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Clean and healthy waters for future generations

Water Quality and Wastewater Planning Program Status Update

August 11, 2018



AECOM

Agenda

- ❖ **Lonnies' Pond Oyster Demonstration Project**
- ❖ **Eldredge Park Way Permeable Reactive Barrier Demonstration Project**
- ❖ **Downtown Area Wastewater Infrastructure**
- ❖ **Financial Planning**



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Lonnies' Pond Oyster Demonstration Project

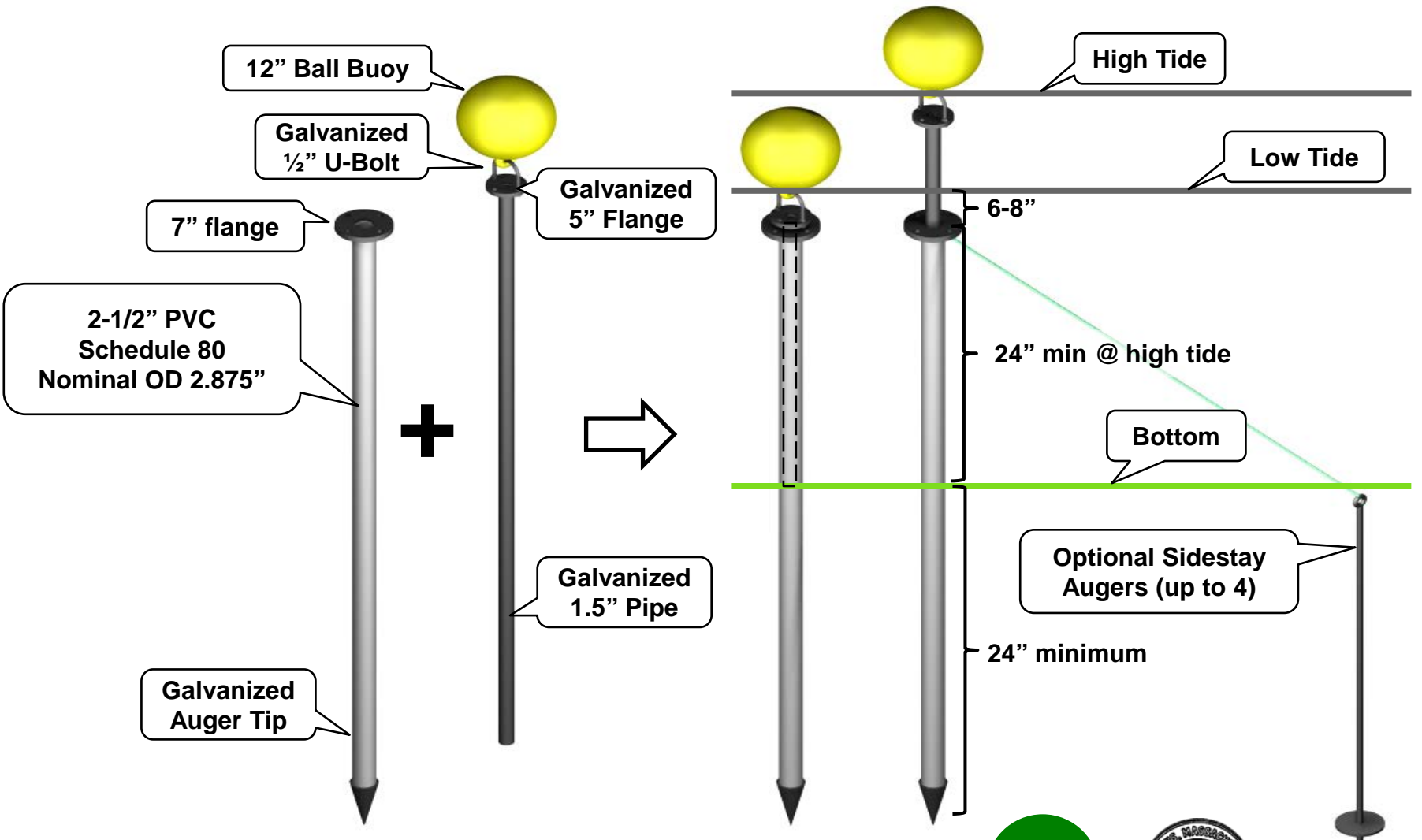


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Lonnies' Pond Oyster Demonstration Project Telescoping Auger System



Lonnies' Pond Oyster Demonstration Project Telescoping Auger System (cont.)



Lonnie's' Pond Oyster Demonstration Project Views of the 2016 Fields



Lonnies' Pond Oyster Demonstration Project

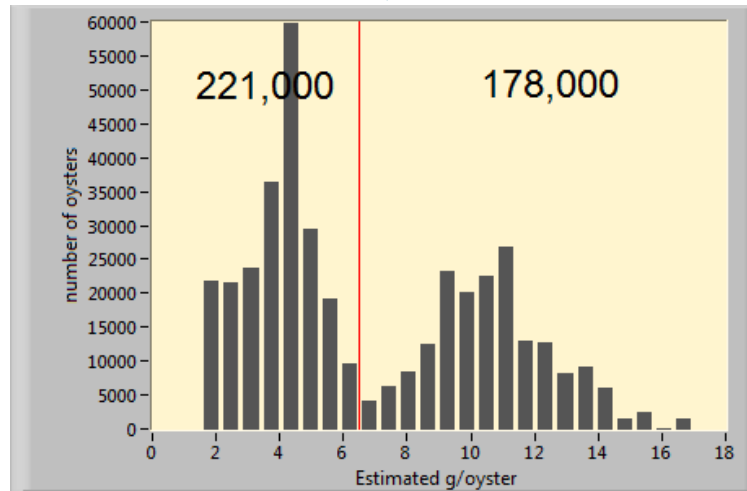
Selecting Y1 Oysters

Early May



~2.6 g N / sq.ft.

Mid September



~5.1 g N / sq.ft.



Lonnies' Pond Oyster Demonstration Project Views of the 2017 Fields

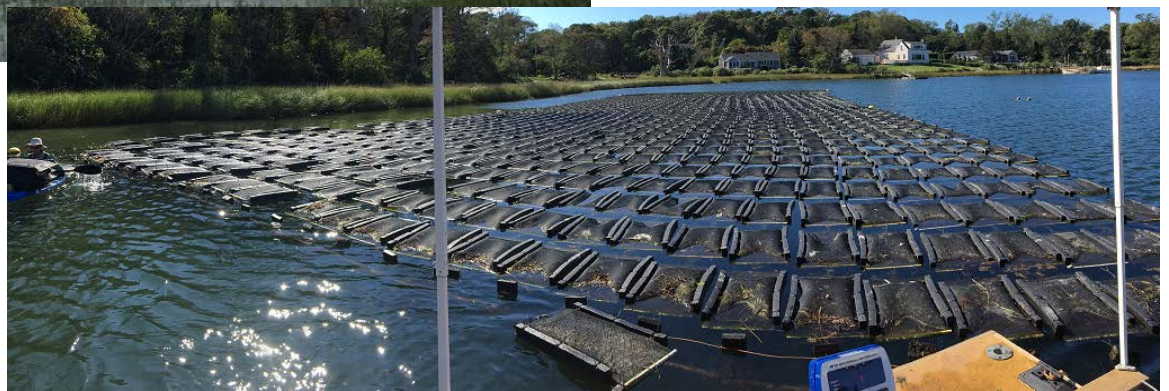
Early May



Mid September



Early October



10/2016

2016

800 bags, 0.22ac
~110 kg N / ac

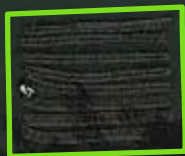
Kescayo Gansett Pond

2

3

1

4



Google Earth

Tour Guide



1996

Imagery Date: 10/10/2016 41°46'12.57" N 69°58'35.82" W elev 0 ft eye alt 1117 ft

4/2017

2017

1,020 bags, 0.19ac
~150 kg N / ac

Kescayo Gansett Pond

2

3

W	E
---	---

1

4

Google Earth

Tour Guide

1996

Imagery Date: 4/14/2017 41°46'12.57" N 69°58'35.82" W elev 0 ft eye alt 1117 ft

2018

2,040 bags, 0.37ac
~150 kg N / ac

NE

Kescayo Gansett Pond

2

3

NW

SW

SE

1

4

Google Earth

Lonnies' Pond Oyster Demonstration Project Projections for 2018 and Beyond

- ❖ **Assume Observed Uptake Rates (not optimized)**
 - Y1: 3.7 g N / sq.ft. (Started as 2-3 mm Seed in Early May)
 - Y2: 3.4 g N / sq.ft. (Started as ~16g / oyster in Mid April)
 - 1:3 ratio for Y1:Y2 area → 3.5 g N / sq.ft.
- ❖ **Allow Use of up to 10% of Total Pond Area**
- ❖ **Oysters Not Removed During Growing Season**
- ❖ **Prepare RFQ for Growers**



Lonnies' Pond Oyster Demonstration Project

Comparison of Demonstration Years

	Unit	Demo Year 1 2016	Demo Year 2 2017	Demo Year 3 2018
Field Area	sq.ft.	9,600	8,160	16,320
	acres	0.22	0.19	0.37
Bags	Number	800	1,020	2,040
	sq.ft. / bag	12	8	8
N Content	% of live wt.	0.33%	(0.33%)	TBD
N Uptake	g / sq.ft.	2.1 – 3.1	3.5	TBD



5/2016

20XX

2,550 bags, 0.47 ac
~70 kg N
(24% MEP)

Kescayo Gansett Pond

Google Earth

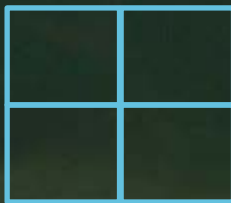
5/2016

20XX

5,610 bags, 1.0 ac
~150 kg N
(50% MEP)



Kescayo Gansett Pond



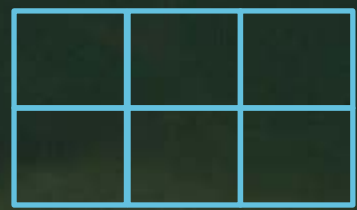
Google Earth

20XX

8,160 bags, 1.5 ac
~225 kg N
(75% MEP)



Kescayo Gansett Pond



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Water Quality and Wastewater Planning Program Status Update

Eldredge Parkway Permeable Reactive Barrier Demonstration Project



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Eldredge Park Way PRB Demonstration Project

Status and Observations

Status

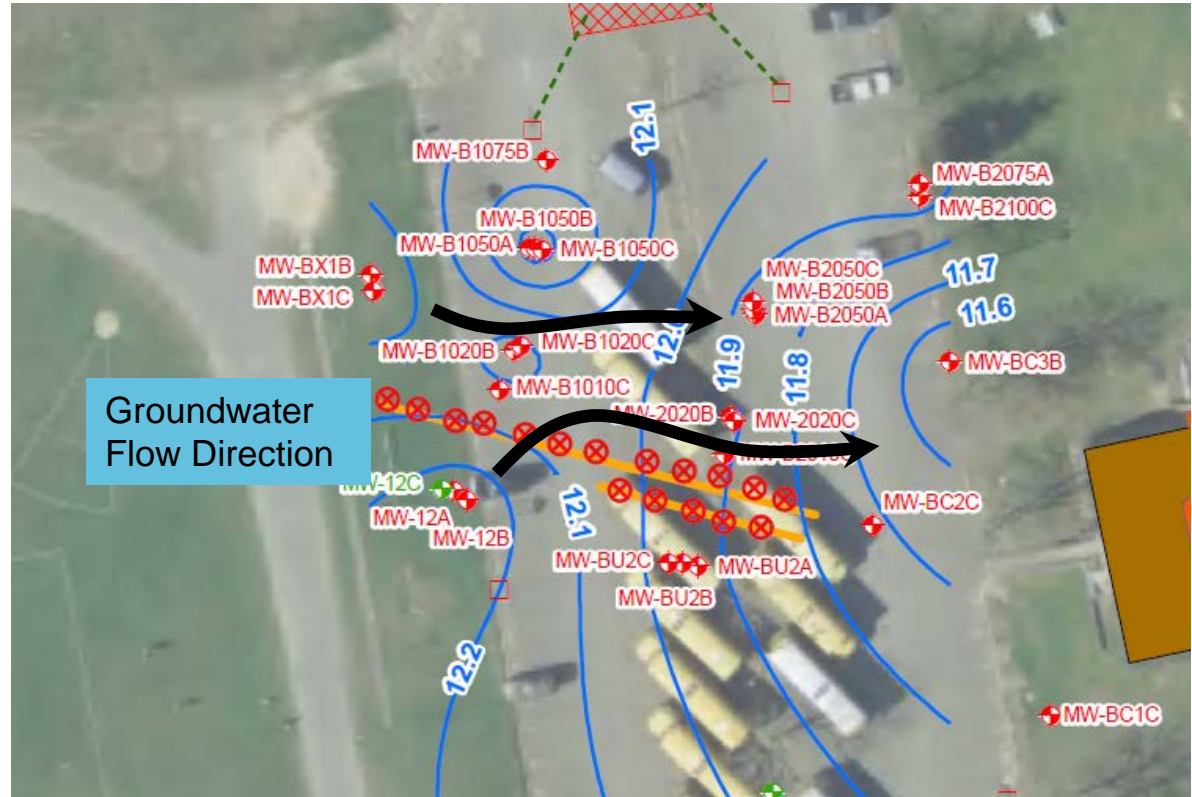
- ❖ Permeable Reactive Barrier (PRB) Installed November 2016
 - 110 Feet Long
 - Depth to Groundwater 30 – 40 Feet Below Grade
 - Injection Interval (30 feet) 38 – 68 Feet Below Grade
- ❖ Quarterly monitoring ongoing
- ❖ Additional Section of PRB Installed in June 2018 to Treat Adjacent Area to the North

Observations

- ❖ Groundwater Flow is Complex Due to Variable Groundwater Gradient
- ❖ Local Conditions Such as Variable Discharge to the Middle School Septic Leach Fields May be Periodically Altering Flow Through the PRB
- ❖ Flow Direction Varies From NE Through the PRB in the Southerly Monitoring Area to SE (unaffected by PRB) in the Northerly Monitoring Area

Eldredge Parkway PRB Demonstration Project Status and Observations

- ❖ **Localized High Nitrate Concentrations Are Present in the Northerly Area**
- ❖ **High Nitrate Concentrations Potentially Associated with 1977 Middle School Septic Leach Field**
- ❖ **Well Screens**
 - A - Deep
 - B - Intermediate
 - C - Water Table



Eldredge Park Way PRB Demonstration Project Monitoring Well – Sampling and Analysis

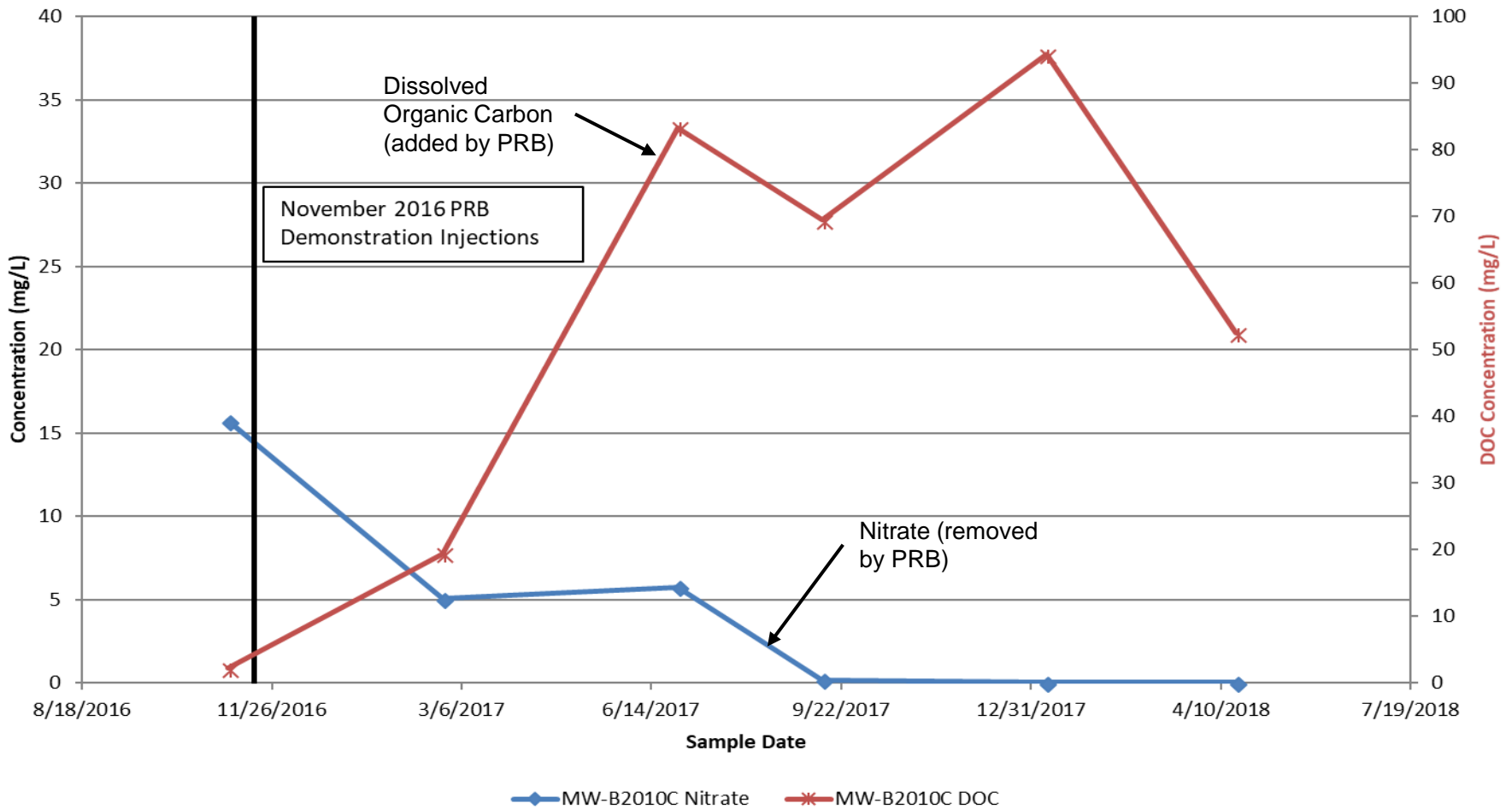


Eldredge Park Way PRB Demonstration Project Monitoring Well – Sampling and Analysis



Chart 2

Nitrate and DOC Concentrations at Eldredge Park Way PRB Demonstration MW-B2010C



Eldredge Park Way PRB Demonstration Project Monitoring Well – Sampling and Analysis

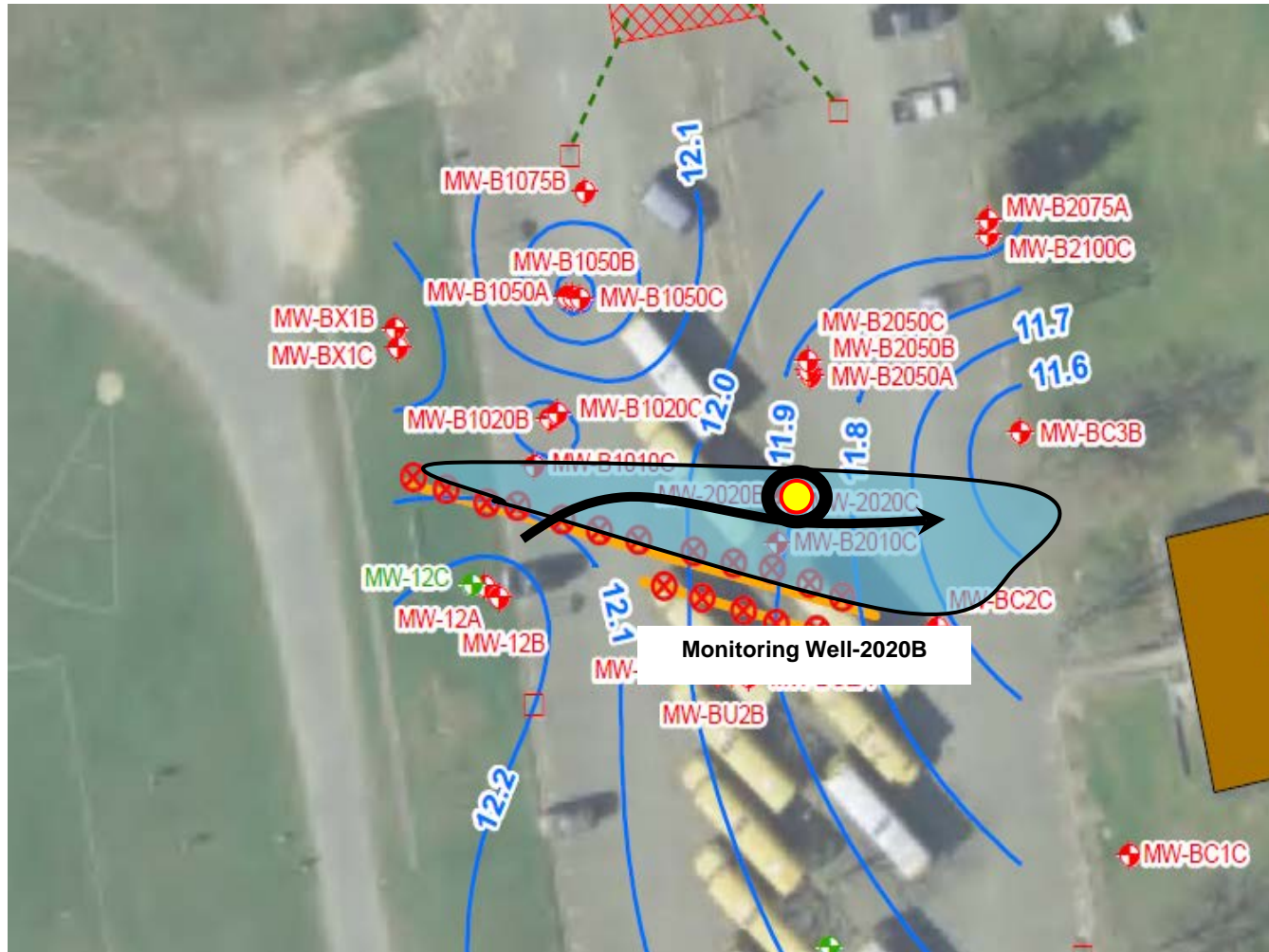
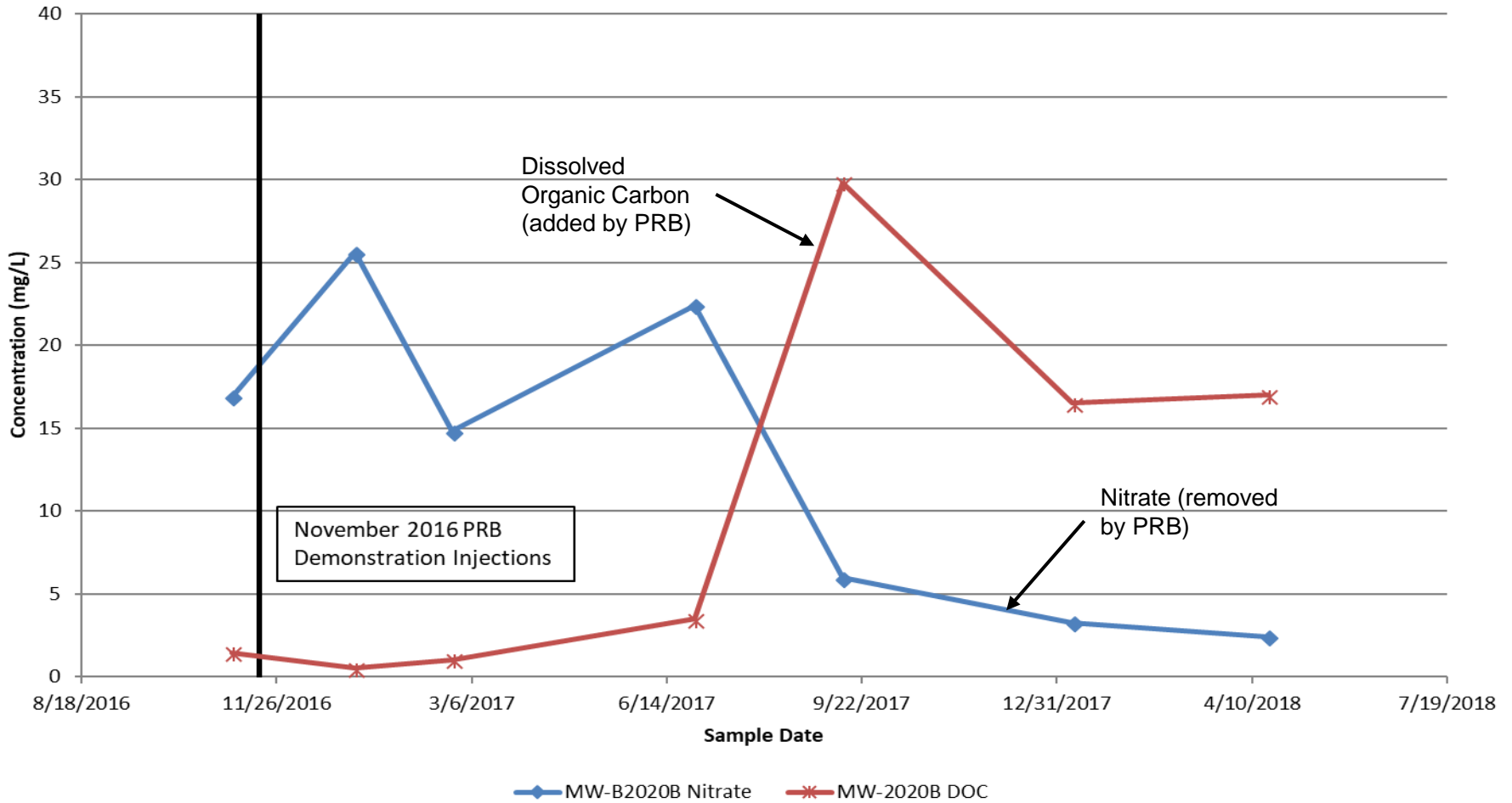


Chart 5 Nitrate and DOC Concentrations at Eldredge Park Way PRB Demonstration MW-B2020B



Eldredge Park Way PRB Demonstration Project Monitoring Well – Sampling and Analysis

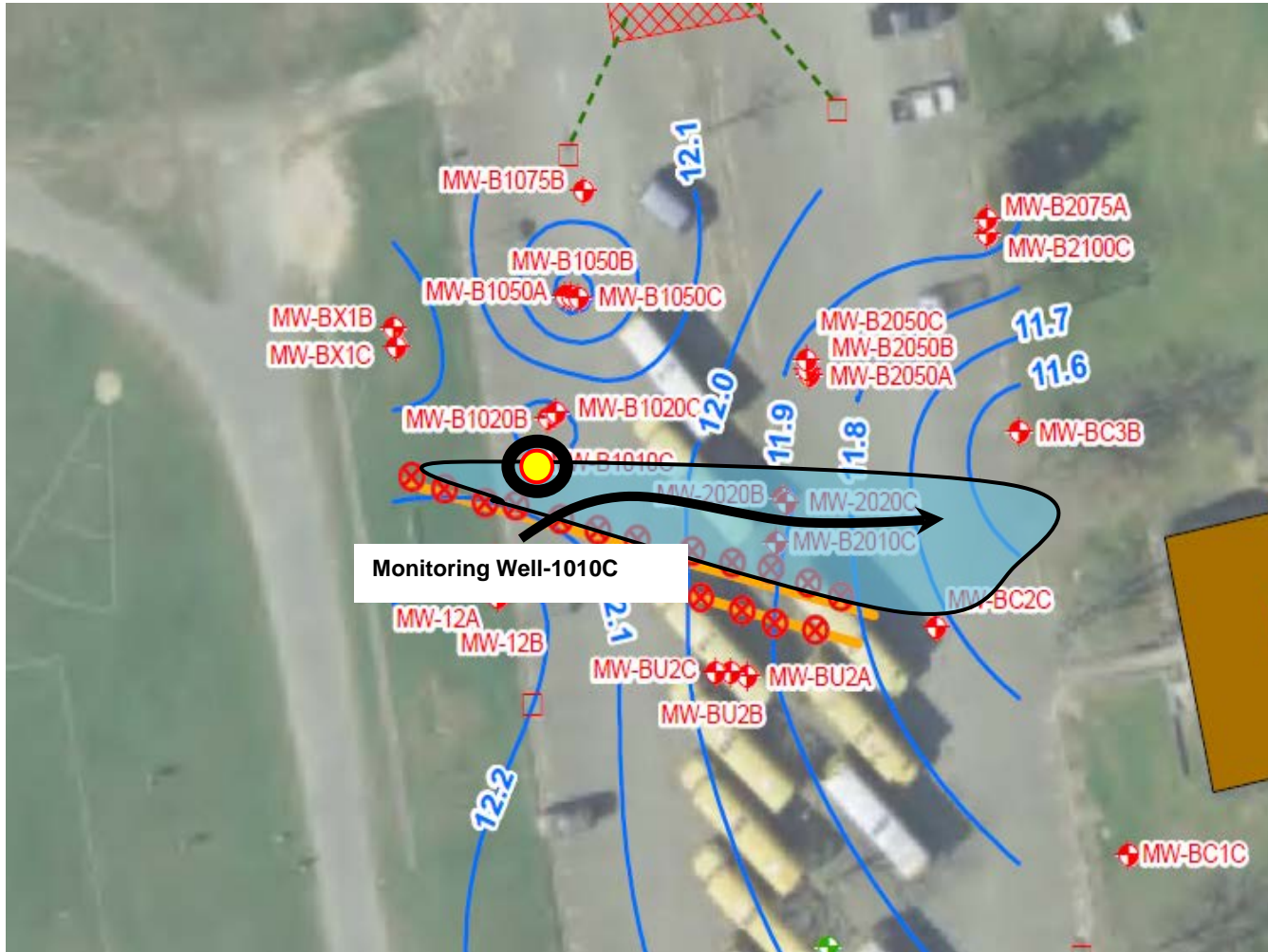
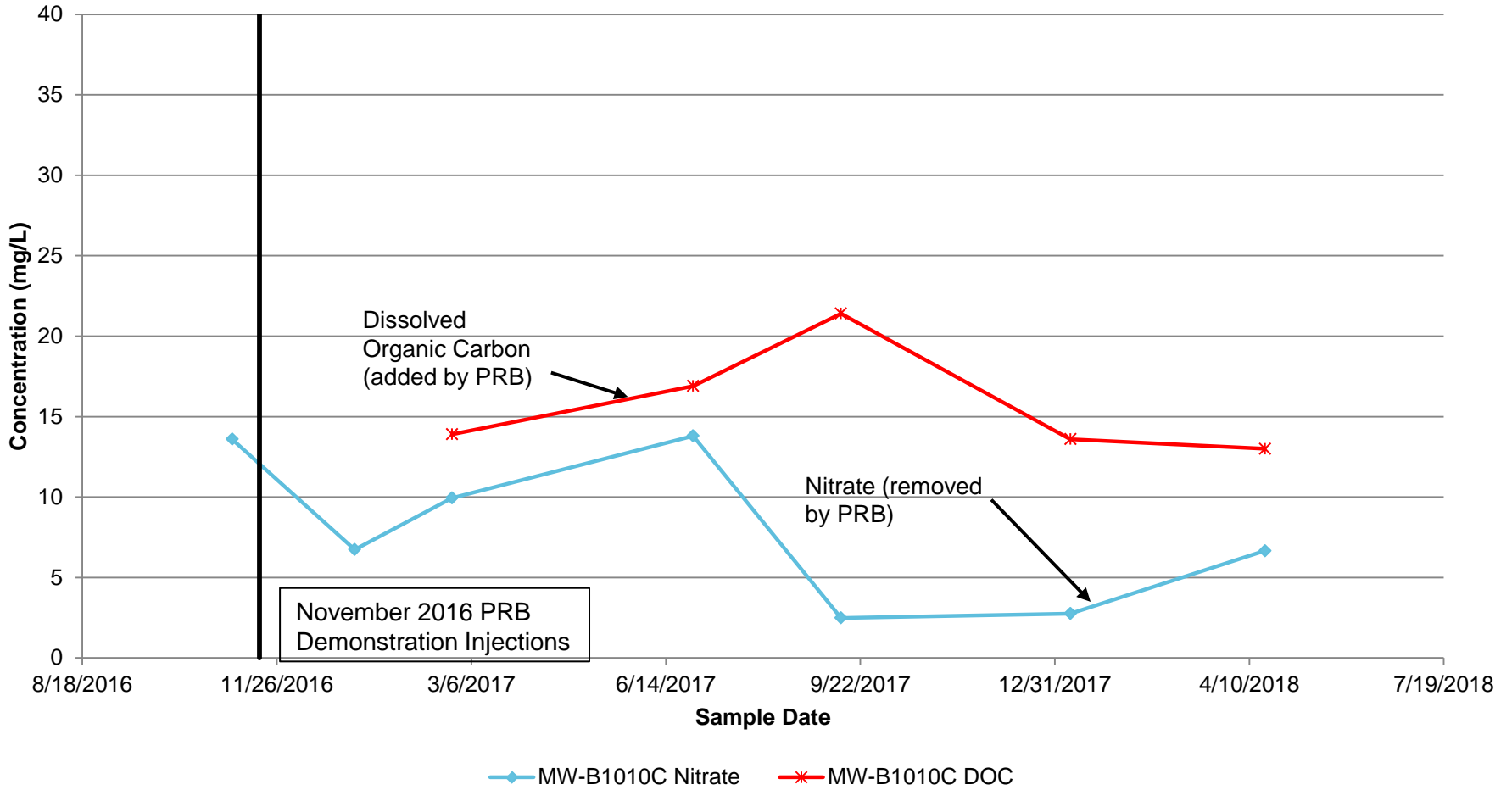


Chart 1

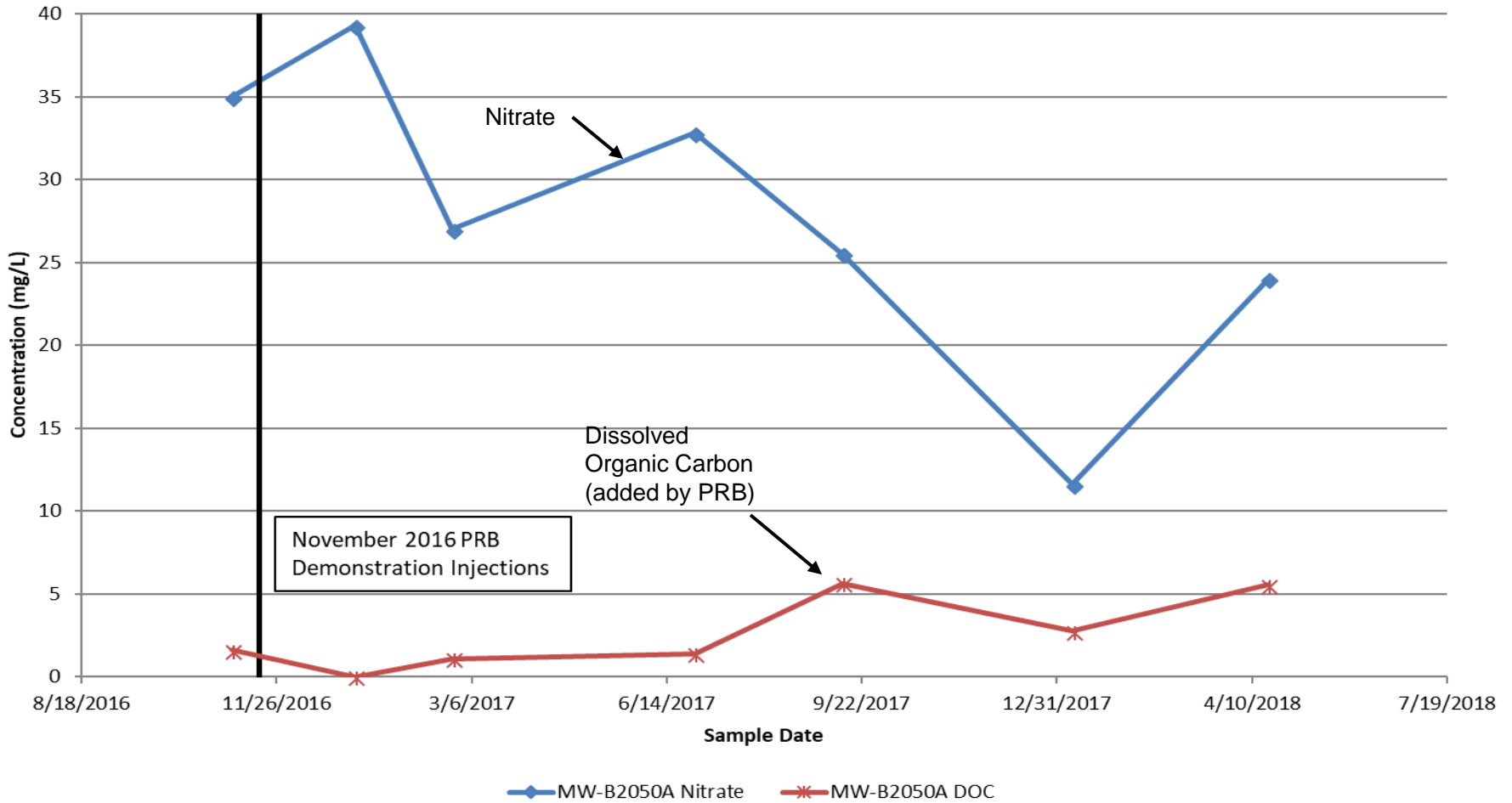
Nitrate and DOC Concentrations at Eldredge Park Way PRB Demonstration MW-B1010C



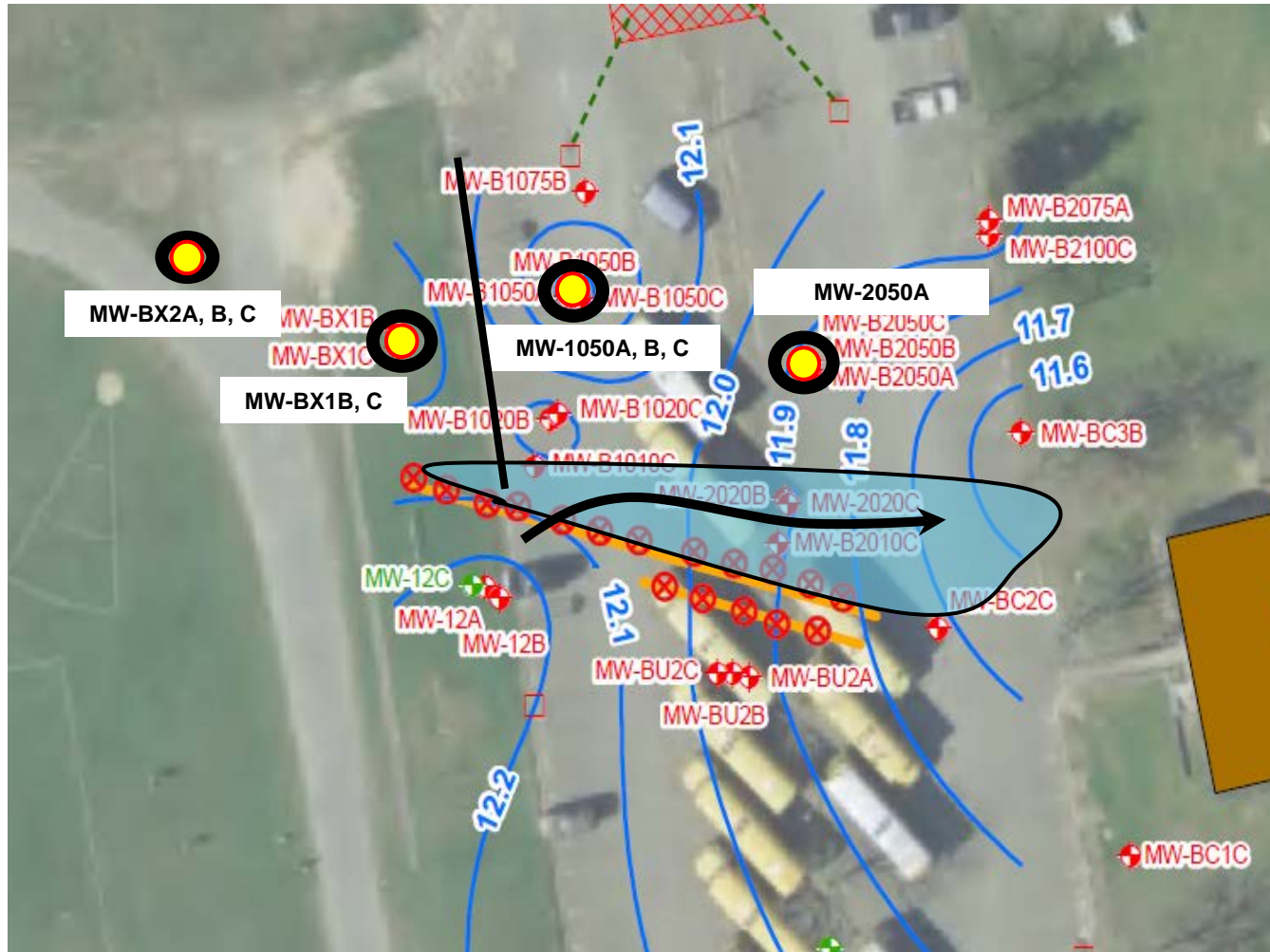
Eldredge Park Way PRB Demonstration Project Monitoring Well – Sampling and Analysis



Chart 8 Nitrate and DOC Concentrations at Eldredge Park Way PRB Demonstration MW-B2050A



Eldredge Park Way PRB Demonstration Project Added Monitoring Wells and PRB Expansion



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Water Quality and Wastewater Planning Program Status Update

Downtown Area Wastewater Infrastructure



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Downtown Area Wastewater Infrastructure Wastewater Treatment Facility Summary

❖ **Wastewater Flow**

- Existing Flow Estimated At 140,000 GPD
- Future Flow Estimated At 234,000 GPD

❖ **Septage Receiving and Processing at 16,000 GPD**

❖ **Biological Process - Sequence Batch Reactors (SBR)**

❖ **Effluent Disposal System**

- Wick Wells
- 32 Lots Hollow Road

❖ **Acceptance of Wastewater Flows from Meetinghouse Pond Area**



Downtown Area Wastewater Infrastructure Collection System Summary






- ❖ **30,000 LF of Gravity Sewers (8 to 12-inch)**
- ❖ **10,000 LF of Low Pressure Sewers (1.5 to 2.5-inch)**
- ❖ **7,500 LF of Force Mains (6 to 8-inch)**
- ❖ **3 Pumping Stations**
- ❖ **Connections**
 - 330 Parcels
 - 1,087 Users
- ❖ **Wastewater Flow**
 - Existing Flow Estimated At 140,000 GPD
 - Future Flow Estimated At 234,000 GPD




Town of Orleans, MA
Water Quality and Wastewater Planning Services

**Downtown
Proposed Collection System Layout**

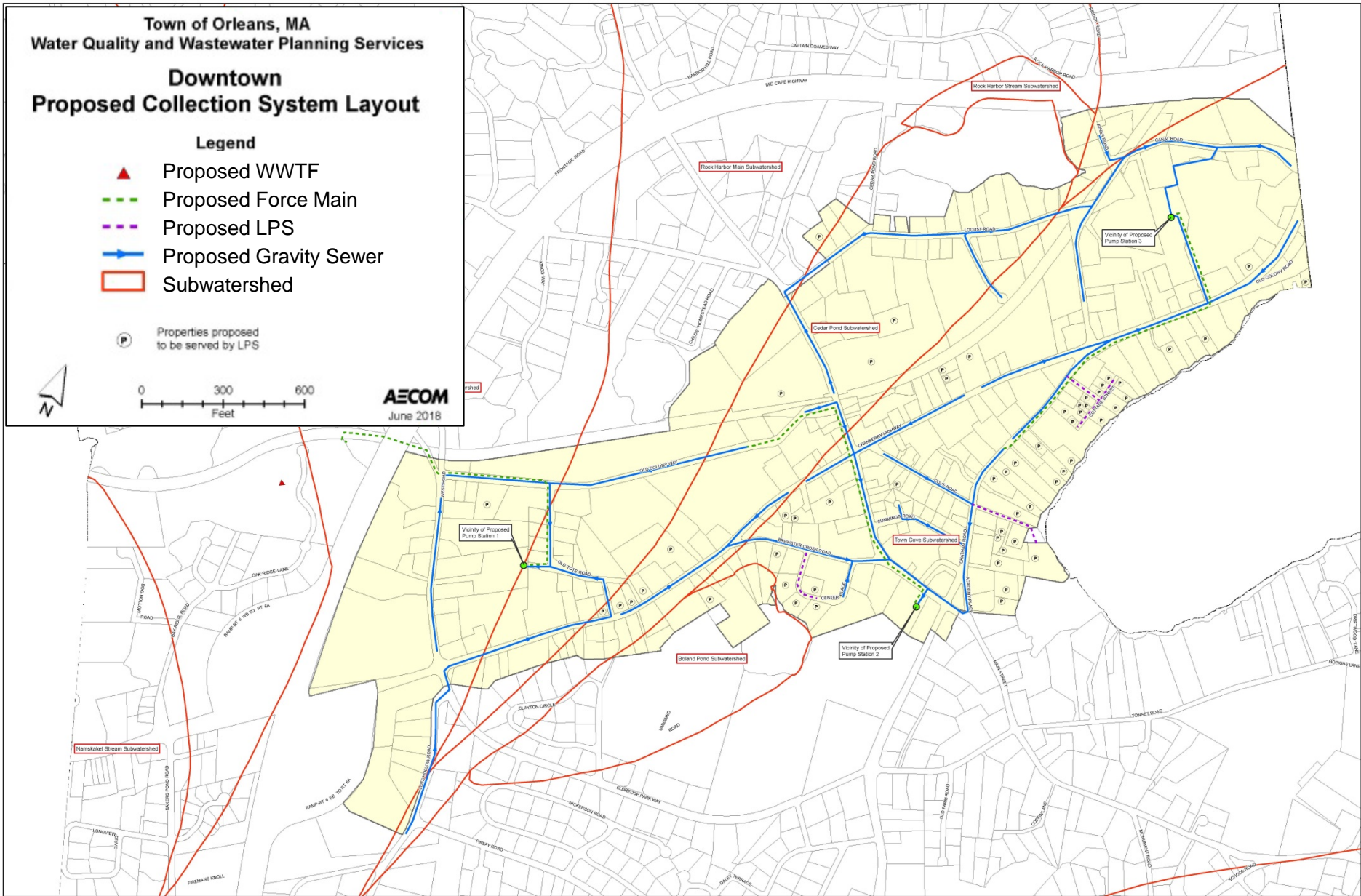
Legend

-  Proposed WWTF
-  Proposed Force Main
-  Proposed LPS
-  Proposed Gravity Sewer
-  Subwatershed

 Properties proposed to be served by LPS



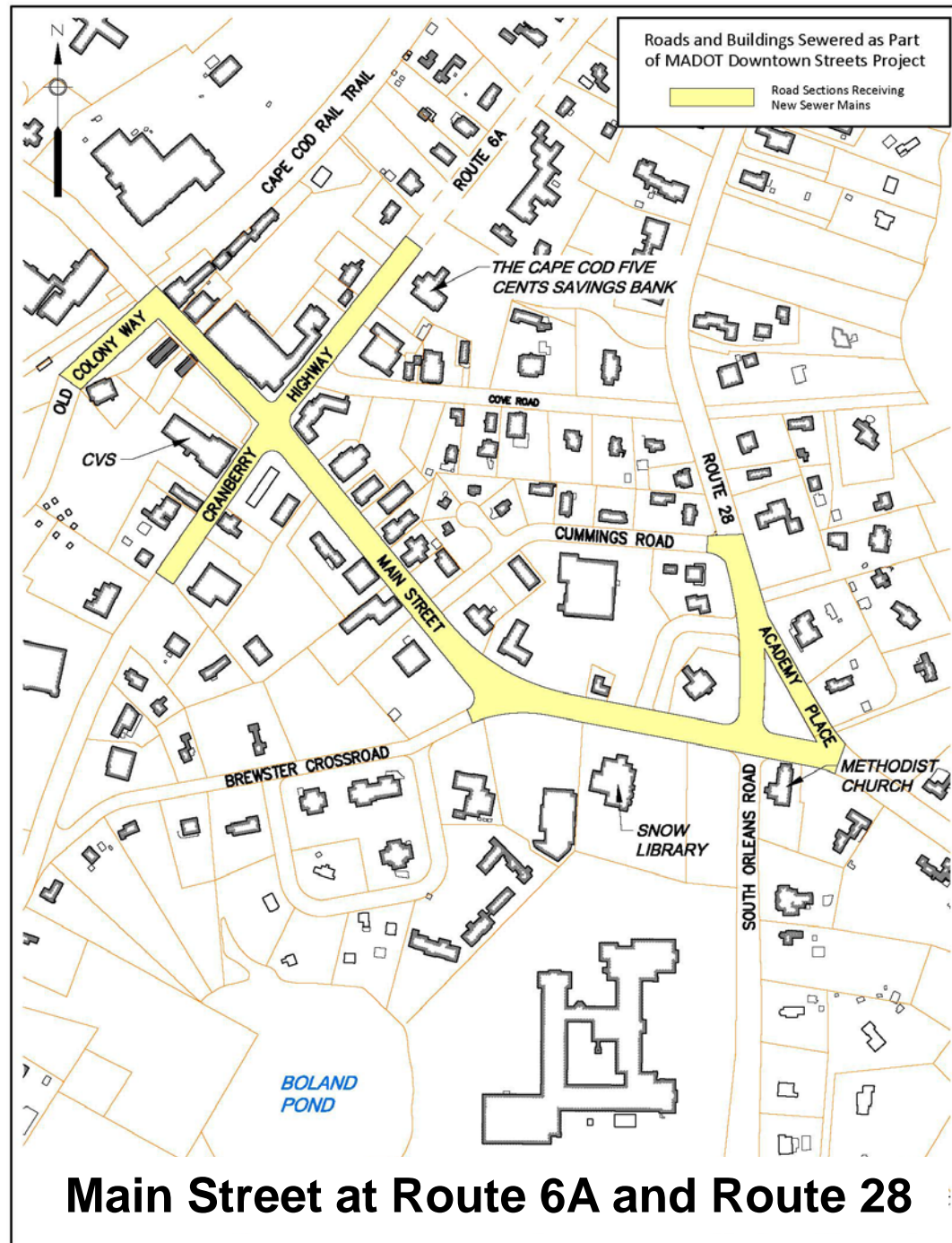
AECOM
June 2018



Downtown Area Wastewater Infrastructure

- ❖ All Infrastructure Completed
- ❖ Roadway Restoration to be Completed
- ❖ Cost Components
 - Construction
 - Engineering
 - Police Details

Town Meeting Funding	Expenditures To Date	Estimate to Complete
\$3,699,600	\$2,800,000	\$400,000



Downtown Area Wastewater Infrastructure Meetinghouse Pond Area Impact Analysis

❖ Wastewater Flow

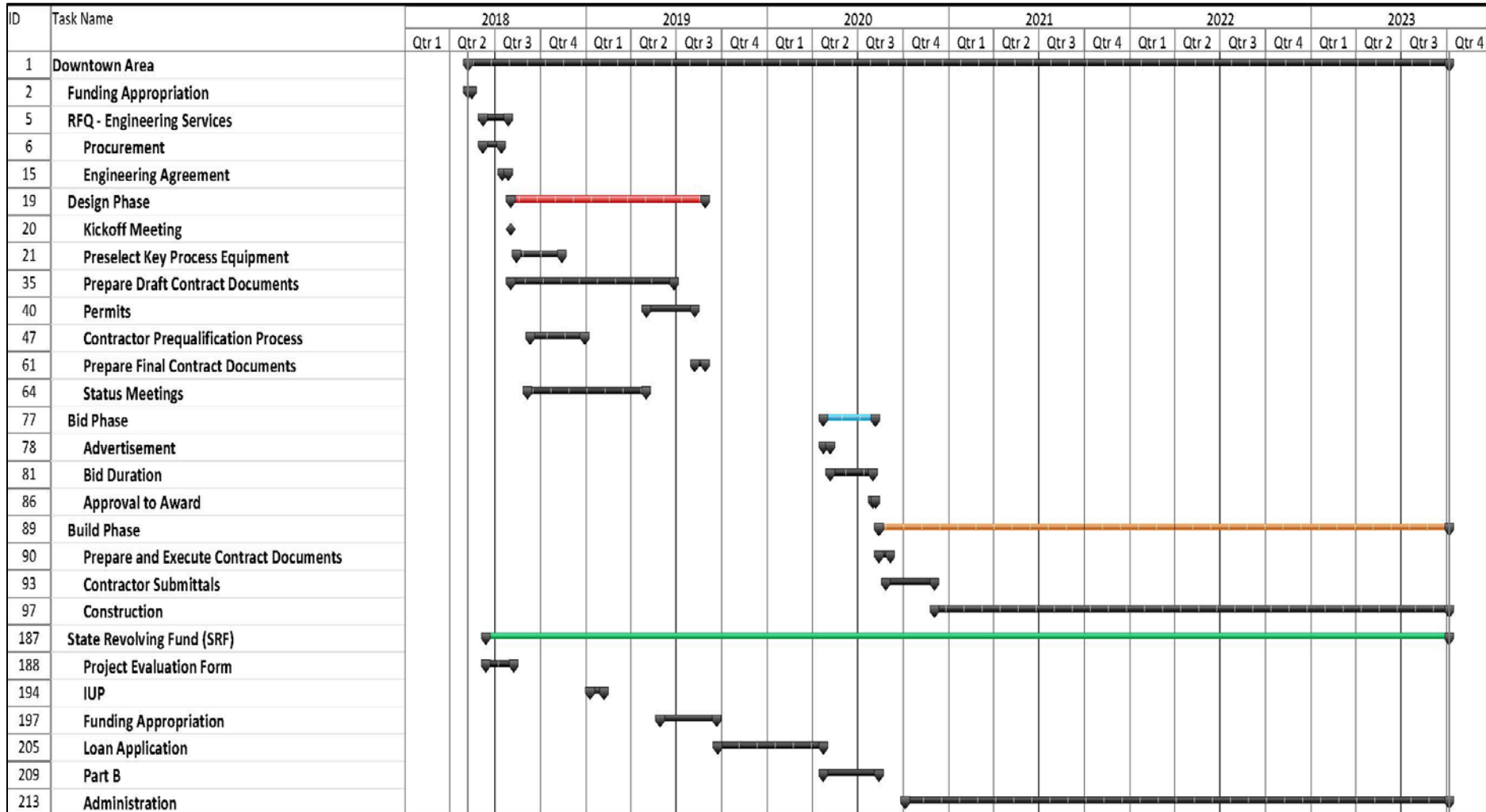
- Existing Flow Estimated At 80,000 GPD
- Future Flow Estimated At 105,000 GPD

❖ Potential Connection Points

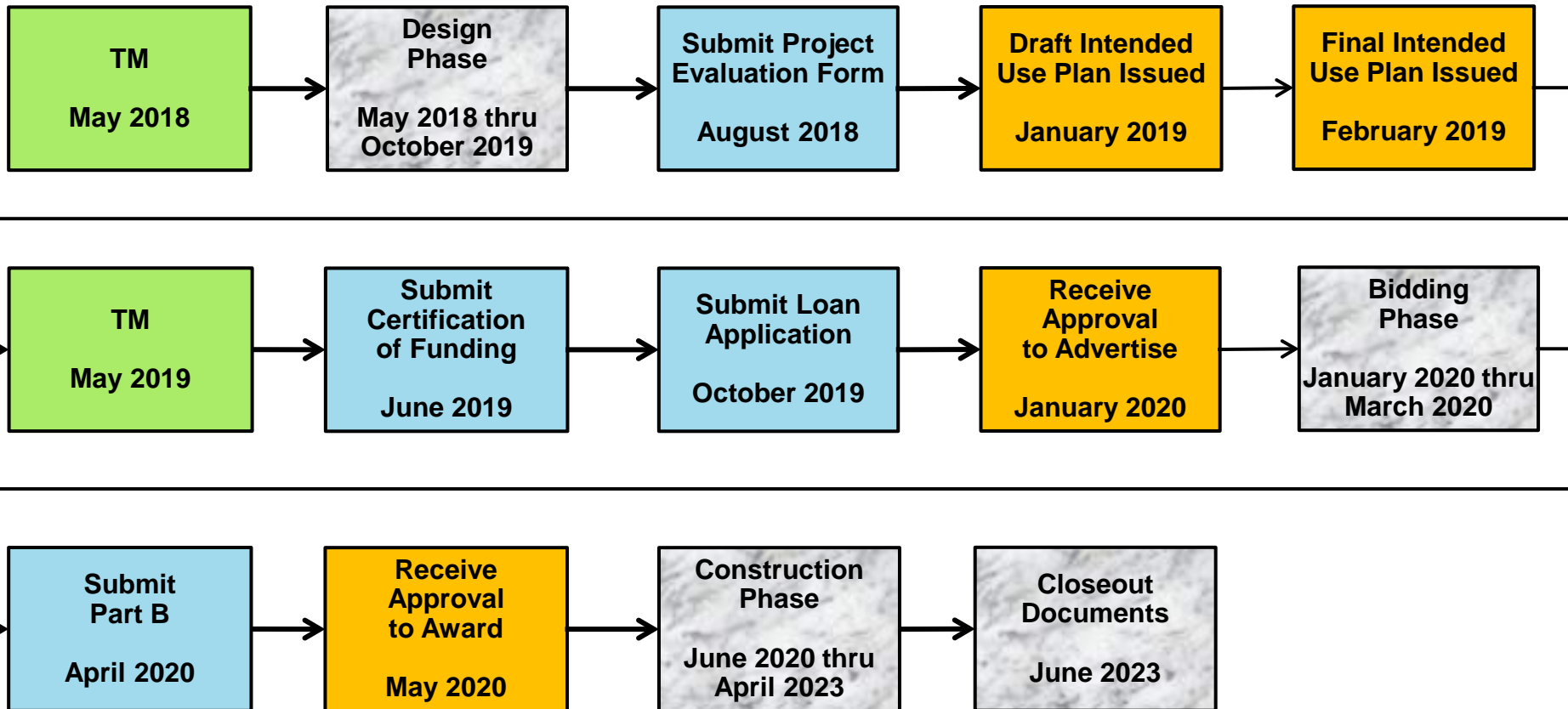
- Main Street and Academy Place
- Lots Hollow Road and Finlay Road
- Wastewater Treatment Facility



Downtown Area Wastewater Infrastructure Project Schedule



Downtown Area Wastewater Infrastructure State Revolving Fund (SRF) Loan Program Schedule



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Financial Planning



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Downtown Area Wastewater Infrastructure Draft Betterment Bylaw Undergoing Modifications

- ❖ **Downtown Area Being Split from Meetinghouse Pond Area**
- ❖ **Testing new Sewer Unit Calculations**
 - Property Valuations
 - Water Usage
 - Building Square Footage



Downtown Area Wastewater Infrastructure

Recent Headlines

- ❖ **Betterment Fee Formula Still a Work in Progress**
- ❖ **BOS: WWTF will Take Pumped Septage**
- ❖ **Watershed Moment**
 - Lawmakers OK Tax on Short-term Rentals
 - Baker Sends Airbnb Bill Back to Legislature
 - Long-term Benefit
 - Legislature Should Salvage Short-term Rental Tax Bill



Lonnies' Pond Oyster Demonstration Project Project Team

❖ **Town of Orleans, MA**

- Board of Selectman
- Public Works & Natural Resources
- Shellfish and Waterways Improvement Advisory Committee
- Orleans Water Quality Advisory Panel
- Water Resources Associates

❖ **AECOM Technical Services, Inc.**

- Science Wears, Inc.
- MT Environmental Restoration

❖ **UMass Dartmouth School for Marine Science and Technology (SMAST)**



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Thank You

Alan McClennen, Selectman, Town of Orleans, MA
alanmcclennen@gmail.com

Thomas Parece, P.E., AECOM Technical Services, Inc.
tom.parece@aecom.com



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