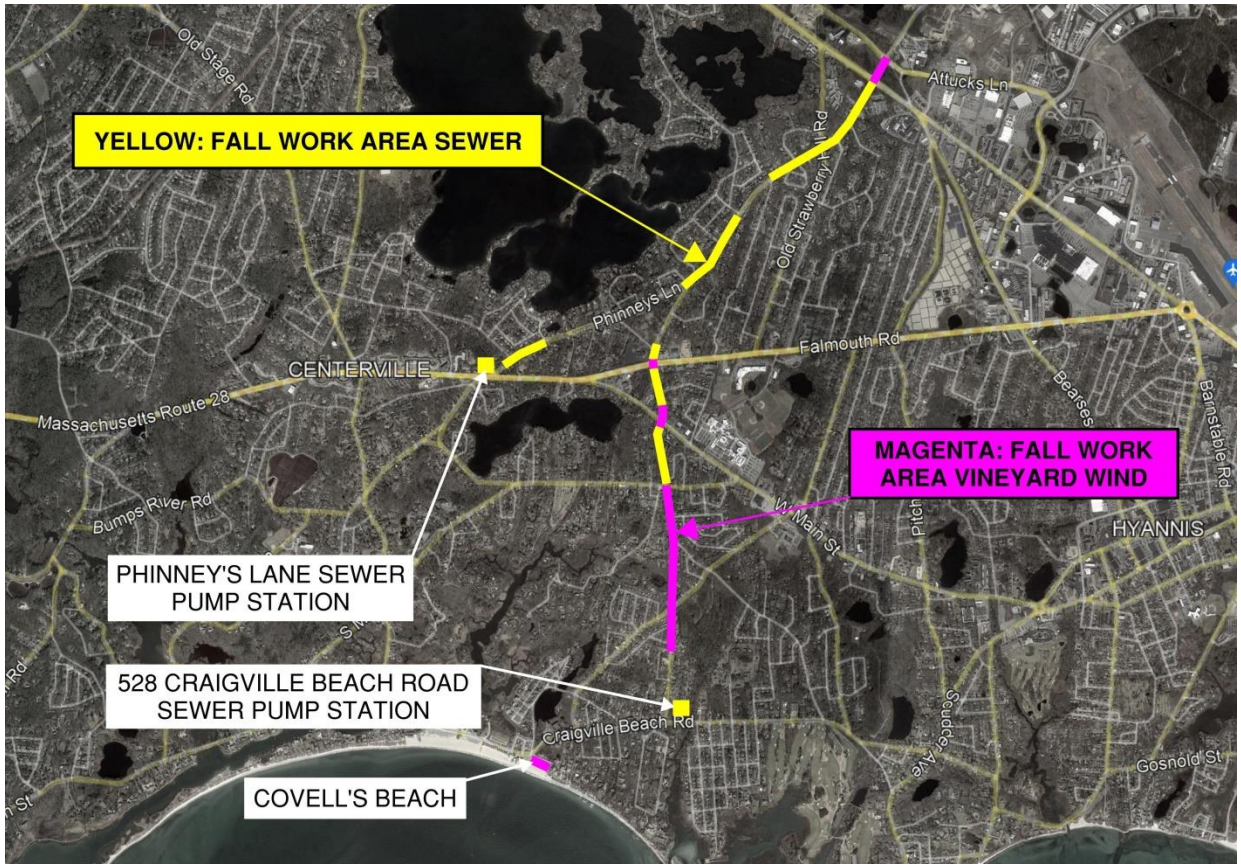
Water Resources Management Update

Department of Public Works

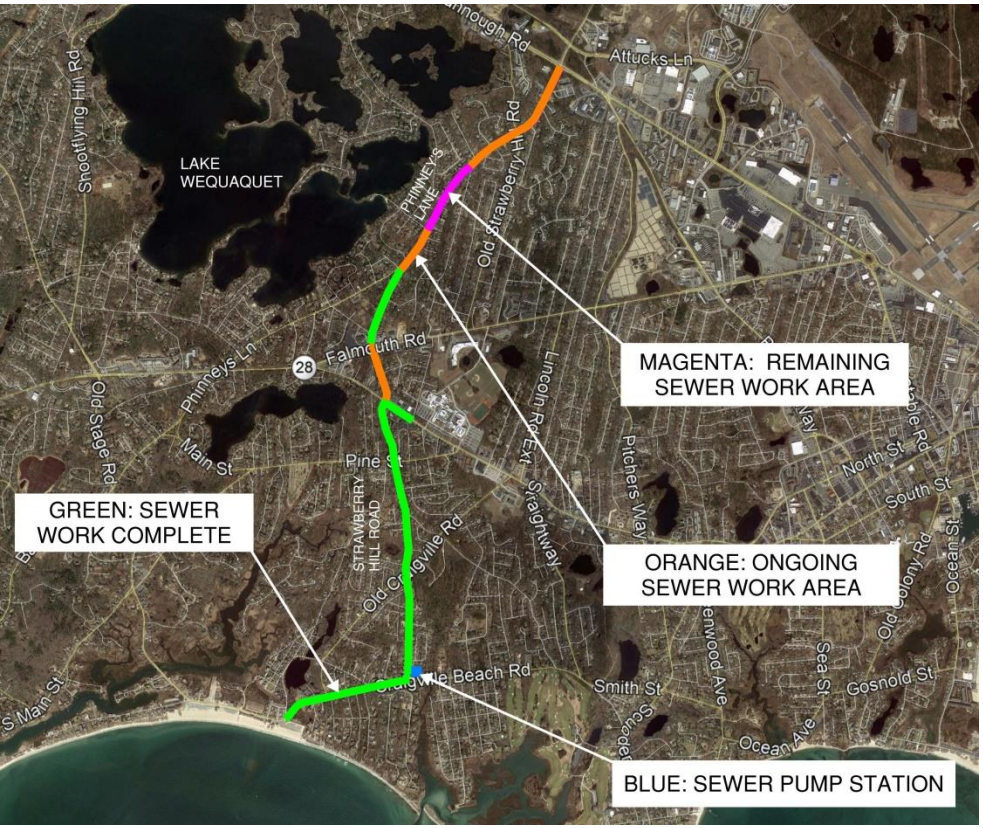
September 15, 2022

CWMP Construction Updates
Active Construction Projects

- ***Strawberry Hill Road Sewer Expansion***
- ***Route 28 East Sewer Expansion***
  - *Includes Phinney's Lane Pump Station*
- ***Vineyard Wind Construction***



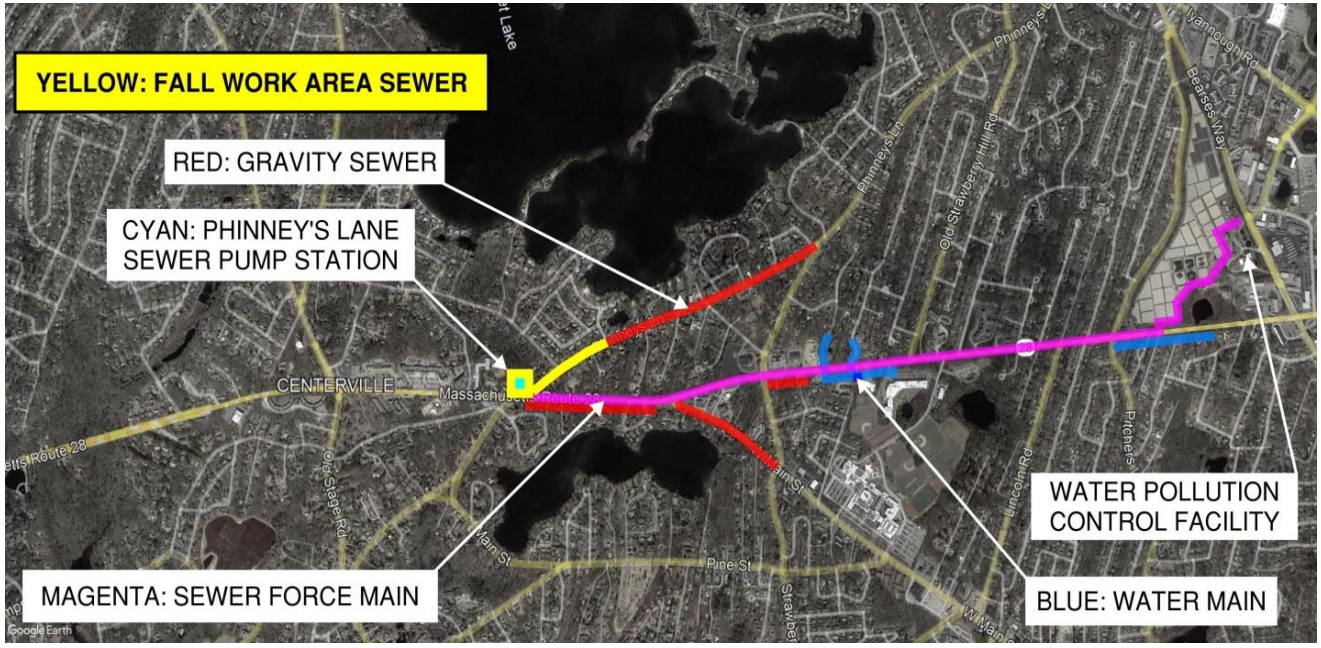
CWMP Construction Updates
Strawberry Hill Road Sewer Project



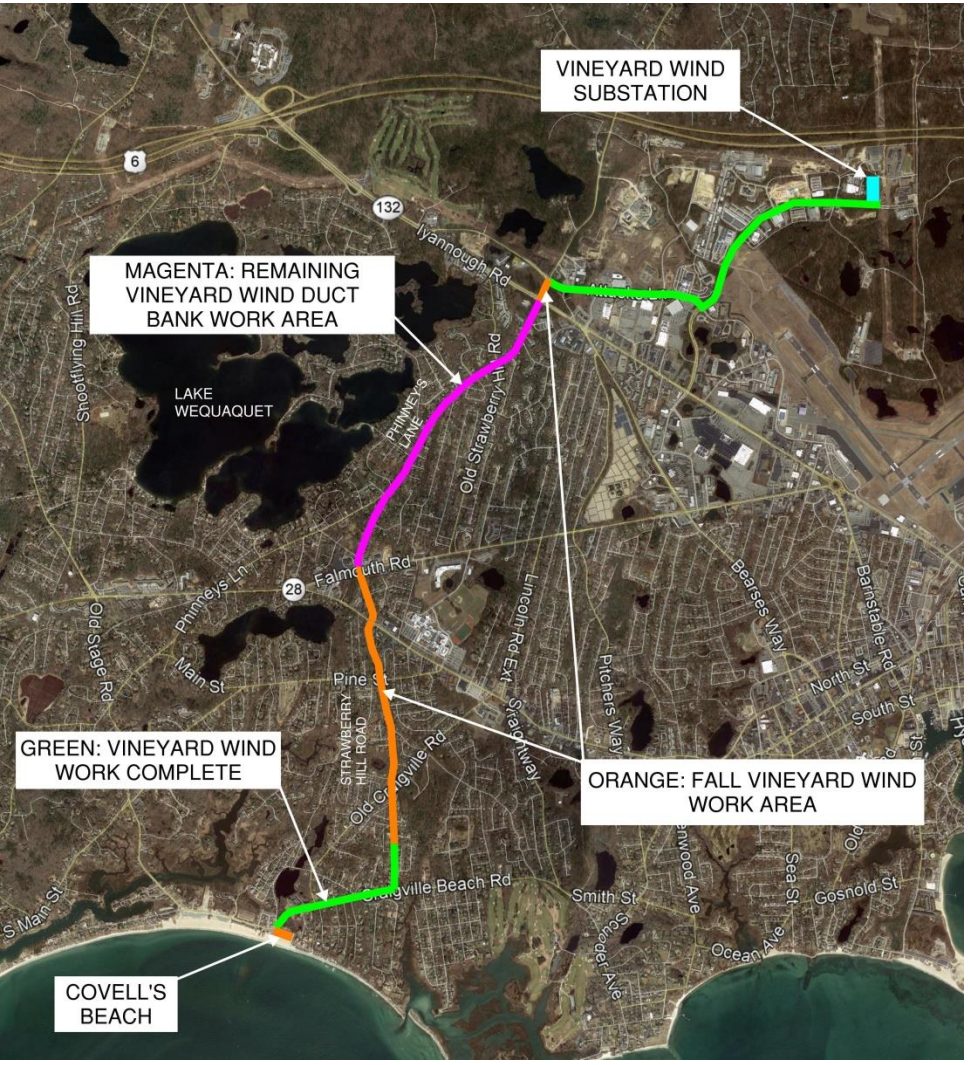
- *Project on schedule for completion in Spring*
- *Construction completed to date:*
  - *±14,200 LF (±56%) of gravity sewer main installed to date*
  - *Sewer work on Craigville Beach Road completed.*
  - *Sewer work on Strawberry Hill Road, south of Pine Street, completed.*
- *On-going construction*
  - *Sewer construction on-going on Phinneys Lane between Wequaquet Lane and Conners Road.*
  - *Water bypass set-up on-going on Phinneys Lane between Old Strawberry Hill Rd and Rte 132.*
  - *Sewer Pump Station at intersection of Strawberry Hill Road and Craigville Beach Road.*

CWMP Construction Updates
Route 28 East Sewer Expansion

- *Phinney's Lane Pump Station construction underway*
  - *Support of Excavation work (driving of sheeting) nearing completion*
  - *Excavation depth of 40 feet required for foundation.*
- *Sewer Construction anticipated to commence on 10/3/22*
  - *Start on Phinney's at pump station site and work north. Deep construction (+/- 20')*
  - *Work in Route 28 scheduled to start in Spring*
  - *Project completion anticipated Winter, 2023*



CWMP Construction Updates
Vineyard Wind Project

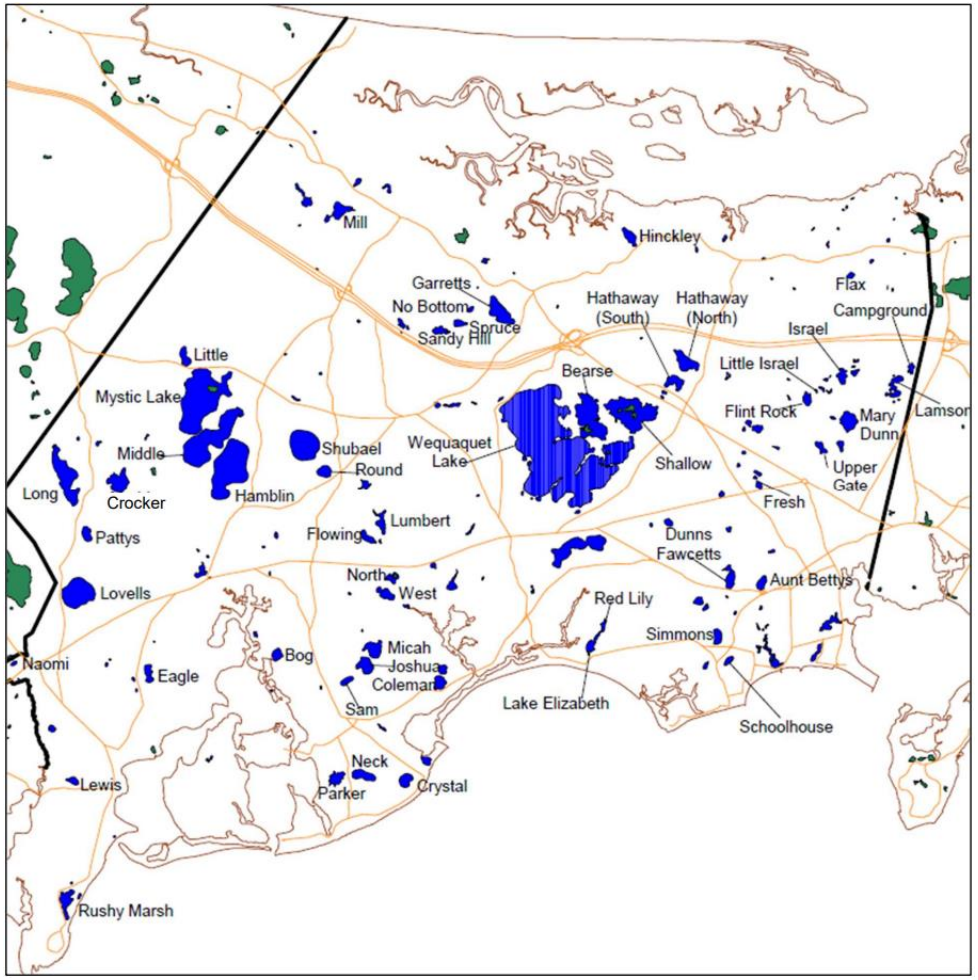


- *Project on-schedule for completion this Spring*
- *On-going construction this fall:*
  - *Duct Bank and Water Main on Strawberry Hill Road*
  - *Construction at Covells Beach Parking Lot*
    - *VW Mobilized on 9/15/22*
  - *Testing along route*
- *Anticipated final paving schedule of disturbed roadways:*
  - *Fall 2022:*
    - *Craigville Beach Road*
    - *West Main Street*
    - *Independence Drive*
    - *Attucks Lane*
  - *Spring 2023:*
    - *Strawberry Hill Road*
  - *Fall 2023:*
    - *Phinney's Lane*
    - *Wequaquet Lane*

Barnstable Ponds and Lakes

Overview

- *~180 ponds in Barnstable*
- *25 ponds are designated as Great Ponds*
  - *Most of these are impaired to some degree*
- *Ponds and Lakes Stewardship (PALS) monitoring has been on-going since 2001.*
  - *Data available for 33 Ponds*
- *Pond and Lake Management Plan Program was initiated in 2020*
- *Ponds were prioritized based on available data*
  - *Shubael Pond was at the top of that list.*



Ponds and Lakes Management Plans

- *Overview*
  - *Purpose: Understand the nutrient management needs for pond and lake resources, develop, and implement plans to address issues that impair water quality.*
- *Selected Locations*
  - *2020: Shubael Pond*
  - *2021: Long Pond, MM*
  - *2022: Lovell's Pond*
  - *2023 (Anticipated): Lake Wequaquet, Bearses, Gooseberry Pond*
- *General Findings*
  - *Ponds are being negatively impacted by phosphorus inputs.*

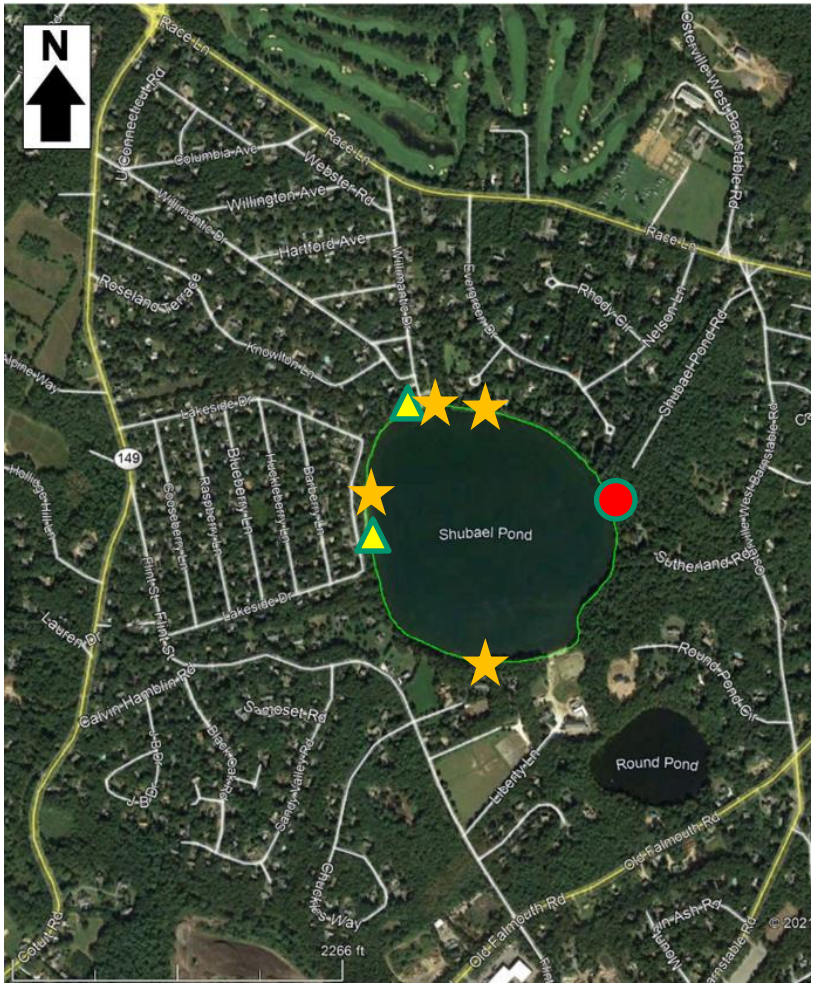
DPW Approach

- *Systematic and science based approach to target effective management*

- *2 Year Study for each pond*
  - *Year 1 - Nutrient Diagnostic Assessment*
    - *Water quality*
    - *Septic System assessment*
    - *Stormwater monitoring*
    - *Runoff from surrounding watershed*
  - *Year 2 - Develop a Management Plan*
    - *Set nutrient reduction targets*
    - *Evaluate management alternatives*

Shubael Pond Overview

- *General*



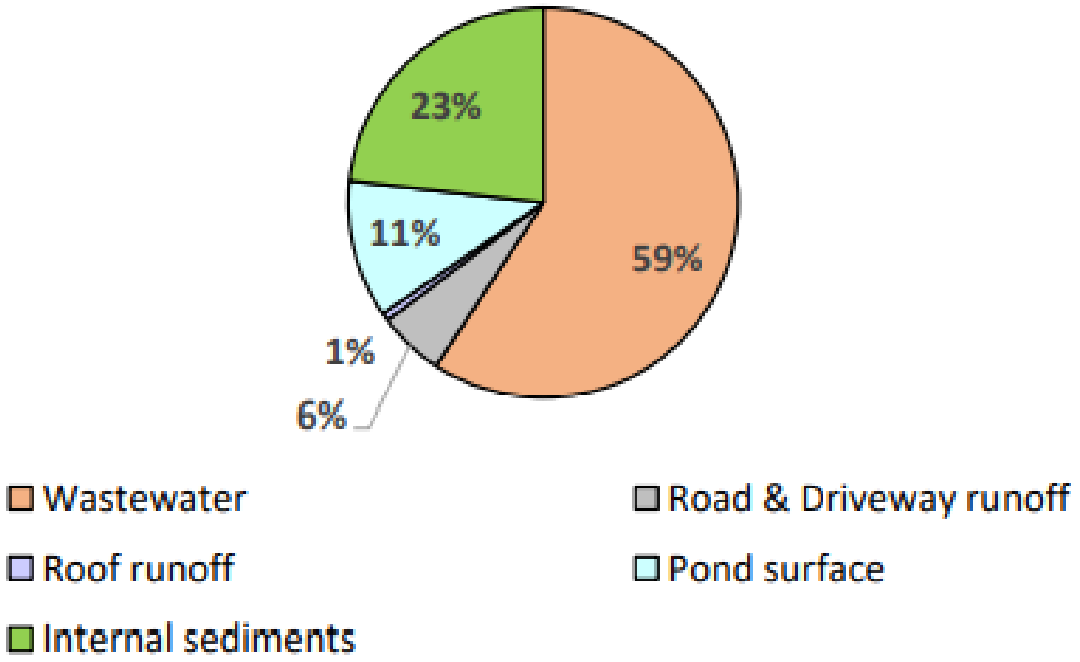
- ***Size:*** *55-acres*
- ***Depth:*** *Max depth of 40 feet*
- ***Trout Stocked:*** *spring and fall*
- ***Boat Ramps:*** △
  - *Willimantic Drive*
  - *Lakeside Drive*
- ***Beaches:*** ★
  - *Willimantic Beach*
  - *Sand Shores Beach*
  - *Fair Acres Beach*
  - *Evergreen Homeowners Association*
- ***Town Way to Water:*** ●
  - *Shubael Pond Road*

Shubael Pond Management Plan

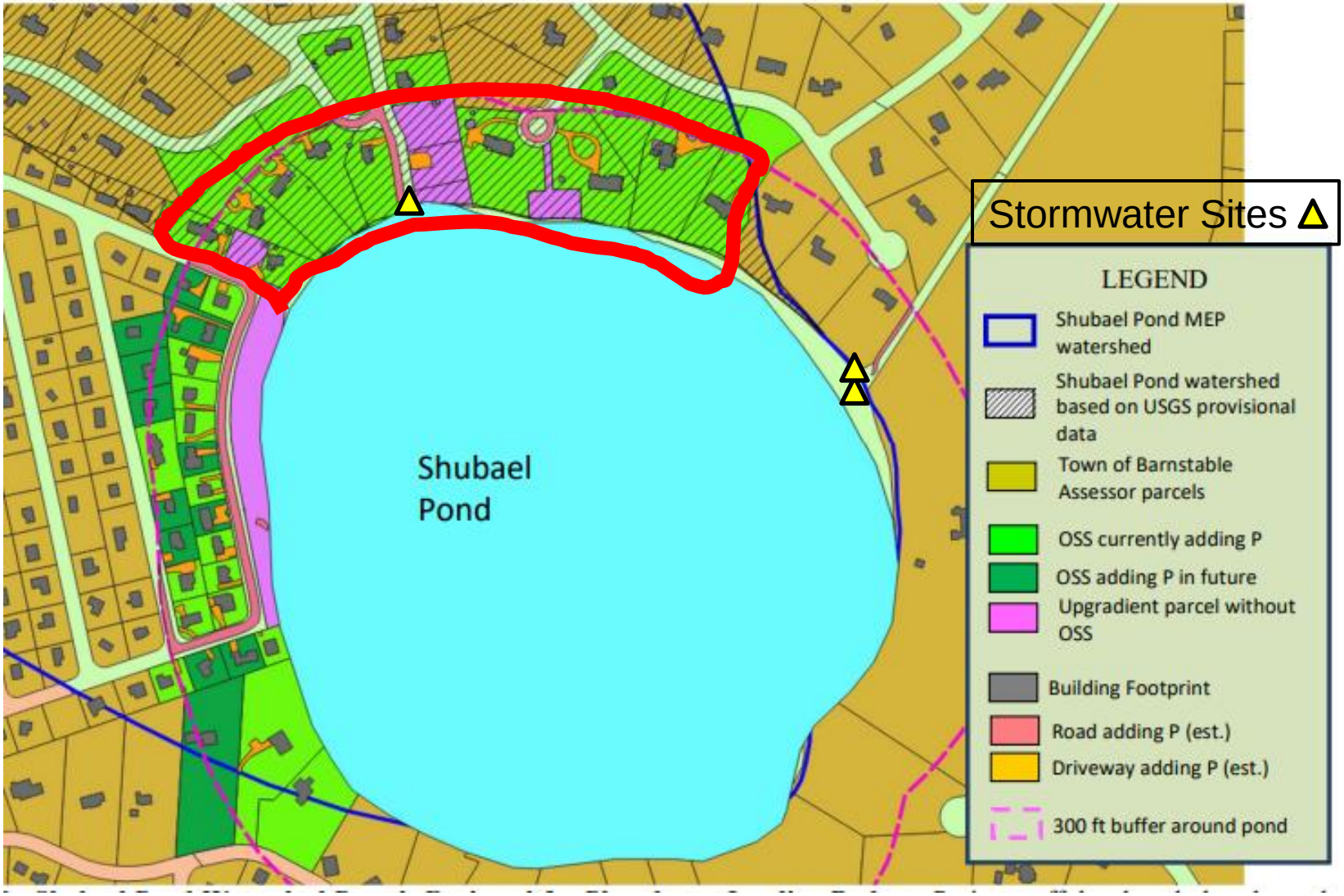
- *Monitoring Phase: Completed 2021*
- *Management Plan Released: July 2022*
  - *Report available on Town Website*
- *Findings:*
  - *Phosphorus is limiting nutrient.*
  - *Phosphorus reductions are necessary to improve water quality.*
  - *The largest source of which is septic systems*
  - *Addressing septic systems is the key to meeting targets*

Shubael Pond Phosphorus Sources

1. *Septic systems within 300-ft of the pond and in the contributing watershed*
2. *Phosphorus released from anaerobic sediments*
3. *Natural atmospheric deposition to the pond surface (non-controllable)*
4. *Stormwater Inputs*
5. *Overland runoff to the pond*



Shubael Pond
Septic System Inputs



Shubael Pond Management Plan

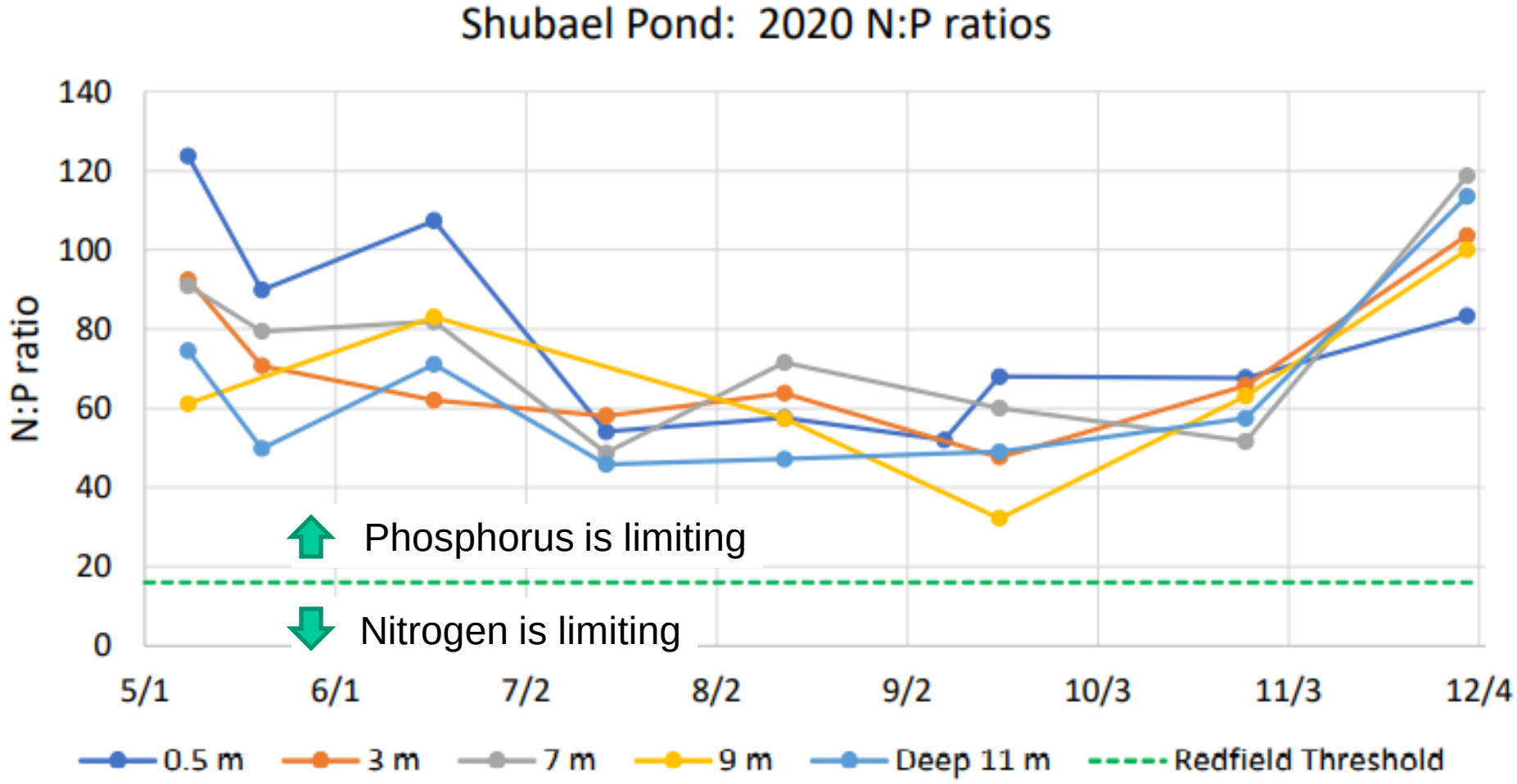
- *Recommendations:*
  - *Long Term: Advance the sewer expansion for the homes contributing phosphorus to the pond from Phase 3 to Phase 2.*
  - *2023: Perform an Alum treatment in Spring 2023. Monitor and perform again as needed (anticipated every 3-5 years).*
    - *Item #: 2023-026*
    - *Does not reduce phosphorus to target, but anticipated to help*
  - *2023: Reduce stormwater inputs along the Shubael Pond Road Pipe.*
    - *Item #: 2023-025*
    - *Does not reduce phosphorus to target, but an improvement*

Long Pond, Marstons Mills Management Plan

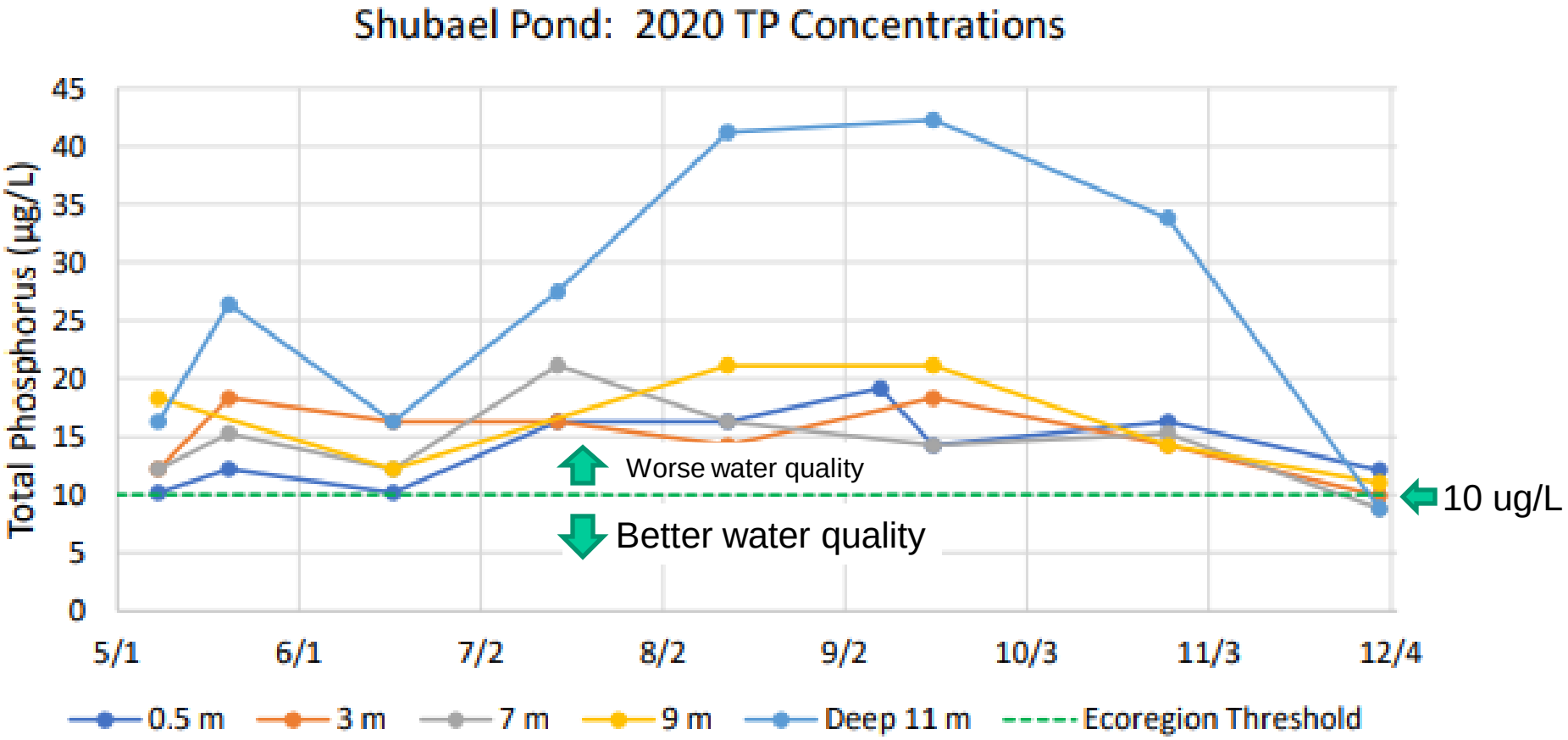
- *Monitoring Phase: Completed 2021*
- *Management Plan Report:*
  - *Draft report received on August 8, 2022.*
  - *SMAST addressing DPW comments.*
  - *Final report anticipated in September.*
- *Preliminary Findings:*
  - *Phosphorus reduction from septic systems is necessary to improve water quality.*
  - *86% of the phosphorus load is from septic systems within 300-ft of the pond in the contributing watershed.*
  - *Alum and aeration are not identified as effective short term solutions for this pond.*
- *Recommendations:*
  - *Significantly expediting sewer expansion to Long Pond, MM is not feasible.*
  - *DPW is evaluating other options for short term improvements to water quality.*

Discussion?

Phosphorus is the key to management



2020 Phosphorus Concentrations

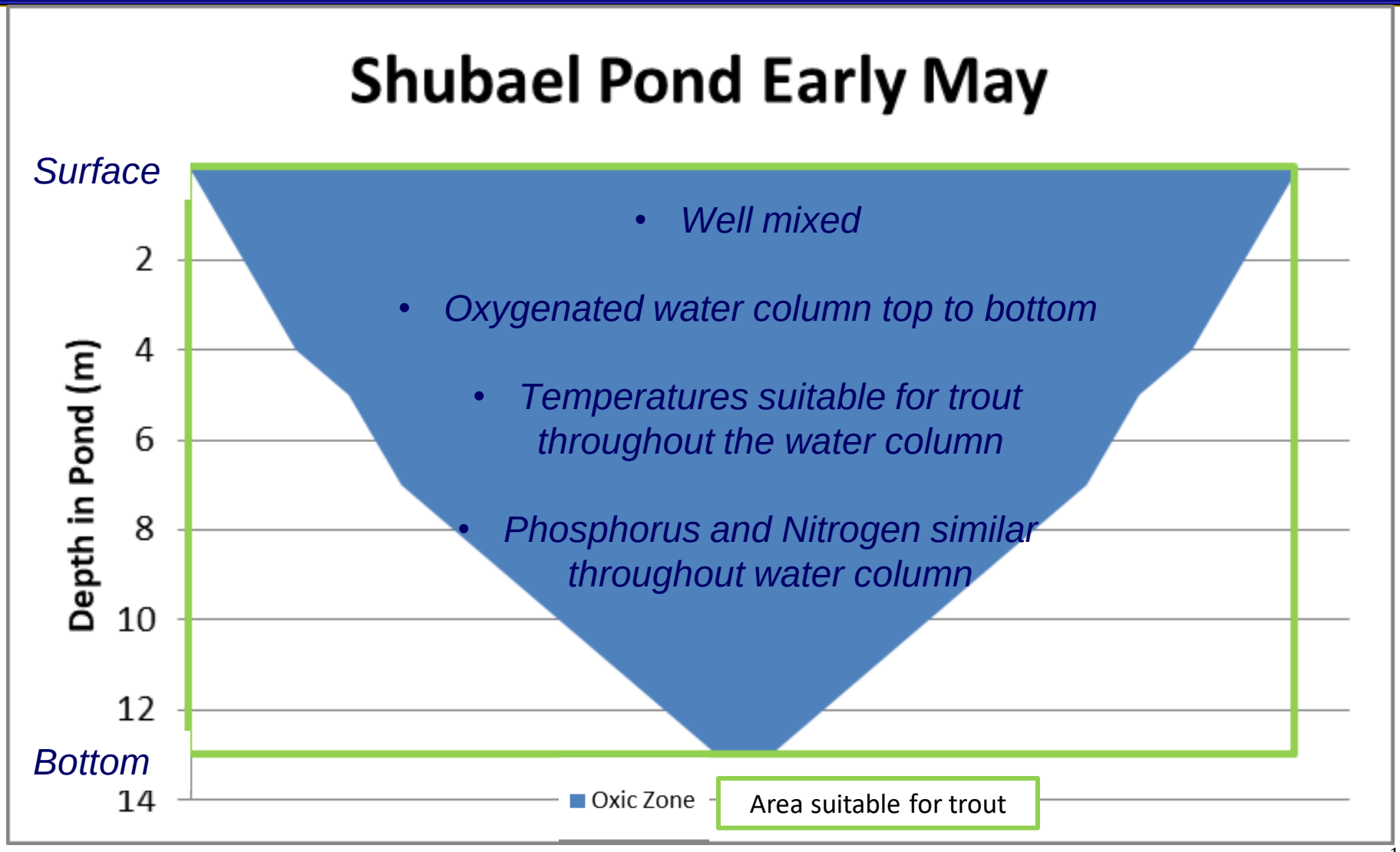


Cyanobacteria in Shubael Pond

- ***Cyanobacteria Monitoring conducted by the Town Health Division revealed no blooms prior to 2018***

- ***Cyanobacteria Warnings were issued in:***
  - *2018*
  - *2019*
  - *2020*

Shubael Pond Dissolved Oxygen and Temperature Conditions



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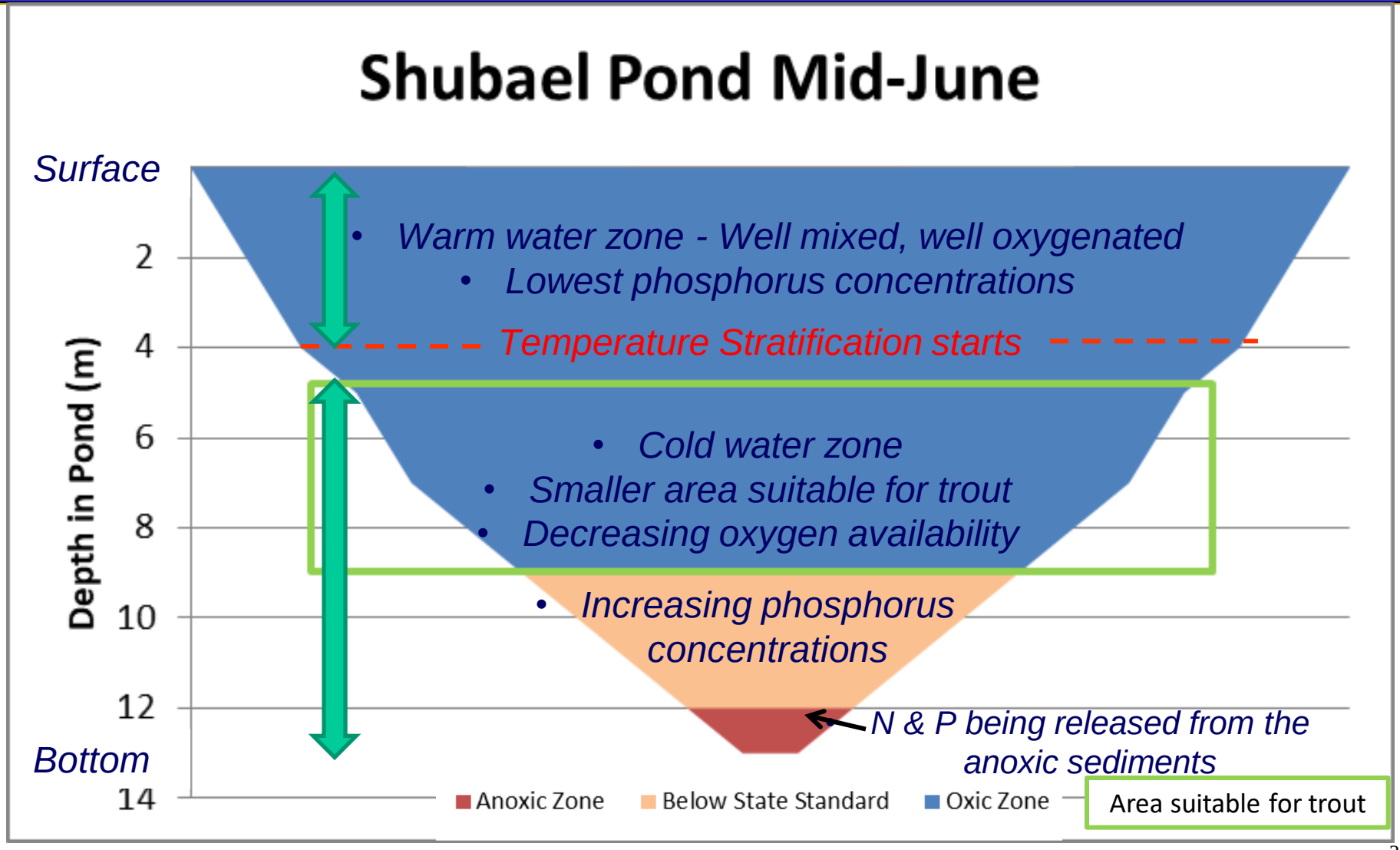

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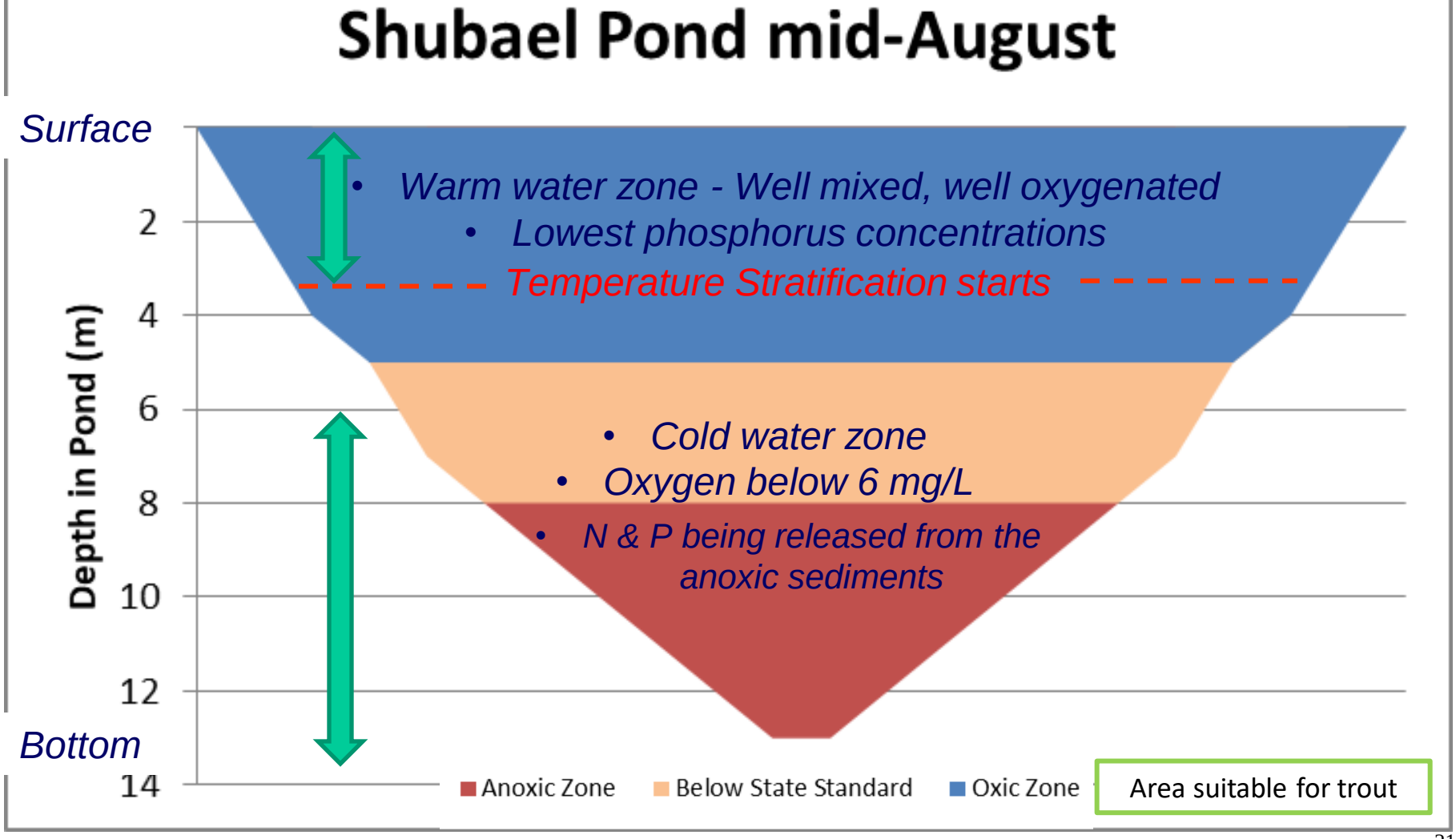

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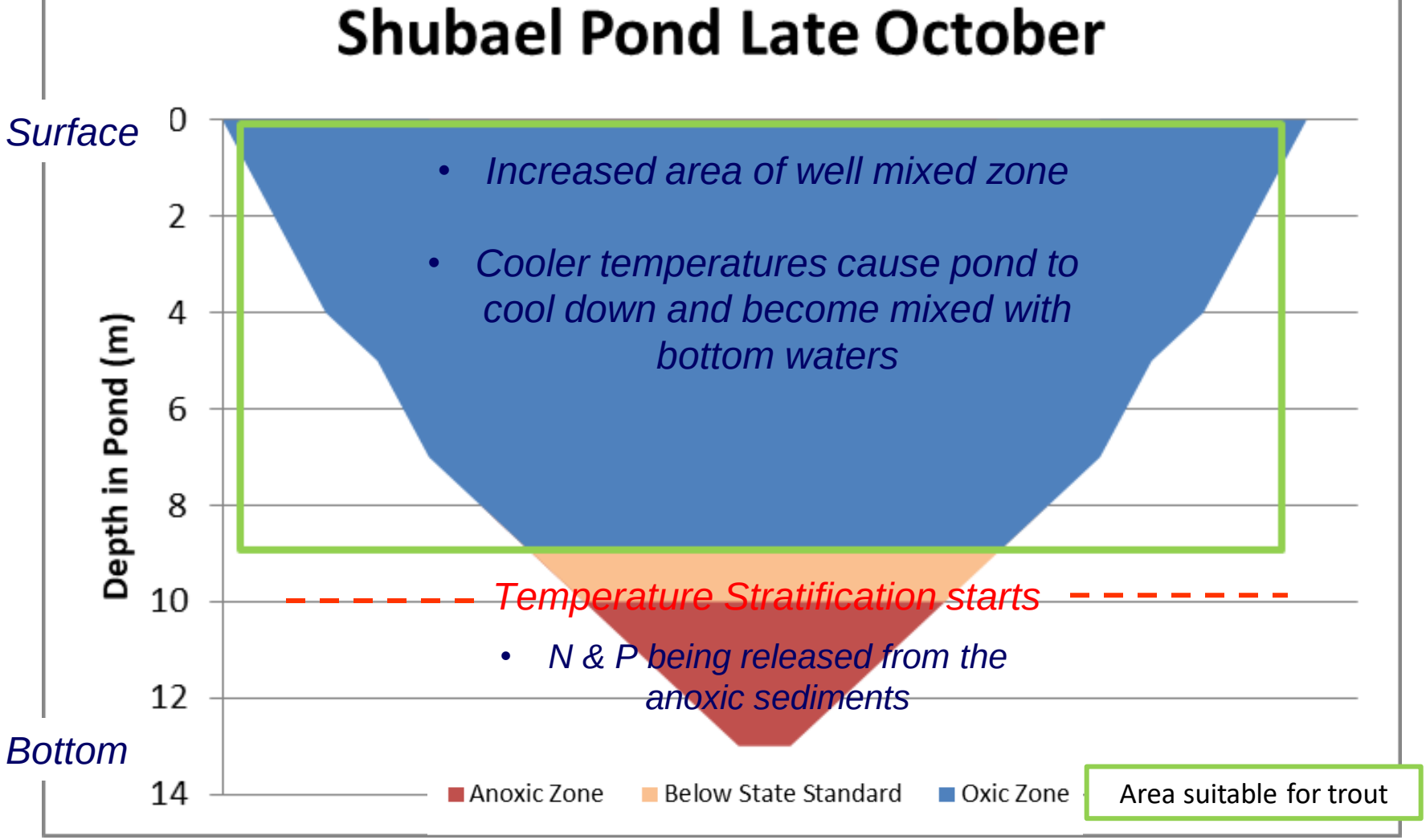
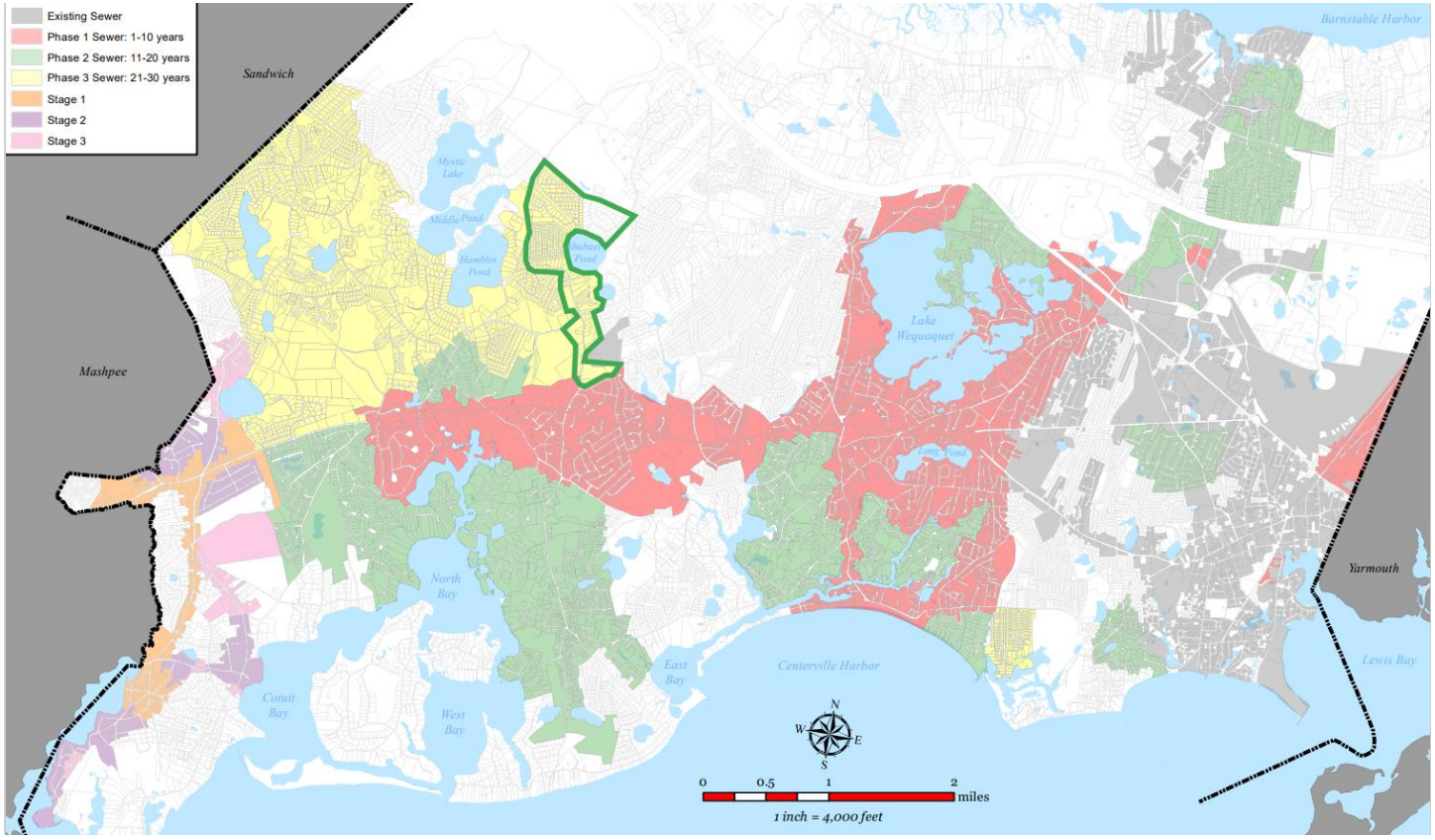


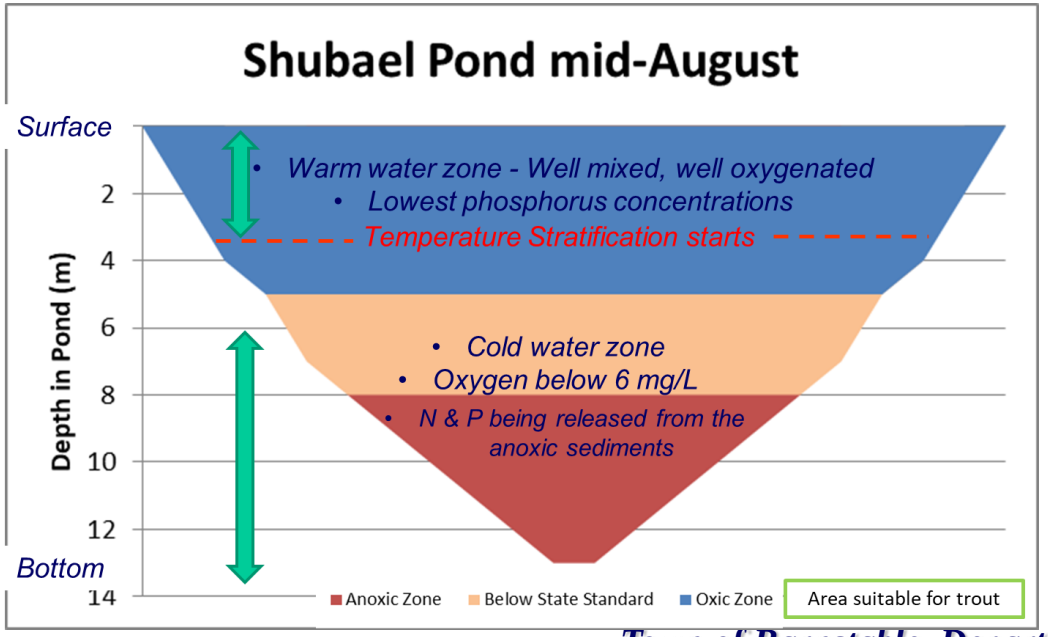
Recommended Solutions

- *Long Term: Sewer the homes contributing phosphorus to Shubael Pond*
  - *The Town will advance the timeline for sewer from Phase 3 to Phase 2.*
  - *Modeling indicates this will reduce the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L.*



Recommended Solutions

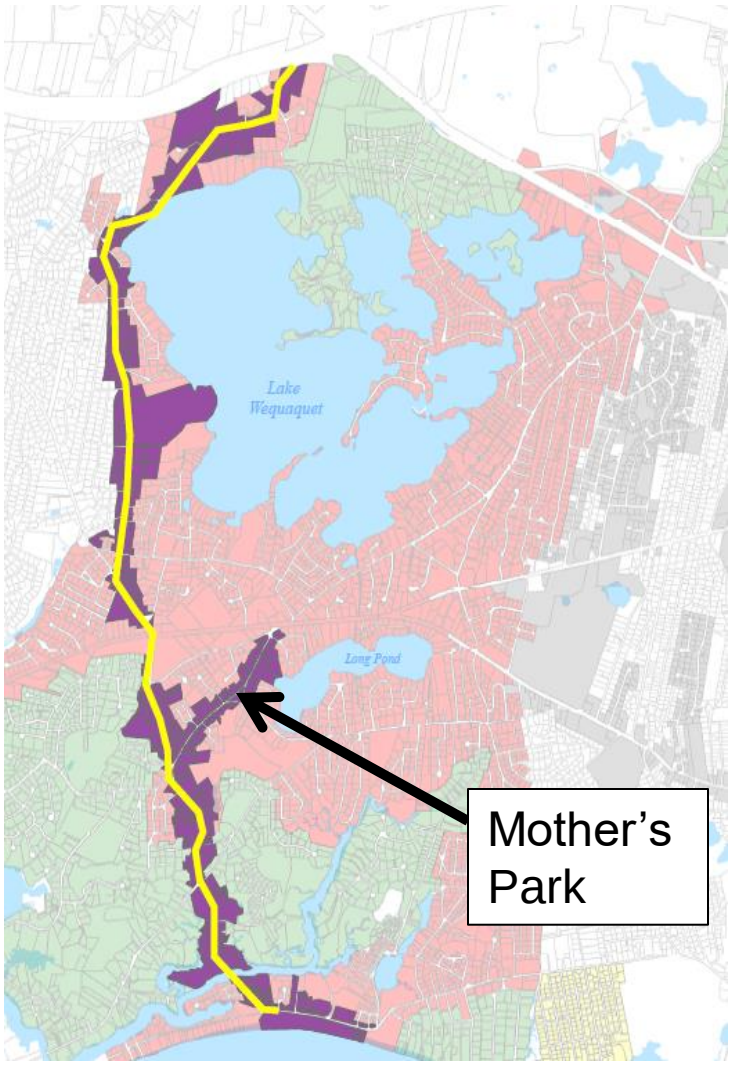
- *Near Term (FY23): Perform an alum treatment*
  - *The Town will use alum to bind to the phosphorus and reduce the amount phosphorus that is released from sediments during periods of anoxia.*
  - *This will reduce phosphorus available for cyanobacteria, but will not reduce to the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L.*



Recommended Solutions

- *Near Term (FY23): Reduce stormwater inputs from Shubael Pond Road*
  - *The Town proposes to install additional stormwater infrastructure along this pipe to reduce inputs to Shuabel.*
  - *This will not reduce to the phosphorus load enough to achieve phosphorus concentrations less than 10 ug/L, but does reduce further nutrient and TSS loading from this pipe.*

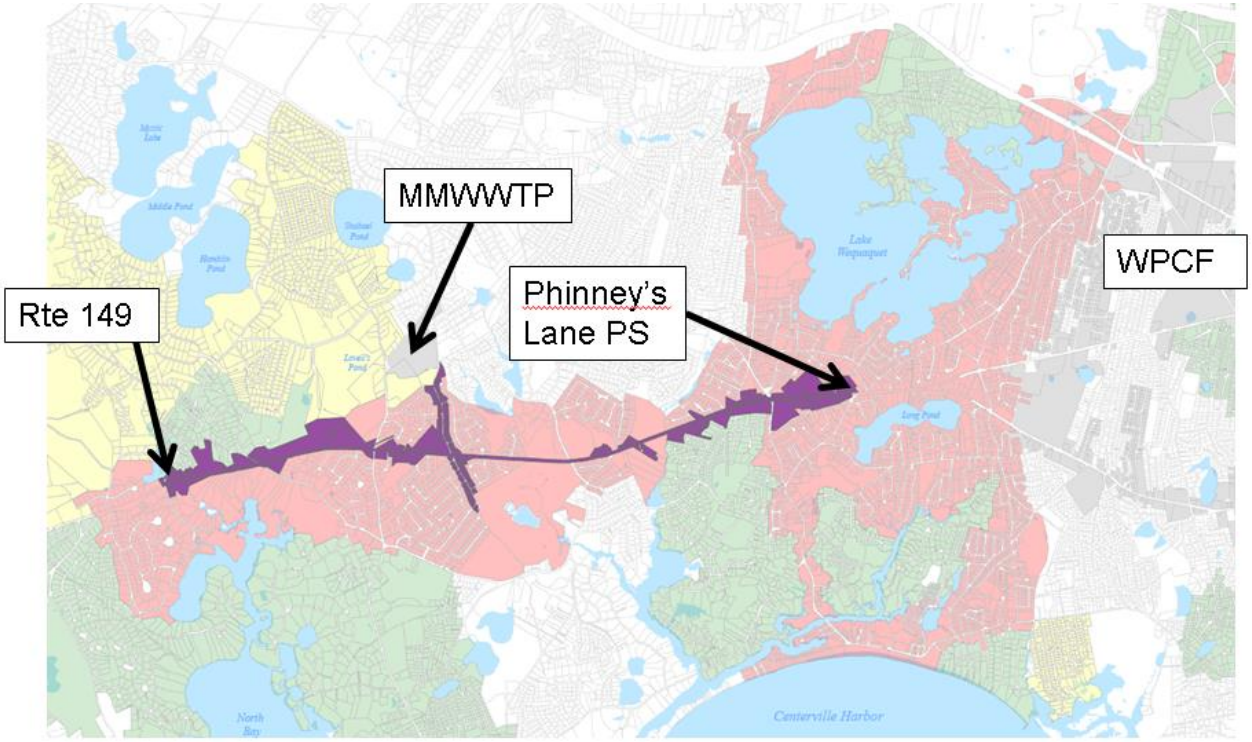
CWMP Project Updates



- *Park City Wind Coordination*
  - *DPW proceeding w/ retaining designer(s) for sewer construction along proposed PCW on-shore route.*
  - *DPW continues to meet w/ PCW staff weekly to coordinate design efforts.*
    - *Weekly discussions also include coordination on Commonwealth Wind Project*
  - *PCW continues route analysis.*
    - *Utility surveys on-going to map subsurface utilities "preferred" route and "alternate" route.*
    - *Evaluating potential construction impacts along route, specifically Main St, Centerville.*
  - *DPW continues to coordinate w/ legal team re: pump station at Mother's Park Road and associated intersection improvements.*
  - *Sewer project anticipated to include 6 sewer pump stations (including Mother's Park Road).*
    - *Land acquisition anticipated to be necessary for 1-3 sites.*
  - *Construction start anticipated Fall/Winter 2023.*

CWMP Project Updates

- *Route 28 "West" Sewer Expansion*
  - *Project extends sewers westerly within Route 28 from Phinney's Lane into the Three Bay's Watershed to Route 149. Infrastructure is the backbone for necessary sewer expansion in the westerly portion of Town, particularly the Three Bays Watershed.*
  - *Reviewing proposals for design services. Anticipate award of contract in September*
  - *Project scheduled to commence in FY2025 and be completed by FY2027*



CWMP Project Updates

- *Route 28 / Yarmouth Road – MassDOT*
  - *Sewer work anticipated to start in the fall*
- *Planning on-going for other Sewer Expansion Projects*
  - *Phinney's Lane and Long Pond Sewer Projects*
    - *Surveys complete, preliminary design (in-house) advancing for both*
    - *Phinney's Lane: Construction start FY25*
      - *Neighborhoods on east and west side of Phinney's Lane*
      - ***Large number of private roads***
    - *Long Pond: Construction start FY27*
      - *Neighborhoods around Long Pond, Centerville*
      - ***Large number of private roads***
  - *Old Craigville Road, Old Yarmouth Road and Shootflying Hill Road Projects*
    - *Preparing RFPs to be issued for survey later this year.*

CWMP Project Updates

- *WPCF Updates*
  - *Evaluation of Nitrogen Removal Improvements*
    - *Reviewing draft report*
    - *Will provide update on recommended plan*
    - *Next step: Designer selection*
    - *Construction start anticipated for FY25*
  - *Effluent Disposal Evaluation*
    - *CDM Smith conducting refined modeling evaluation of identified options*
  - *Solids Processing Facility Upgrades*
    - *Construction on-going*
  - *WPCF Engineering Facility Study*
    - *Study on-going*

Other On-Going Sewer Projects

- *720 Main Street Pump Station Replacement*
  - *Project listed on 2022 CWSRF Intended Use Plan*
  - *Design on-going.*
  - *Public presentation anticipated in Fall.*
- *Pump Station Rehabilitation Program*
  - *FY21: Various Improvements at 5 Pump Stations*
    - *4 new generators to be installed as part of project.*
    - *Lead time on generators up to 15 months.*
      - *Project completion likely delayed to Spring 2023*
  - *FY22: Freezer Road PS Improvements*
    - *Contract executed with contractor (Robert B Our)*
  - *FY23: Old Colony PS Improvements*
    - *Project development on-going*

Project Updates

- *2023 State Revolving Fund (SRF) Project Evaluation Forms (PEFs) Submitted*
  - *PEFs are initial applications which are reviewed for consideration of eligibility.*
  - *Draft Intended Use Plan (IUP) released in January/February identifies projects that are determined eligible.*
  - *Barnstable submitted X Clean Water project and X Drinking Water Projects for 2023*
  - *Clean Water Projects*
    - *Park City Wind Route Sewer Expansion: $30,900,000*
    - *WPCF Improvements: $6,121,800*
    - *Sewer System Rehabilitation – Infiltration and Inflow Removal: $810,000*
    - *2023 Wastewater Pump Station Improvements: $3,320,000*
    - *Bearses Way Sewer Extension and Vacuum Sewer Removal: $1,120,000*
  - *Drinking Water Projects*
    - *Mary Dunn 4 Pump Station and 16” Transmission Main Replacement: $3,914,000*
    - *Mary Dunn 1 Water Storage Tank Rehabilitation: $975,000*

Drinking Water New Source Study Update

- *Hyannis Water System continues efforts to identify new sources of drinking water.*
- *A public informational meeting was held on Wednesday, April 13, 2022 to discuss the potential development of a test well and further sampling at Site C (Bridge St Conservation Area).*
- *Site B is also anticipated to be further tested.*
- *DPW in contracting phase for additional sampling efforts at Sites B and C.*
  - *Sampling likely in the fall.*

Table 4: Highest Ranked Sites by Yield

Site ID / Location	Well ID	Potential Yield (gpm)
Bridge St. Conservation Area (Site C)	TW-1C-20	5,087
Hathaway's Pond (Site E)	TW-1E-20	565
West Barnstable Conservation Area (Site D)	TW-2D-20	529
North of Rt. 6 (Site B)	TW-2B-20	519

Table 5: Water Quality Results Summary

Analyte	TW-2B-20 3/3/20	TW-1C-20 5/19/20	TW-2D-20 2/19/20	TW-1E-20 1/27/20	TW-1F-20 2/26/20[7]	TW-1G-20 3/12/20[7]	Max. Contaminant Level (MCL)
Total Fe (mg/L)	0.078	0.131	0.054	ND[1]	0.194	ND	0.3 mg/L
Total Mn (mg/L)	ND	ND	0.041	ND	0.028	ND	0.05 mg/L
pH	6	5.8	6.2	5.7	5.6	6	6.5 - 8.5
Total Pb (mg/L)	ND	ND	0.0078	ND	ND	ND	TT[2] 0.015 mg/L
Perchlorate (mg/L)	0.000088	0.000082	0.000077	0.000054	0.000084	ND	0.002 mg/L
Chloroform (mg/L)	0.00053	0.00077	0.0016	0.001	0.0059	0.0022	0.07
PFAS 6[3] (ng/L)	ND	11.23[4]	ND	ND	ND	ND	20 ppt
Other PFAS (NEtFOSAA[5]) (ng/L)	1.86	ND	ND	ND	ND	ND	N/L[6]

Notes:
1) ND = Not Detected
2) TT = Treatment Technique. If > 10% of tap water samples tested exceed the action level of 0.015 mg/L, additional steps must be taken for water treatment.
3) The sum concentration of the six PFAS compounds regulated by the current MassDEP MCL including PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA).
4) Three of six PFAS compounds proposed by MassDEP for regulation were detected: PFHxS, PFOA, PFOS
5) NEtFOSAA = N-Methyl Perfluorooctanesulfonamidoacetic Acid
6) N/L = Not Listed
7) Sites sampled for completeness, however not favorable for development due to limited yield potential

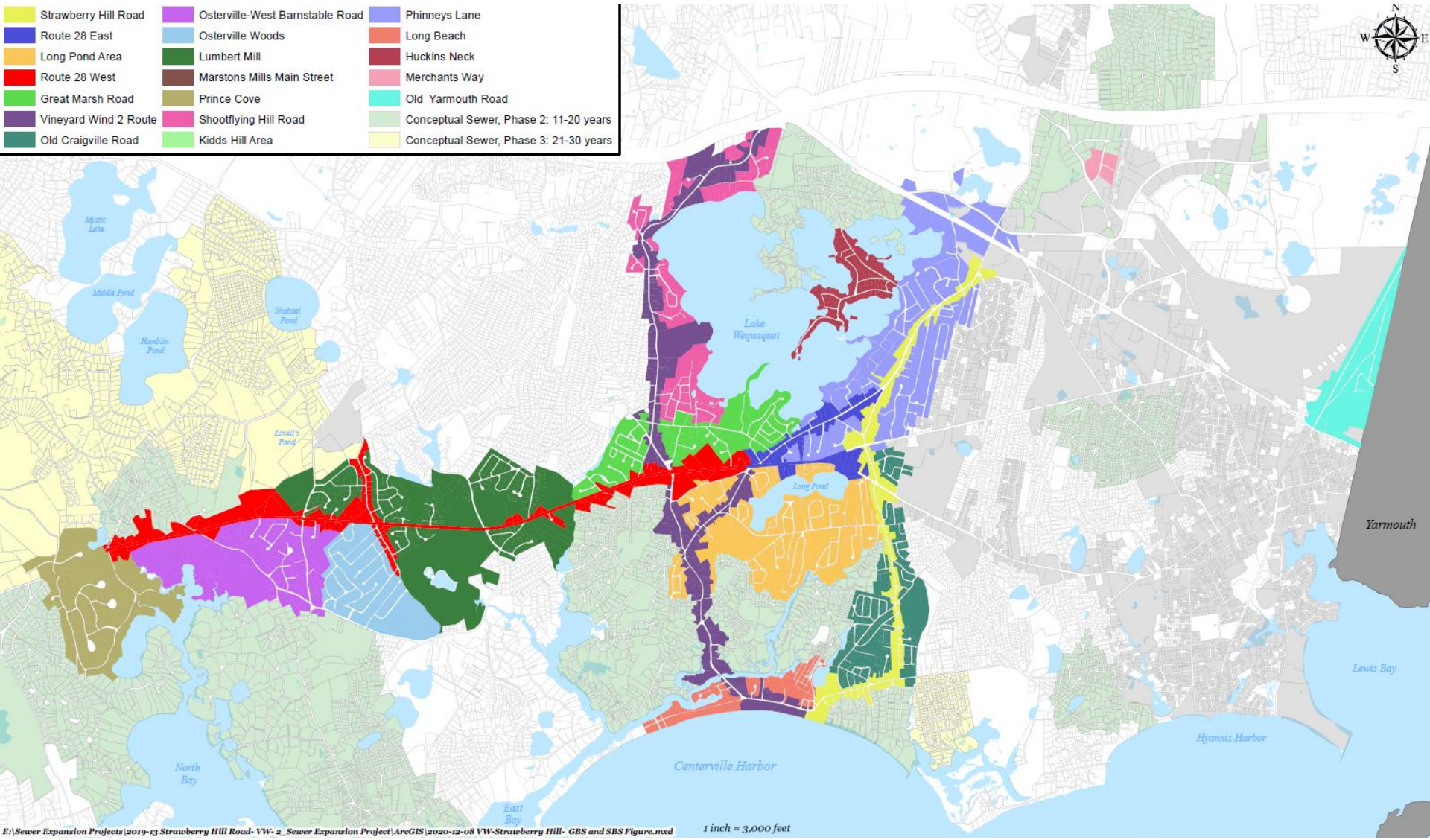
Pilot Studies – Hyannisport & Straightway & Mary Dunn Water Treatment Facilities

- *In Fall 2020, the Town hired Kleinfelder to assist in completing pilot studies on the Town's existing Hyannisport & Straightway Water Treatment Facilities and the Mary Dunn Water Treatment Facility.*
- *Spring 2021, Kleinfelder conducted field testing at the Hyannisport, Straightway and Simmons Ponds wells.*
- *Fall 2021, Kleinfelder prepared a draft Pilot Study report providing recommendations for water treatment, based on completed field testing for the Straightway Treatment Facility. This report was finalized and submitted to DEP, and subsequently DEP approved the proposed treatment processes on February 22, 2022.*
- *On April 28th, the Town Council appropriated funds for the design of the Straightway Treatment Facility.*
  - *DPW is in the process of contracting for these efforts.*

Barnstable Fire District
New Water Treatment Plant

- *Barnstable Fire District Water Department will be proceeding with construction of a new $20M drinking water treatment plant to remove PFAS from contaminated drinking water wells.*

Phase 1 Implementation Plan



Phase 1 Schedule

Sewer Expansion Collection System Projects - Phase 1															
				Phase 1										Phase 2	
Project	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	*TOTAL*
Merchants Way															*$0*
Strawberry Hill Road		*$835,000*	*$10,600,000*												$11,435,000
Route 28 East		*$800,000*		*$22,000,000*											$22,800,000
Vineyard Wind 2 Route				$2,500,000		$28,000,000									$30,500,000
Phinneys Lane	*$315,000*	*$735,000*					$32,000,000								$33,050,000
Route 28 West		*$612,000*		$3,500,000			$35,000,000								$39,112,000
Old Yarmouth Road					$275,000	$600,000		$7,150,000							$8,025,000
Old Craigville Road					$600,000	$1,400,000		$17,000,000							$19,000,000
Long Pond Area	*$402,000*	*$938,000*							$35,000,000						$36,340,000
Shootflying Hill Road					$375,000		$875,000		$7,150,000						$8,400,000
Long Beach						$300,000	$700,000		$8,000,000						$9,000,000
Great Marsh Road							$500,000	$1,200,000		$15,500,000					$17,200,000
Osterville Woods							$550,000	$1,250,000		$17,000,000					$18,800,000
South County Road								$300,000	$700,000		$13,000,000				$14,000,000
Prince Cove									$400,000	$1,000,000		$15,500,000			$16,900,000
Huckins Neck									$300,000	$700,000		$9,000,000			$10,000,000
Lumbert Mill										$700,000	$1,500,000		$20,225,000		$22,425,000
TOTAL COSTS	$717,000	$3,920,000	$10,600,000	$28,000,000	$1,250,000	$30,300,000	$69,625,000	$26,900,000	$51,550,000	$34,900,000	$14,500,000	$24,500,000	$20,225,000	$0	$316,987,000
NEW PARCELS CONNECTED	0	7	0	0	238	91	0	351	278	1,032	441	1,352	349	418	4,557
COMBINED FLOW (GPD)	1,670,000	1,670,000	1,670,000	1,670,000	1,716,500	1,732,000	1,732,000	1,798,000	1,870,500	2,035,500	2,084,500	2,320,500	2,388,500	2,451,000	781,000

5-Year CIP (FY23-FY27)

Drinking Water New Source Study Update

- *New source alternatives evaluation report prepared by Weston & Sampson in 2019 concluded Hyannis Water System has a deficit of 1.87 MGD in 2020 and 3.23 MGD in 2040, if largest source is lost.*
- *11 sites were identified and ranked using the multiple criteria. 7 sites were selected for additional test well drilling, based on results of ranking.*
- *Sites were evaluated and ranked based on pump yield and water quality test results. Site C (Bridge St Conservation Area) was selected as the most advantageous site due a potential yield almost 10-times greater than other sites.*
- *In January of this year, DPW met with the West Barnstable Water Commissioners to present these findings.*
- *A public informational meeting was held on Wednesday, April 13, 2022 to discuss the potential development of a test well and further sampling at Site C.*
- *Site B is also anticipated to be further tested.*

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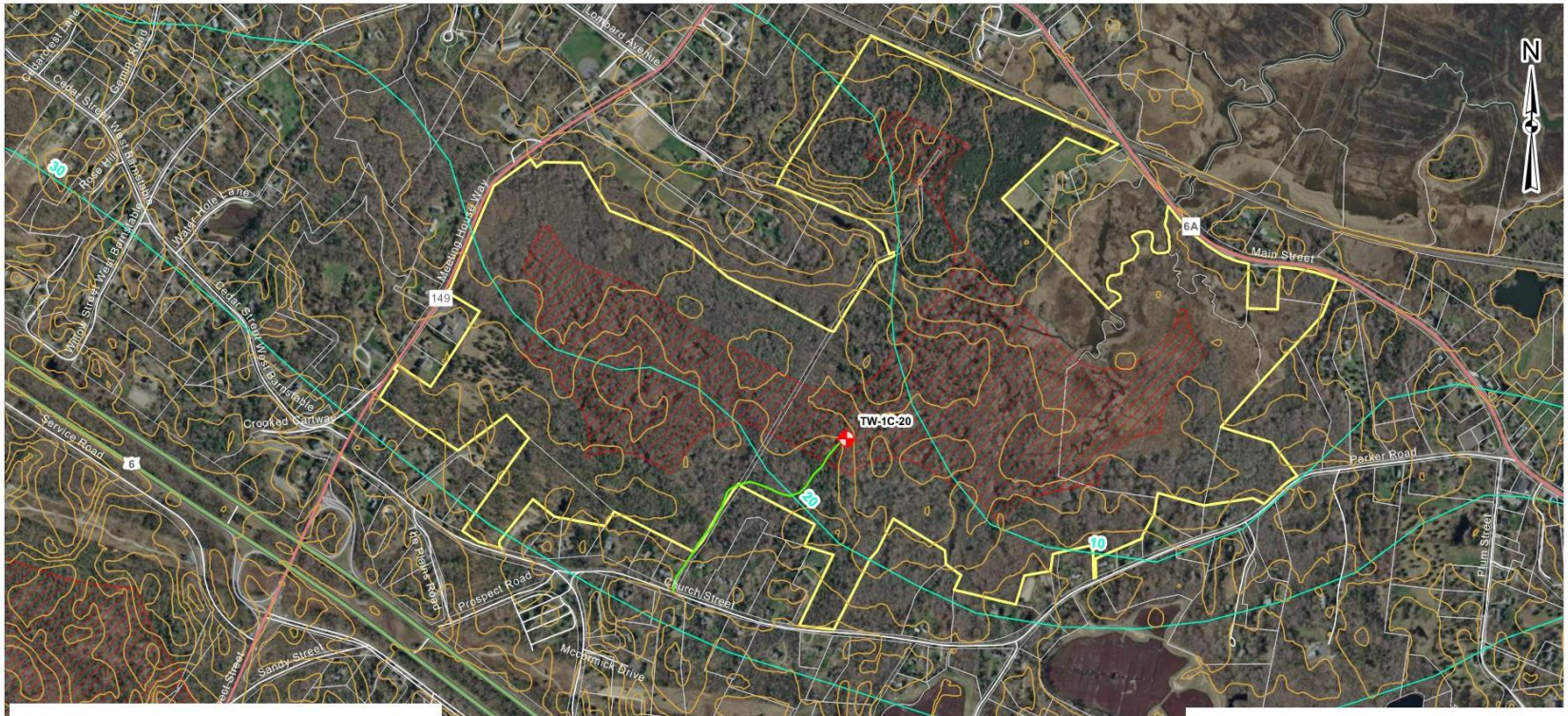
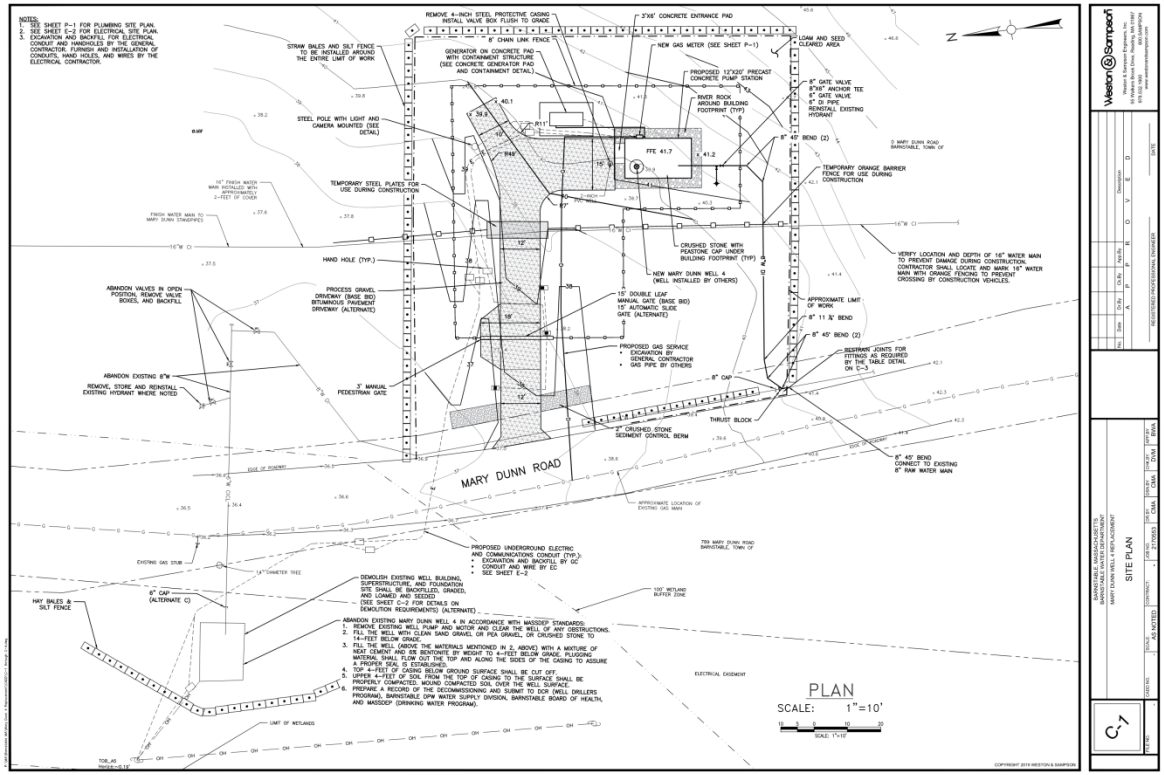
Total Mn (mg/L)	ND	ND	0.041	ND	0.028	ND	0.05 mg/L
pH	6	5.8	6.2	5.7	5.6	6	6.5 - 8.5
Total Pb (mg/L)	ND	ND	0.0078	ND	ND	ND	TT[2] 0.015 mg/L
Perchlorate (mg/L)	0.000088	0.000082	0.000077	0.000054	0.000084	ND	0.002 mg/L
Chloroform (mg/L)	0.00053	0.00077	0.0016	0.001	0.0059	0.0022	0.07
PFAS 6[3] (ng/L)	ND	11.23[4]	ND	ND	ND	ND	20 ppt
Other PFAS (NEtFOSAA[5]) (ng/L)	1.86	ND	ND	ND	ND	ND	N/L[6]

Notes:
1) ND = Not Detected
2) TT = Treatment Technique. If > 10% of tap water samples tested exceed the action level of 0.015 mg/L, additional steps must be taken for water treatment.
3) The sum concentration of the six PFAS compounds regulated by the current MassDEP MCL including PFOS, PFOA, PFHxS, PFNA, PFHpA, and PFDA).
4) Three of six PFAS compounds proposed by MassDEP for regulation were detected: PFHxS, PFOA, PFOS
5) NEtFOSAA = N-Methyl Perfluorooctanesulfonamidoacetic Acid
6) N/L = Not Listed
7) Sites sampled for completeness, however not favorable for development due to limited yield potential

Site C – Bridge Street Conservation Area



Mary Dunn Well #4
Summary of Work Completed



- *In Spring 2019, F.G. Sullivan installed a new 24”” x 48”, gravel packed well across the street from the existing Mary Dunn Well #4 pump station & well that has been out of service.*
- *2019-2021: Design of the new Mary Dunn Well #4 pump station, which includes a new pre-cast concrete pump station building, has been completed by Weston & Sampson.*
- *Project is scheduled to bid in Spring 2022, with final completion by December 2022.*

Pumping/Testing Data

Table 4: Highest Ranked Sites by Yield

Site ID / Location	Well ID	Potential Yield (gpm)
Bridge St. Conservation Area (Site C)	TW-1C-20	5,087
Hathaway's Pond (Site E)	TW-1E-20	565
West Barnstable Conservation Area (Site D)	TW-2D-20	529
North of Rt. 6 (Site B)	TW-2B-20	519

Table 5: Water Quality Results Summary

Analyte	TW-2B-20 3/3/20	TW-1C-20 5/19/20	TW-2D-20 2/19/20	TW-1E-20 1/27/20	TW-1F-20 2/26/20[7]	TW-1G-20 3/12/20[7]	Max. Contaminant Level (MCL)
Total Fe (mg/L)	0.078	0.131	0.054	ND[1]	0.194	ND	0.3 mg/L
Total Mn (mg/L)	ND	ND	0.041	ND	0.028	ND	0.05 mg/L
pH	6	5.8	6.2	5.7	5.6	6	6.5 - 8.5
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Perchlorate (mg/L)	0.000088	0.000082	0.000077	0.000054	0.000084	ND	0.002 mg/L
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PFAS 6[3] (ng/L)	ND	11.23[4]	ND	ND	ND	ND	20 ppt
Other PFAS (NEtFOSAA[5]) (ng/L)	1.86	ND	ND	ND	ND	ND	N/L[6]

Notes:
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5) NEtFOSAA = N-Methyl Perfluorooctanesulfonamidoacetic Acid
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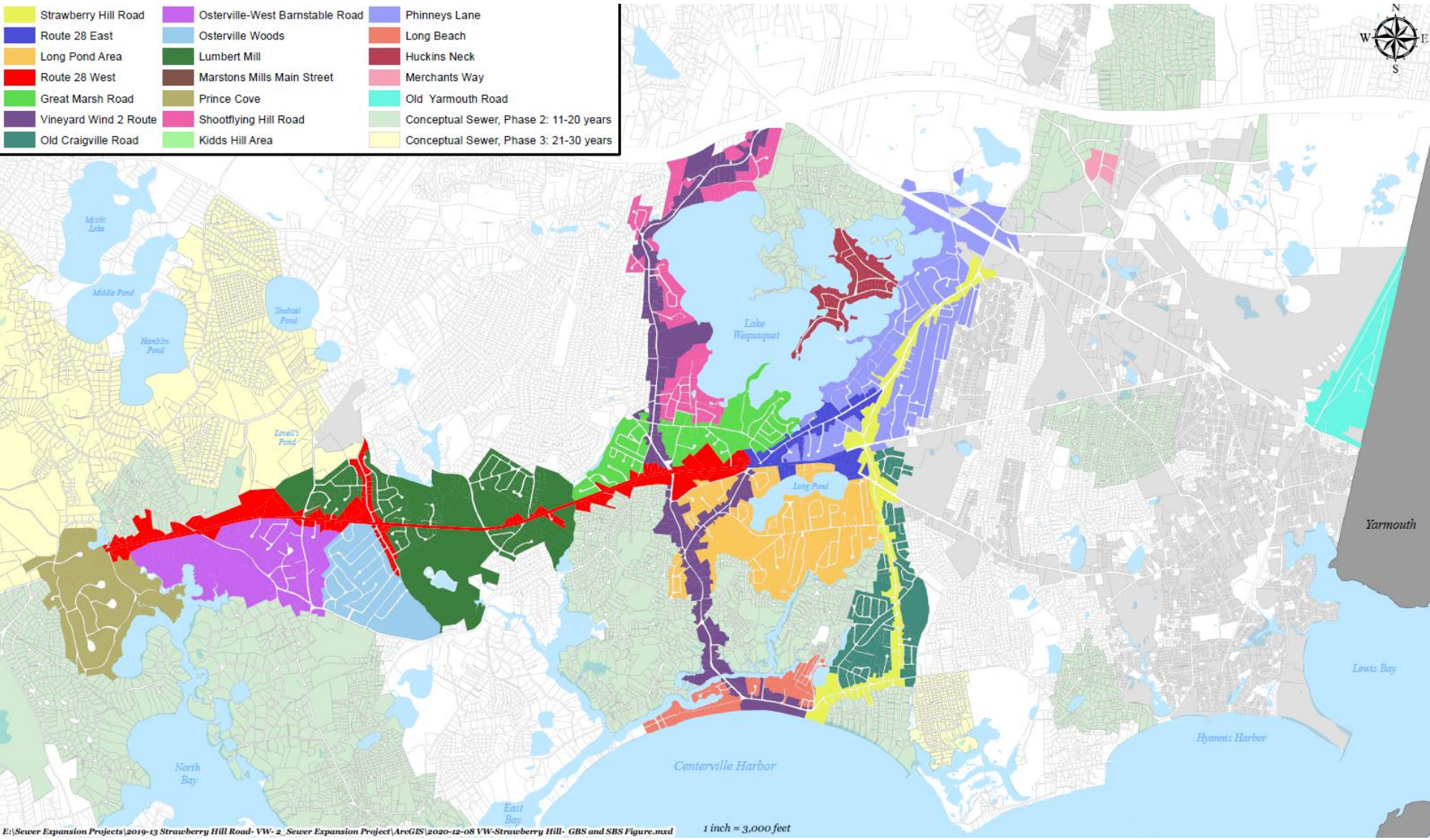
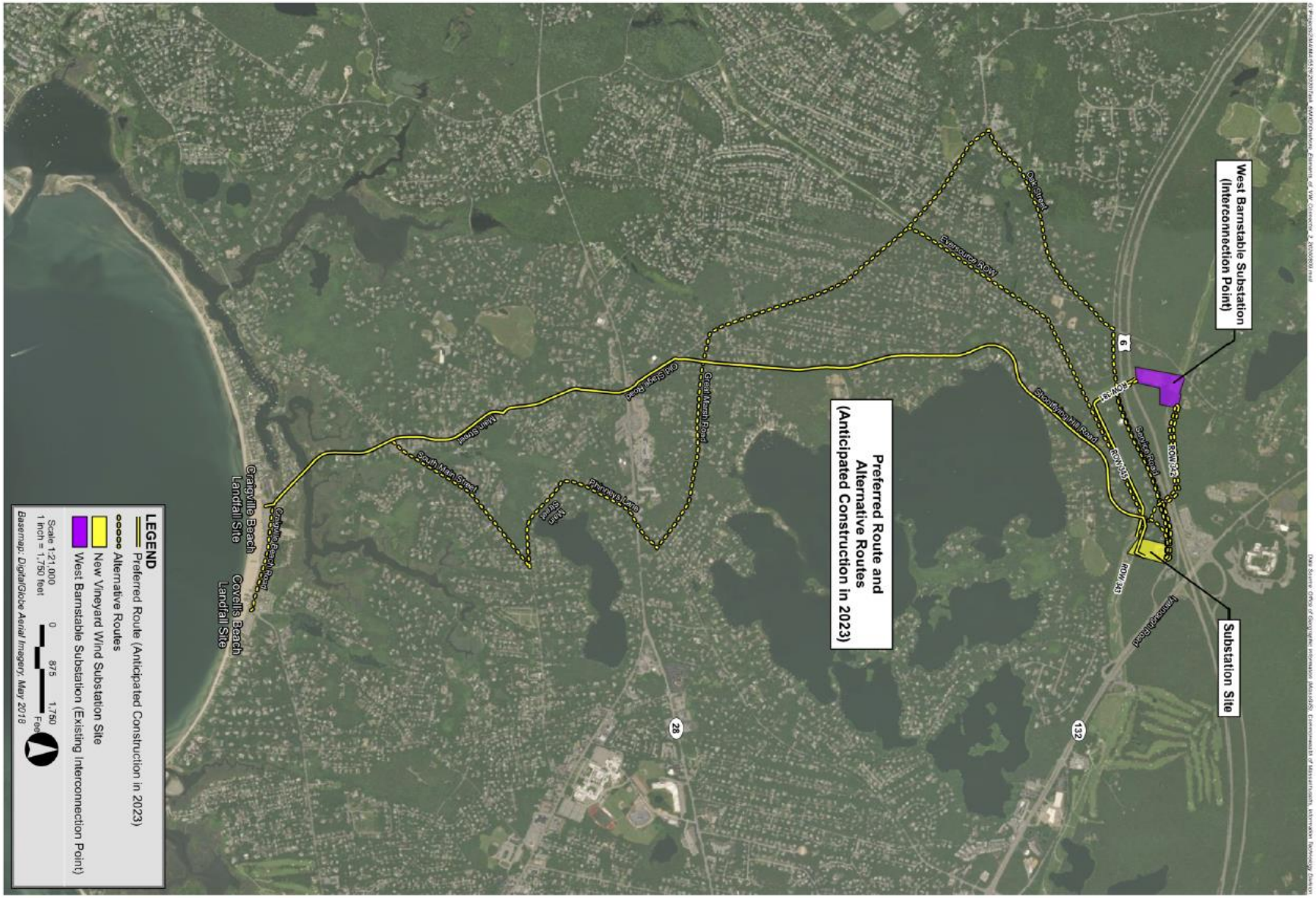
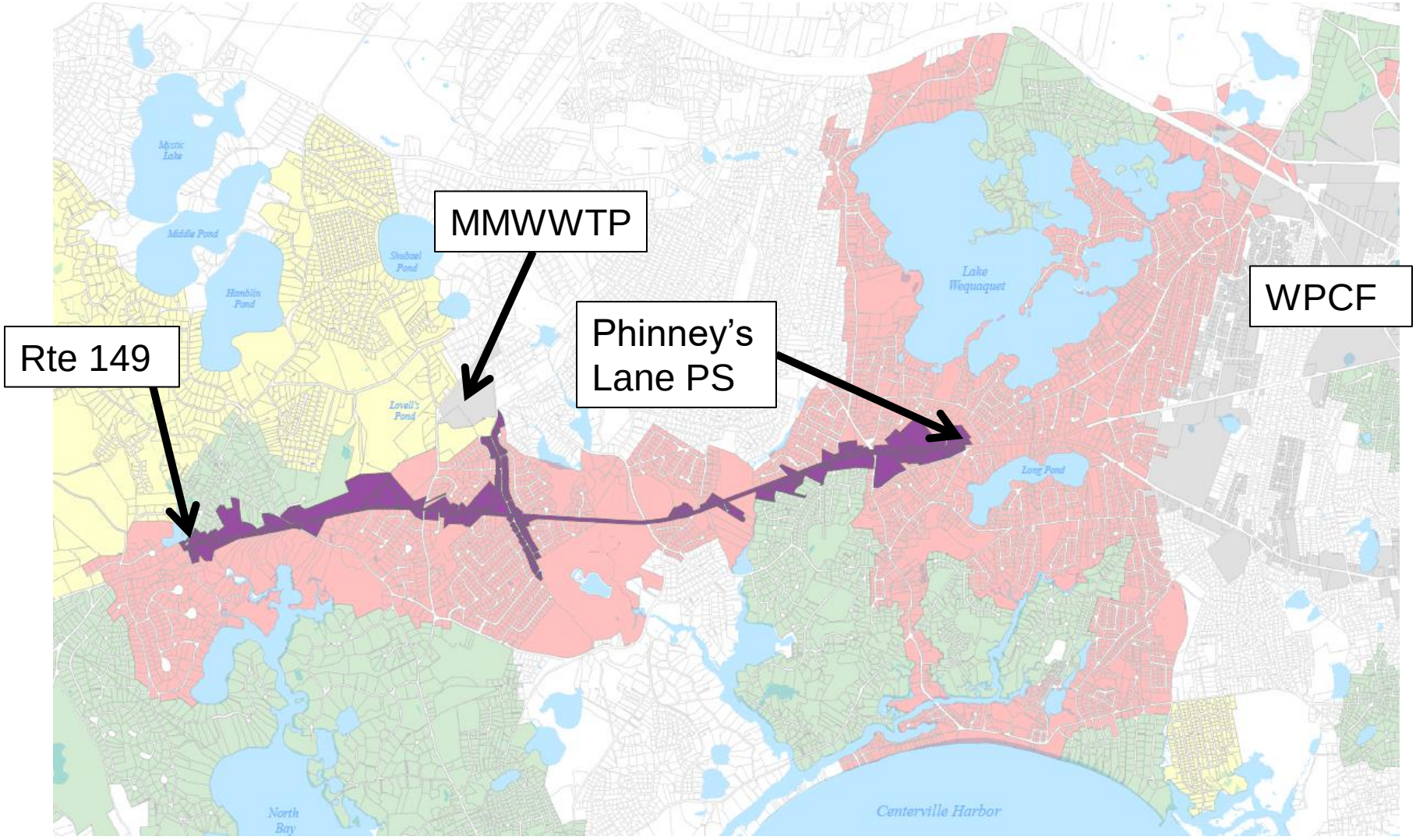
Phase 1 Implementation Plan



Park City Wind Route



CWMP Project Updates



Clean Water SRF Update (From February)

- *SRF*
  - *2020 Projects*
    - *All loans have been secured and projects are underway (4 projects)*
    - *Mass Clean Water Trust announced total loan forgiveness for the 4 projects of $876,534*
  - *2021 Projects*
    - *Route 28 East Sewer Expansion Project – Loan Application under review*
    - *Freezer Road Sewer Pump Station Rehabilitation – Currently out to bid*
  - *2022 Projects*
    - *Draft Intended Use Plan (IUP) released today*
    - *720 Main Street Pump Station Relocation listed*