Orleans Water Quality Advisory Panel

Water Quality and Wastewater Planning

Program Status Update

April 12, 2017

Agenda

- Approval of Meeting Minutes of March 15, 2017
- Public Comment
- Tri-Town Septage Treatment Facility Demolition Status
- Non-Traditional Technology Demonstration Project Update
- Downtown Area PDR (25% Design) – Update

  BREAK
- Design/Build/Operate Delivery Options Update
- Financial Analysis Update - Cost Allocation
- Freshwater Ponds Planning Update
- FY18 Wastewater Warrant Budgets and Priorities
- Other Items and Public Comment

Town of Orleans Massachusetts

Tri-Town Septage Treatment Facility Demolition

Tri-Town Septage Treatment Facility Demolition Status
FY18 Town Meeting Cost Allocation by Town

- **FY18 Appropriation = $2,262,400**
- **Schedule**
  - Town Meeting Appropriations (Brewster, Eastham & Orleans) – May 2017
  - Demolition – September 2017 thru April 2018

Item	Orleans	Brewster	Eastham
Septage Treatment Facility	$696,800	$696,800	$696,800
Compost Shelter	$172,000	$0	$0
Totals	$868,800	$696,800	$696,800

Town of Orleans Massachusetts

Non-Traditional Technology Demonstration Projects Update

Non-Traditional Technologies
Shellfish/Aquaculture

- **Focus on Town-wide Shellfish Management Plan**
  - Lonnies Pond
  - Kent's Point
  - Existing Grant Expansion
  - Town Cove
- **Shellfish and Waterways Improvement Advisory Committee**

Non-Traditional Technologies (cont.)
Shellfish/Aquaculture

Lonnies Pond

- Year-2 Expansion Reduced
- Goals
  - Determine viable density of oysters per bag and bags per acre
  - Prove sustainability for 2nd year
  - Reduced denitrification focus
  - Develop watershed-wide plan including shellfish component but considering other technologies
- Prepare Year-2 Report

Kent's Point

- No Proposed Funding at May 2017 Town Meeting

Non-Traditional Technologies (cont.)
Shellfish/Aquaculture

Existing Grant Expansion

- Build on Interest and Capacity of Current Growers
- Develop Mechanisms for Providing Support
- Provide SMAST technical support as needed

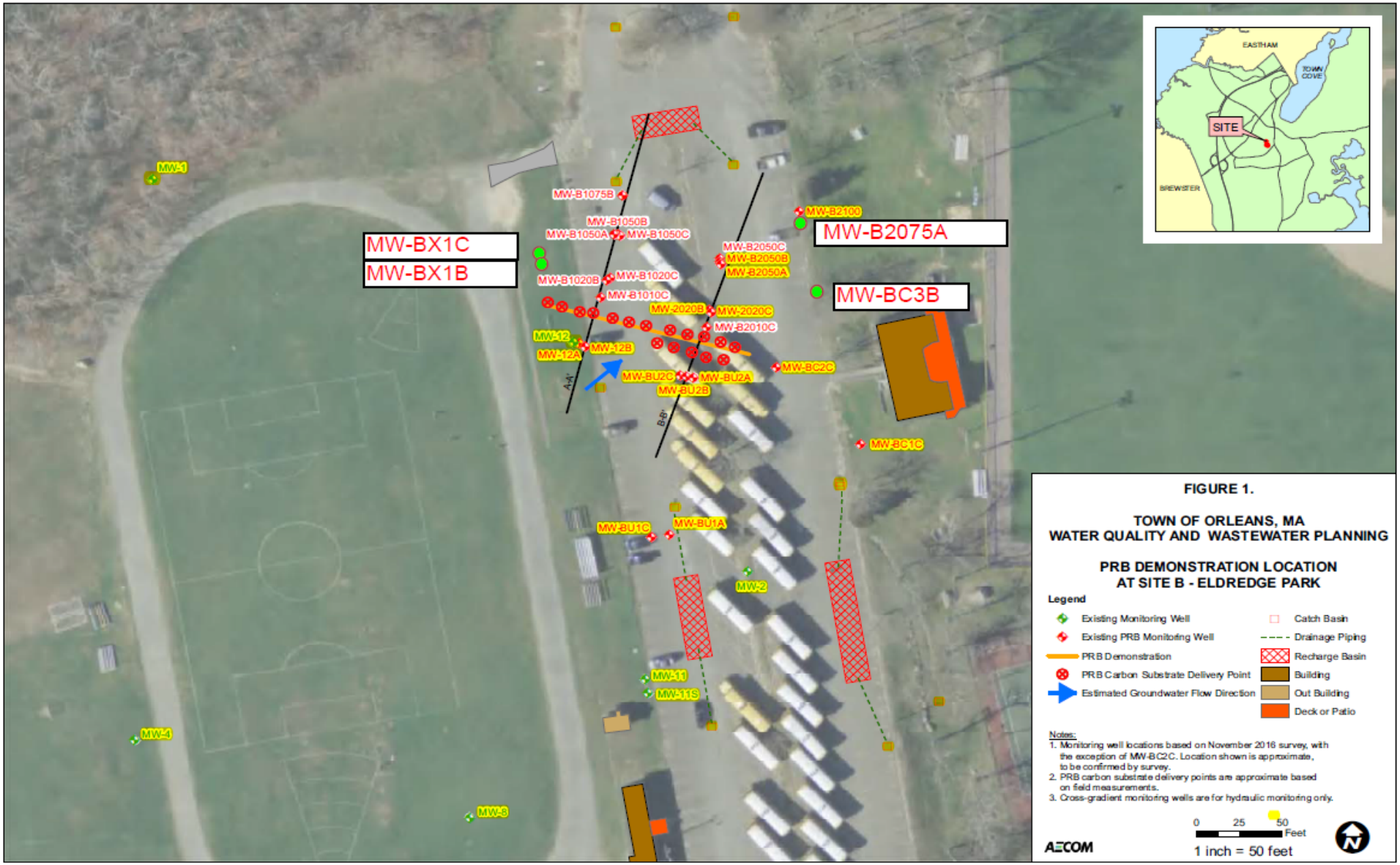
Town Cove

- Additional coordination & meetings with growers
- Develop Detailed Plan for Implementation in late Summer – early Fall
- SMAST will lead and provide technical support as needed

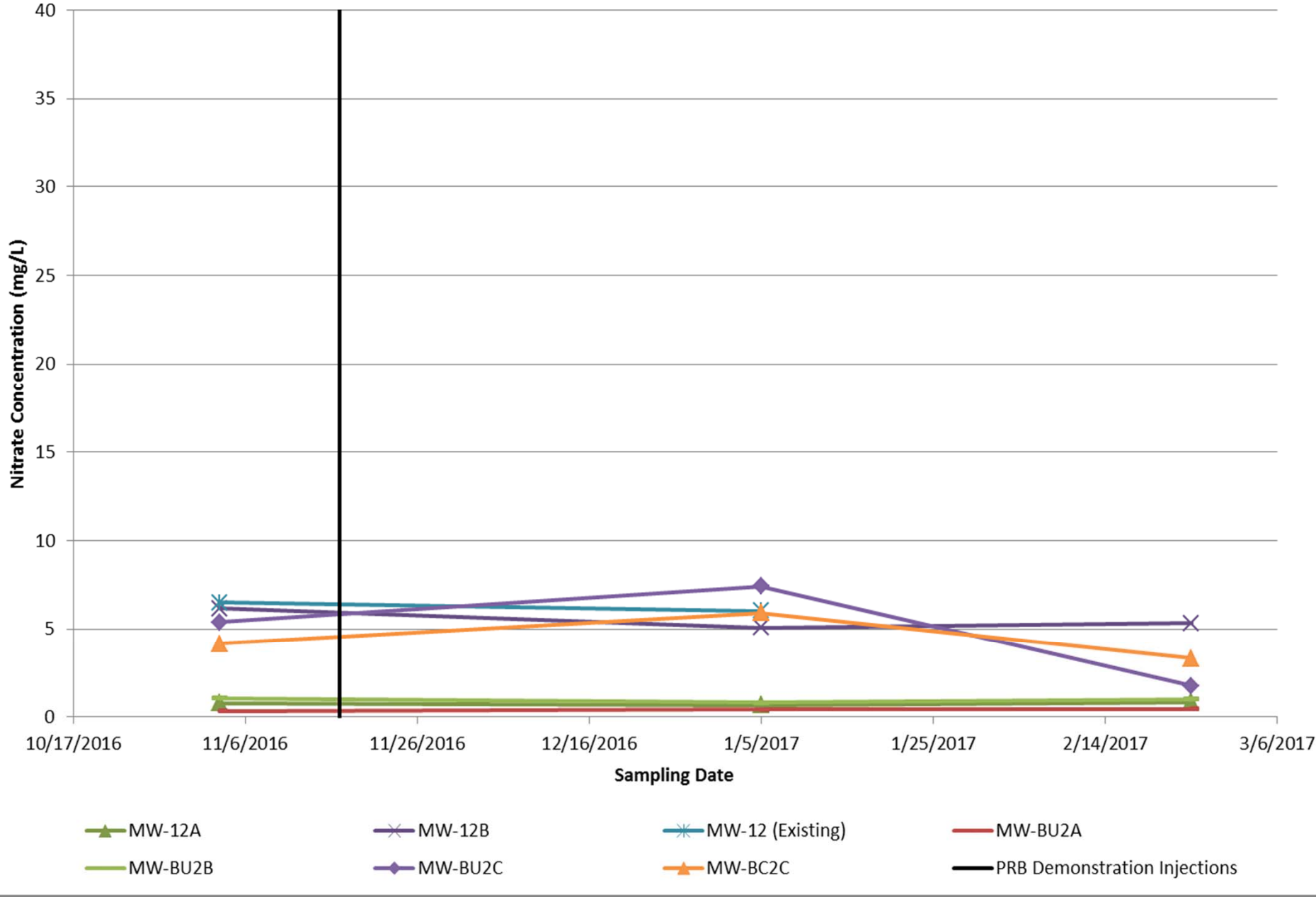
Non-Traditional Technologies (cont.)
Eldredge Park Way PRB

- **Conducted quarterly groundwater monitoring event on February 23 and 24, 2017**
  - Collected samples from 21 groundwater monitoring wells
  - Laboratory analyses included nitrogen, anions, and elements
- **Installed four additional groundwater monitoring wells in order to expand the range of monitoring and refine groundwater flow direction interpretation**

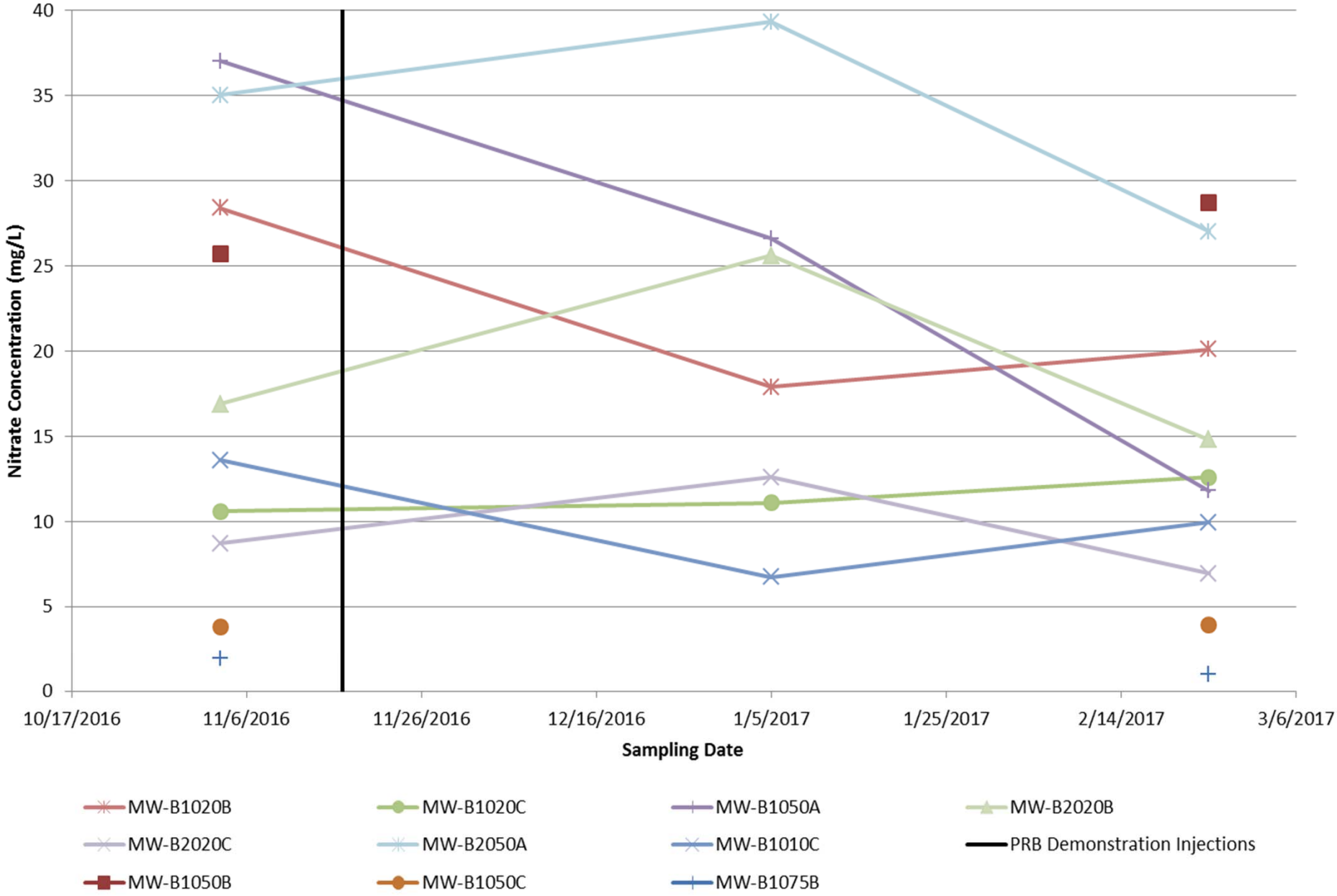
Non-Traditional Technologies (cont.)
Eldredge Park Way PRB – 4 new monitoring wells



Nitrate Concentrations at Eldredge Park Way PRB Demonstration
Upgradient and Cross-gradient Monitoring Wells

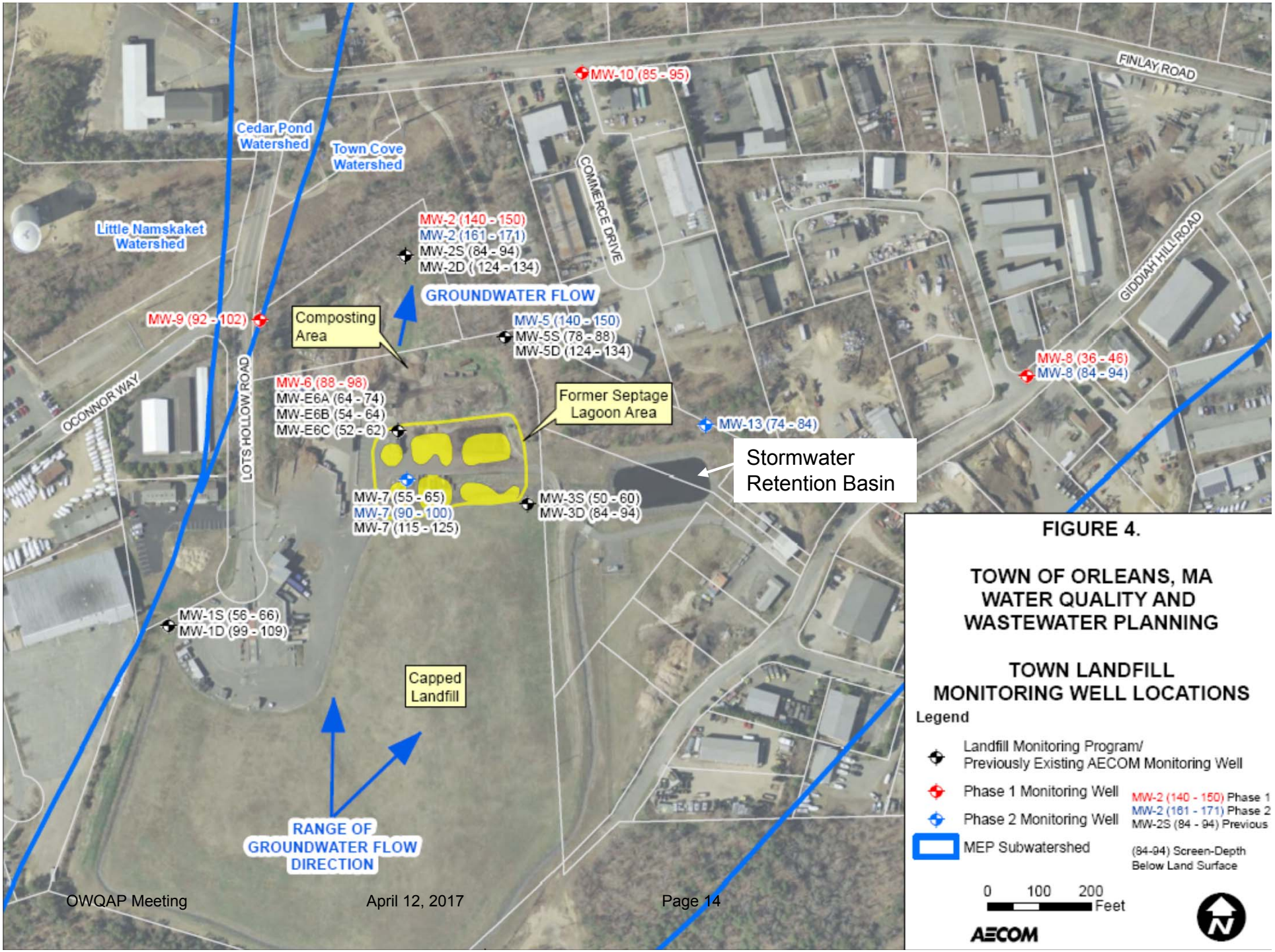


Nitrate Concentrations at Eldredge Park Way PRB Demonstration
Downgradient Monitoring Wells



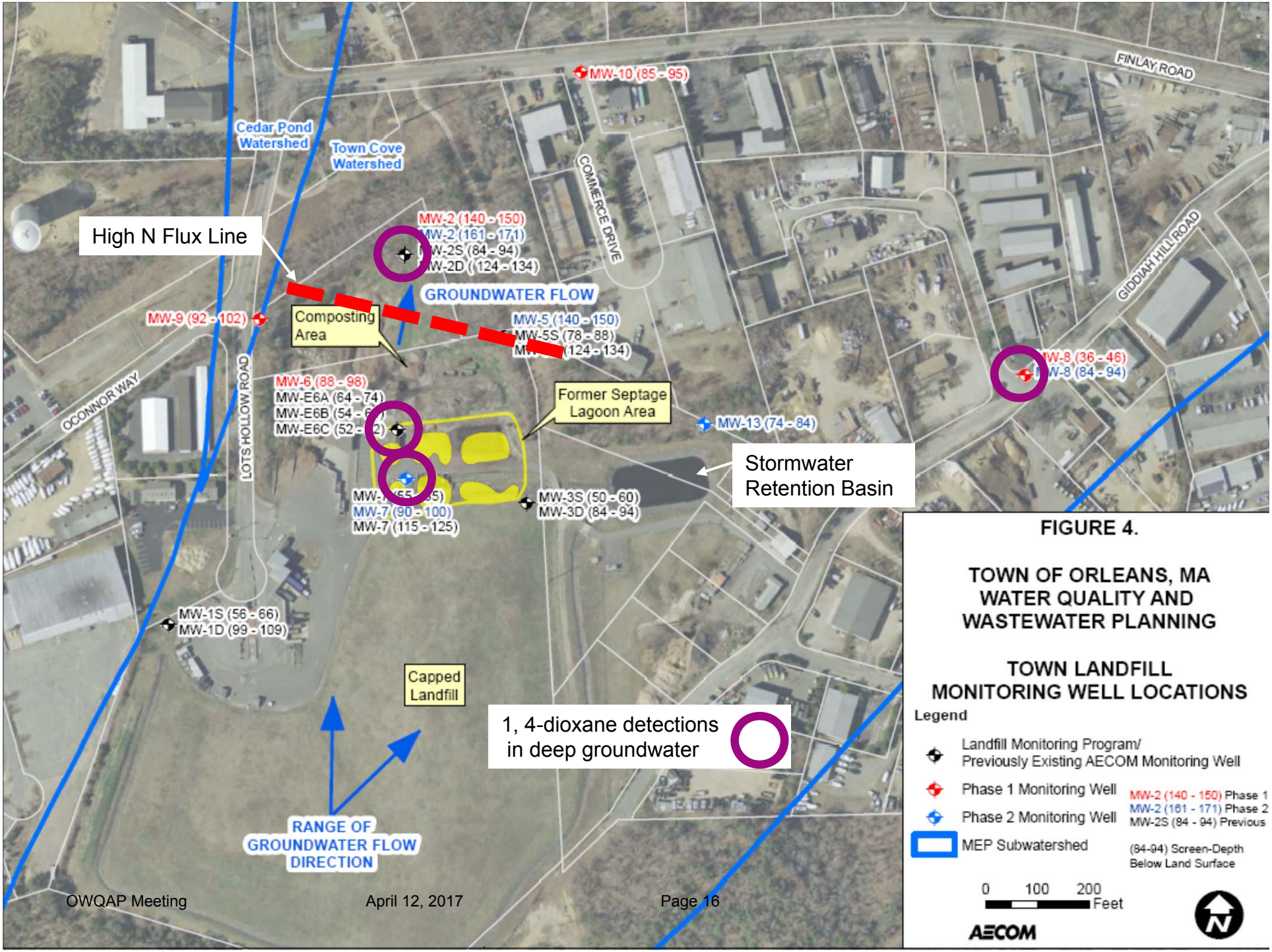
Non-Traditional Technologies (cont.)
Eldredge Park Way PRB - Next Steps

- **Evaluate PRB layout based on new data to determine if modifications required**
- **Continue monitoring Demonstration Test at Eldredge Park – FY 2017 through FY 2019**


MW-10 (85 - 95)
FINLAY ROAD
Cedar Pond Watershed
Town Cove Watershed
COMMERCE DRIVE
Little Namskaket Watershed
MW-2 (140 - 150)
MW-2 (161 - 171)
MW-2S (84 - 94)
MW-2D (124 - 134)
GROUNDWATER FLOW
GIDDIAH HILL ROAD
MW-9 (92 - 102)
Composting Area
MW-5 (140 - 150)
MW-5S (78 - 88)
MW-5D (124 - 134)
MW-8 (36 - 46)
MW-8 (84 - 94)
O'CONNOR WAY
LOTS HOLLOW ROAD
MW-6 (88 - 98)
MW-E6A (64 - 74)
MW-E6B (54 - 64)
MW-E6C (52 - 62)
Former Septage Lagoon Area
MW-13 (74 - 84)
Stormwater Retention Basin
MW-7 (55 - 65)
MW-7 (90 - 100)
MW-7 (115 - 125)
MW-3S (50 - 60)
MW-3D (84 - 94)
MW-1S (56 - 66)
MW-1D (99 - 109)
Capped Landfill
RANGE OF GROUNDWATER FLOW DIRECTION
FIGURE 4.
TOWN OF ORLEANS, MA
WATER QUALITY AND WASTEWATER PLANNING
TOWN LANDFILL MONITORING WELL LOCATIONS
Legend
Landfill Monitoring Program/ Previously Existing AECOM Monitoring Well
Phase 1 Monitoring Well
Phase 2 Monitoring Well
MEP Subwatershed
MW-2 (140 - 150) Phase 1
MW-2 (161 - 171) Phase 2
MW-2S (84 - 94) Previous
(84-94) Screen-Depth Below Land Surface
0 100 200 Feet
AECOM
N

Non-Traditional Technologies (cont.)
Town Landfill – Summary Results to Date

- **Groundwater impacted by a two layer plume:**
  - Nitrate nitrogen – water table to ~20 ft. below water table
  - Ammonia nitrogen and 1,4 dioxane ~20 ft. below water table to ~100 ft. below the water table
- **Sources identified:**
  - 1,4 dioxane (solid waste in landfill)
  - Nitrogen (solid waste, septage lagoons, surface runoff, composting)
- **Nitrogen flux highest in area west of the stormwater retention basin – lower nitrogen concentrations to the east**
- **1,4-dioxane detected in deep groundwater monitoring wells > 0.0003 mg/L standard across watershed area immediately downgradient of landfill**


High N Flux Line
Cedar Pond Watershed
Town Cove Watershed
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MW-E6A (64 - 74)
MW-E6B (54 - 6
MW-E6C (52 - 2)
Former Septage Lagoon Area
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Stormwater Retention Basin
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Capped Landfill
1, 4-dioxane detections in deep groundwater
RANGE OF GROUNDWATER FLOW DIRECTION
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Non-Traditional Technologies (cont.)
Town Landfill – Next Steps

- Implement Near-term remedial actions in cooperation with DPW
- Define work plan for additional wells and sampling to define plume
- Develop plume cross sections, velocity, concentrations
- Calibrate and develop groundwater model & mass balance to better define nitrogen flux
- Define, evaluate and screen alternatives based on range of criteria
- Recommend plan for implementation to Selectmen at Fall TM
- Depending on remedial plan and cost, complete design, permit, and implement Long-term corrective action in FY 2018

Non-Traditional Technologies (cont.)
Nitrogen Reducing Barriers

- **Identified Sites with BOH**
- **Responding to Questions from 1st Round of Letters Mailed to Property Owners**
- **2nd Round of Letters to be Mailed to Property Owners**
- **Based on Responses, Evaluate and Identify Four Sites for Implementation**
- **Working with County On-Site Test Center for Design and Monitoring Plans**

Town of Orleans Massachusetts

Downtown Area PDR (25% Design) Status

Downtown Area PDR (25% Design) – Status

- **Topographic Survey**
  - Ground and Aerial Survey – 95% Complete
  - Data Processing to be Completed by Mid-April 2017
- **Subsurface Investigation**
  - 125 Locations
    - 94% Complete (117 Borings)
    - Waiting for Private Property Approval in Order to Complete
  - Nothing Unexpected Observed/Discovered to Date
    - Groundwater: Locus Road and Canal Road Area
    - Bike Path (Old Railroad) Bed Material: Old Pavement

Downtown Area PDR (25% Design) – Status (cont.)

- **Cultural Resource Evaluation**
  - Received Draft Report from PAL
    - Not Recommending Conducting Any Intensive Level Testing
    - Recommending Development of an Unanticipated Discoveries Plan and Monitoring During Construction
  - Submitted Draft Technical Memorandum
- **Collection System Type Evaluation and Preliminary System Configuration**
  - Updated Profiles Showing Gravity Sewer and Pressure Sewer
  - Updated Quantities
  - Updating Costs

Downtown Area PDR (25% Design) – Status (cont.)

- **WWTF Process Selection**
  - Design
    - Sewage and Septage Receiving/Treatment using Either SBR or MBR
    - Includes Biosolids Thickening but Not Dewatering
  - Completed Preliminary Layouts and Profiles
  - Preparing Estimated Capital Cost for Both Options
  - Preparing Draft Technical Memorandum

Effluent Disposal Investigations

- **MassDEP Approved Hydrogeology Evaluations**
  - Orleans Market Place – 140,000 gpd
  - 223 Beach Road – 200,000 gpd
- **Ongoing / Planned Hydrogeology Evaluations**
  - Site 1/1A
  - Route 6 – Exit 12 Cloverleaf
  - 3rd Site Pending FY18 Town Meeting Funding
- **Ongoing Activities**
  - Completed Test Pits, Soil Borings, and Monitoring Well Installation
  - Conducting Sampling, Analysis and Modeling
  - Preparing Draft Technical Memorandum

Town of Orleans Massachusetts

Break

Town of Orleans Massachusetts

Design/Build/Operate Delivery Options Update

Design/Build/Operate Delivery Options Update

- **Special Legislation**
  - Drafted Special Legislation
  - Reviewed and Modified by Town Counsel
  - File Legislation Following Town Meeting Approval
- **Conduct Workshop with Board of Selectman and Town Counsel on Key Issues and Risks During Summer 2017 in Preparation for Fall Special Town Meeting**

Town of Orleans Massachusetts

Financial Analysis Update - Cost Allocation

Financial Analysis Update - Cost Allocation
New Scenario Assumptions – One Plant

- **Capital Costs- WWTF and Collection System**
  - Case 1 – 100% Tax Rate
  - Case 2 – 50% Tax Rate, 50% Downtown Area/MHP Special Assessment
  - Case 3 – 20% Tax Rate, 80% Downtown Area/MHP Special Assessment (Split 50% Downtown Non-residential, 30% Downtown Residential/MHP)
- **Capital Costs Effluent Disposal and NT - 100% Tax rate**
- **O&M&R&M - 100% User Fees**
- **Financing**
  - 30-year 0% SRF
  - 10% Grant
  - Additional 5% Local Tax Option
  - Septage Revenue ($584,000 annually)
  - 15% Contingency for Capital/ Replacement Costs
- **Non-traditional and Septic Only costs do not include individual owner costs to pump and maintain on-site septic systems**

Financial Analysis Update - Cost Allocation
Setting Minimum and Maximum Costs Methodology

- **Apply Maximum Annual Cost**
- **Apply Minimum* Annual Cost**
- **Re-allocate* the difference of costs Town-wide**

*Excludes undevelopable parcels

		Case 1 100% Tax Rate	Case 2 50% Tax Rate, 50% Special Assessment	Case 3 20% Tax Rate, 80% Special Assessment (50% Downtown Non-Residential, 30% Downtown Residential/ Meetinghouse Pond)
Number owners with annual cost above:	$7,000	30	52	66
Total costs owed by owners with costs above maximum:		$ 420,464	$ 765,052	$ 1,182,348
Balance to cover if they only pay the maximum:		$ 210,464	$ 401,052	$ 720,348
Number of Owners to Increase to Minimum:	$300	1199	1547	1998
Surplus after minnimum charge applied:		$ 166,946	$ 224,930	$ 306,879
Net amount remaining to allocate:		$ 43,518	$ 176,122	$ 413,469
Number of Owners to allocate to:		6,398	6,398	6,398
Additional cost allocated per owner:		$ 7	$ 28	$ 65

Total Owners/Users Town-Wide:	6,559
Total number of owners/users with undevelopable land:	161

Financial Analysis Update - Cost Allocation Summary – Annual Costs (Year 20)

							Case 1		Case 2		Case 3	
							100% Tax Rate		50% Tax Rate, 50% Special Assessment		20% Tax Rate, 80% Special Assessment (50% Downtown Non-Residential, 30% Downtown Residential/ Meetinghouse Pond)	
	Area of Orleans	**Type of Wastewater Service[1]**	**Number of Users in Category**	**Average Wastewater (gpd)[4]**	**Average Assessed Value[5]**	**Cost Description[7]**	**Total Average Annual Charges (Year 20)**	**Range of Total Annual Charges (Year 20)[8, 9]**	**Total Average Annual Charges (Year 20)**	**Range of Total Annual Charges (Year 20)[8, 9]**	**Total Average Annual Charges (Year 20)**	**Range of Total Annual Charges (Year 20)[8, 9]**
Sewered Areas	**Sewered Area** Downtown Non-Residential	Sewers &WWTF	384	235	$505,512	*Former Scenario Runs*	*$1,550*	*$0 - $35,544*	*$2,494*	*$0 - $55,128*	*$3,737*	*$0 - $81,405*
						New Scenario Runs	$1,285	*$307* - $7,007	$1,727	*$307* - $7,028	$2,148	*$307* - $7,065
	Downtown Residential/Meetinghouse Pond		1,176	95	$330,644	*Former Scenario Runs*	*$722*	*$0 - $10,657*	*$1,072*	*$0 - $19,079*	*$1,056*	*$0 - $19,607*
						New Scenario Runs	$738	*$307* - $7,007	$1,091	*$307* - $7,028	$1,114	*$307* - $7,065
Unsewered Areas	**Nitrogen Sensitive Areas** Non-Traditional Areas	NT Technology or I/A System	4,208	118	$533,329	*Former Scenario Runs*	*$928*	*$0 - $36,577*	*$755*	*$0 - $36,432*	*$644*	*$0 - $36,339*
						New Scenario Runs	$939	$307 - $7,007	$801	$307 - $7,028	$739	$307 - $7,065
	Non-Nitrogen Sensitive Areas Septic Only	Title 5 On-Site System	791	130	$643,889	*Former Scenario Runs*	*$476*	*$0 - $12,791*	*$317*	*$0 - $8,524*	*$216*	*$0 - $5,790*
						New Scenario Runs	$518	$307 - $7,007	$418	$307 - $7,028	$397	$307 - $5,855

Notes

1. NT Technology = Shellfish, PRB, NRB or On-site I/A System
2. The WWTF will be implemented in phases and therefore users do not pay user charges or special assessments until their phase is implemented. All costs shown here represent "Year 20" when everyone will be connected and paying user charges.
3. Wastewater flows were determined as 95% of the average 2014-2015 water usage data.
4. Assessed values based on FY 2015 assessor's data.
5. Special Assessments are applied to applicable user groups (Downtown and Meetinghouse Pond).
6. Non-residential categories include all parcels that are not 100% residential, such as mixed use, conservation, developable, etc.
7. "Former Scenario Runs" (as determined by the Financial Model) are shown in italics.
8. Maximum and minimum total annual costs were applied, Town-wide. The minimum charge was not applied to the 161 undevelopable parcels. The cost differential was allocated equally Town-wide (with the exception of the 161 undevelopable parcels).
9. The minimum shown for the re-allocated costs does not include undevelopable parcels, which may have an annual cost less than the minimum charge.
   Minimum: $300 Maximum: $7,000

Financial Analysis Update - Cost Allocation
Next Steps

- **Continue to Refine a Limited Number of Scenarios**
- **Follow-up Meetings and Review with Downtown Business Owners and Finance Committee**
- **Follow-up with BOS During Summer 2017 in Preparation for Fall Special Town Meeting**

Town of Orleans Massachusetts

Freshwater Ponds Planning Update

Freshwater Ponds Planning Update

- **Presentations and plans for integrating Town stormwater management information into the ponds management plans**
- **Prioritized Uncle Harvey's Pond for remedial plan, including implementation**
- **Plan to do pre-planning work on Pilgrim Lake**
- **SMAST has provided work plan and draft budgets for FY2018 Warrant Article**

Town of Orleans Massachusetts

FY18 Wastewater Warrant Budgets and Priorities

FY18 Wastewater Warrant Article Budget and Priorities Summary

Task	Description	Amount
1	Continued Planning and Engineering	$2,956,560
2	Adaptive Management Implementation	$416,000
3	Program Management, Financial Planning and Regulatory Coordination	$361,100
	Total	$3,733,660

FY18 Wastewater Warrant Article Budget and Priorities
Continued Planning and Engineering

Task	Description	Amount
1a	Effluent Disposal ● Hydrogeologic Evaluation At One Discharge Site	$301,700
1b	NT Technologies - Demonstration Project Planning and Pre-Design, Final Design and Implementation	
	● Aquaculture – (a) O&M and Monitoring at Lonnies Pond (b) Grant Expansion Planning for Future Implementation; and (c) Town Cove Planning for Future Implementation	$225,160
	● PRB – (a) Expansion and Monitoring at Eldredge Park and (b) Planning and Short-Term Design and Implementation of Landfill Nitrogen Response Action	$1,308,400
	● NRB - Monitoring at 4 Private Property Sites	$43,700

FY18 Wastewater Warrant Article Budget and Priorities
Continued Planning and Engineering (cont.)

Task	Description	Amount
1c	Design and Construction - Collection and WWTF	
	● PDR - Meetinghouse Pond Area (Collection - PDR Design 25%)	$583,400
	● MassDOT - State Intersection Projects (Lawrence Lynch) - 4 Sleeve Locations	$263,400
1d	Design and Construction - NT Technologies	$0
1e	Tri-Town Transition Requirements - Separate Funding Article(s)	$0

FY18 Wastewater Warrant Article Budget and Priorities
Continued Planning and Engineering (cont.)

Task	Description	Amount
1f	Regulatory Coordination ● Coordination at Project Level	$15,800
1g	Meetinghouse Pond Utility Survey ● Field Survey - Utilities and Wetlands	$147,500
1h	Update of Amended CWMP	$67,500

FY18 Wastewater Warrant Article Budget and Priorities
Adaptive Management Implementation

Task	Description	Amount
2a	Water Quality Monitoring: MEP compliance ● Allowance for NT Project Performance	$24,800
2b	Water Quality Monitoring: Project Baselines ● Allowance for NT Project Performance	$70,800
2c	MEP Study & Report Updates	$24,800
2d	Namskaket and Little Namskaket Adaptive Plans	$0
2e	Stormwater and Fertilizer Management ● Separate Funding Article(s)	$0
2f	Cedar Pond and Rock Harbor Creek ● Allowance for Planning	$79,800
2g	Fresh Water Ponds ● Allowance for Planning, Design and Implementation	$215,800

FY18 Wastewater Warrant Article Budget and Priorities Program Management, Financial Planning and Regulatory Coordination

Task	Description	Amount
3a	Technical Oversight & Projects Management	$104,400
3b	Public Engagement Coordination ● OWQAP Meetings ● OWQAP Subcommittee Meetings ● Other Public Meetings ● Status Reports and FAQ Flyers	$181,100
3c	DBO/P3 and Financial Analyses	
	● Design-Build-Operate - Development of Special Legislation	$15,800
	● Financial Analysis - Perform Additional Model Runs	$44,000
3d	Regulatory Coordination	$15,800

Town of Orleans Massachusetts

Other Items and Public Comment

Other Items and Public Comment

- **OWQAP Meeting**
  - May 17, 2017
- **Recent and Proposed Public Information Activities**
  - Shellfish and Waterways Improvement Committee – May 16, 2017
  - BOS – Design-Build-Operate Workshop – Summer 2017
- **Town Meetings**
  - Brewster– May 1, 2017
  - Eastham – May 1, 2017
  - Orleans – May 8, 2017
- **Status Reports and FAQ on Various Projects**

Town of Orleans Massachusetts

Thank You