Orleans Water Quality Advisory Panel

Water Quality and Wastewater Planning

Program Status Update

September 20, 2017

Agenda

- Approval of Meeting Minutes of August 16, 2017
- Public Comment
- Resolution of Motion on Exit 12 (Tabled at August 16 Meeting)
- Tri-Town Septage Treatment Facility Demolition Status Update
- Downtown System Pre-design: Evaluation of Additional Groundwater Recharge Sites
- Non-Traditional Project Update
- Landfill Nitrogen Investigations, Results and Next Steps

BREAK

- Financial Planning Update
- Freshwater Ponds Remediation Plan Update
- Recommendations of OWQAP on Key Warrant Questions
- Public Comment
- Adjourn

Town of Orleans Massachusetts

Resolution of Motion on Exit 12

(Tabled at August 16, 2017 Meeting)

Town of Orleans Massachusetts

Tri-Town Septage Treatment Facility Demolition Status Update

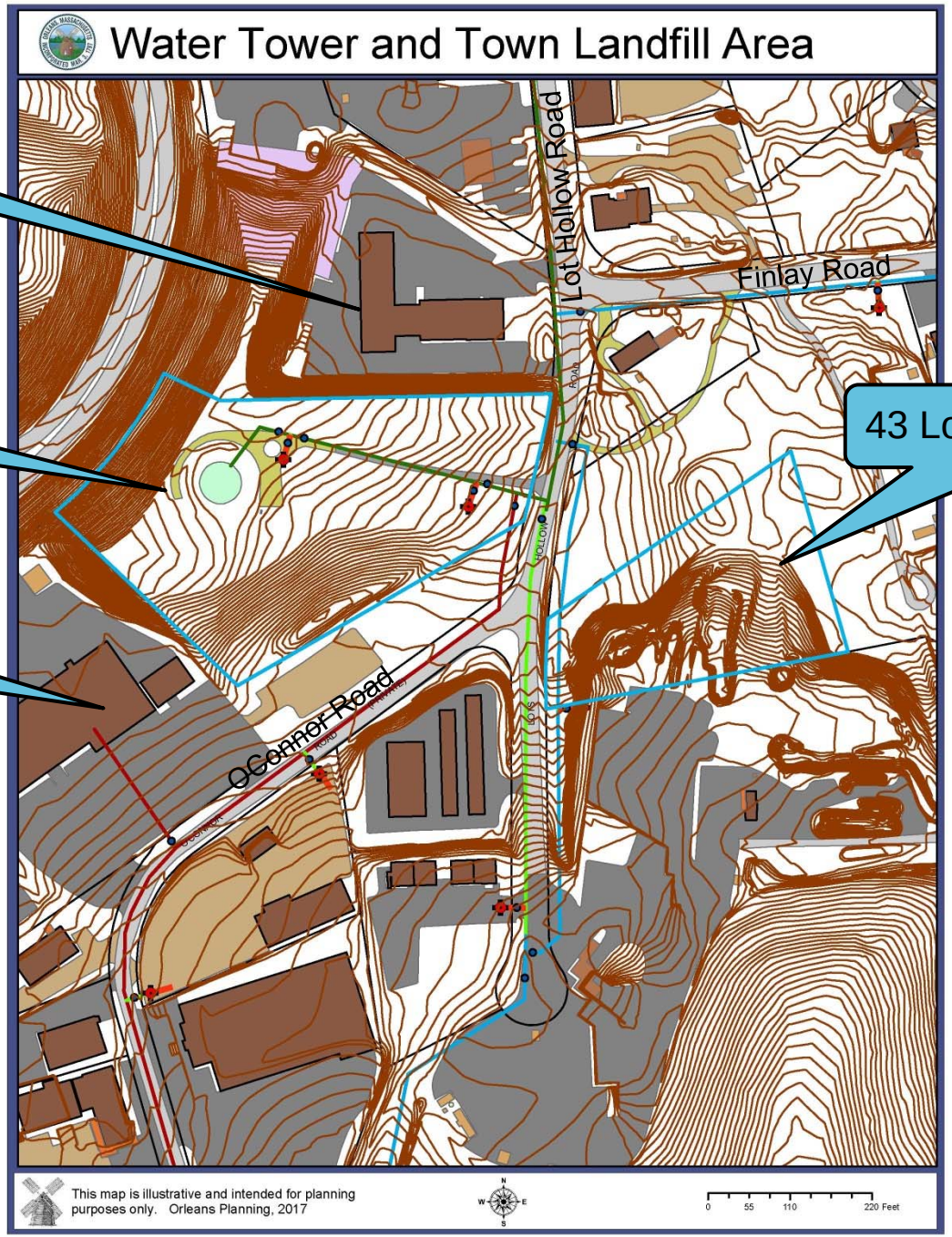
Tri-Town Septage Treatment Facility Demolition Update

- **On-Going Activates**
  - Contractor Submittals - Review and Approval Ongoing
  - Monthly Project Meeting – September 13, 2017
  - Disconnecting Existing Utilities
  - Installed Temporary Fencing and Windscreen
  - Installing Erosion Control
  - Pumping-out Existing Tanks of Any Liquids and/or Solids
  - Collecting Hazardous Materials and Package for Disposal
- **October 2017 through April 2018 – Demolition and Site Restoration Schedule (Refer to Handout)**

Town of Orleans Massachusetts

Downtown Area System Pre-design:

Evaluation of Additional Groundwater Recharge Sites


Water Tower and Town Landfill Area
Wilkinson Ecological Design
32 Lots Hollow Road
Orleans Toyota
43 Lots Hollow Road
Lot Hollow Road
Finlay Road
OConnor Road
This map is illustrative and intended for planning purposes only. Orleans Planning, 2017
0
55
110
220 Feet

AECOM

Summary of the Testing Performed
43 Lots Hollow Road

- **Installation of Several Soil Borings and Monitoring Wells (Depths to 248 Feet Deep)**
- **Installation of Several Soil Borings and Monitoring Wells on Adjacent Properties**
- **Soils Appear to be Favorable for Wick Discharge – Fine to Coarse Sand**
- **Depth to Water Table Favorable for Wick Discharge – 40 to 85 Feet**
- **Several Pumping Tests Performed In the Area of the Potential Wick Discharge**
- **Water Quality Collected and Analyzed from Several Monitoring Wells**

Summary of the Testing Performed (cont.)
32 Lots Hollow Road

- **Installation of One Soil Borings to 45 Feet Deep**
- **Installation of Several Soil Borings and Monitoring Wells on Adjacent Properties**
- **Soils Appear to be Favorable for Wick Discharge – Fine to Coarse Sand**
- **Depth to Water Table Favorable for Wick Discharge – 90 to 105 Feet**
- **Several Pumping Tests Performed South of the Landfill – 350 Feet East**
- **Water Quality Collected and Analyzed from Nearby Monitoring Wells**

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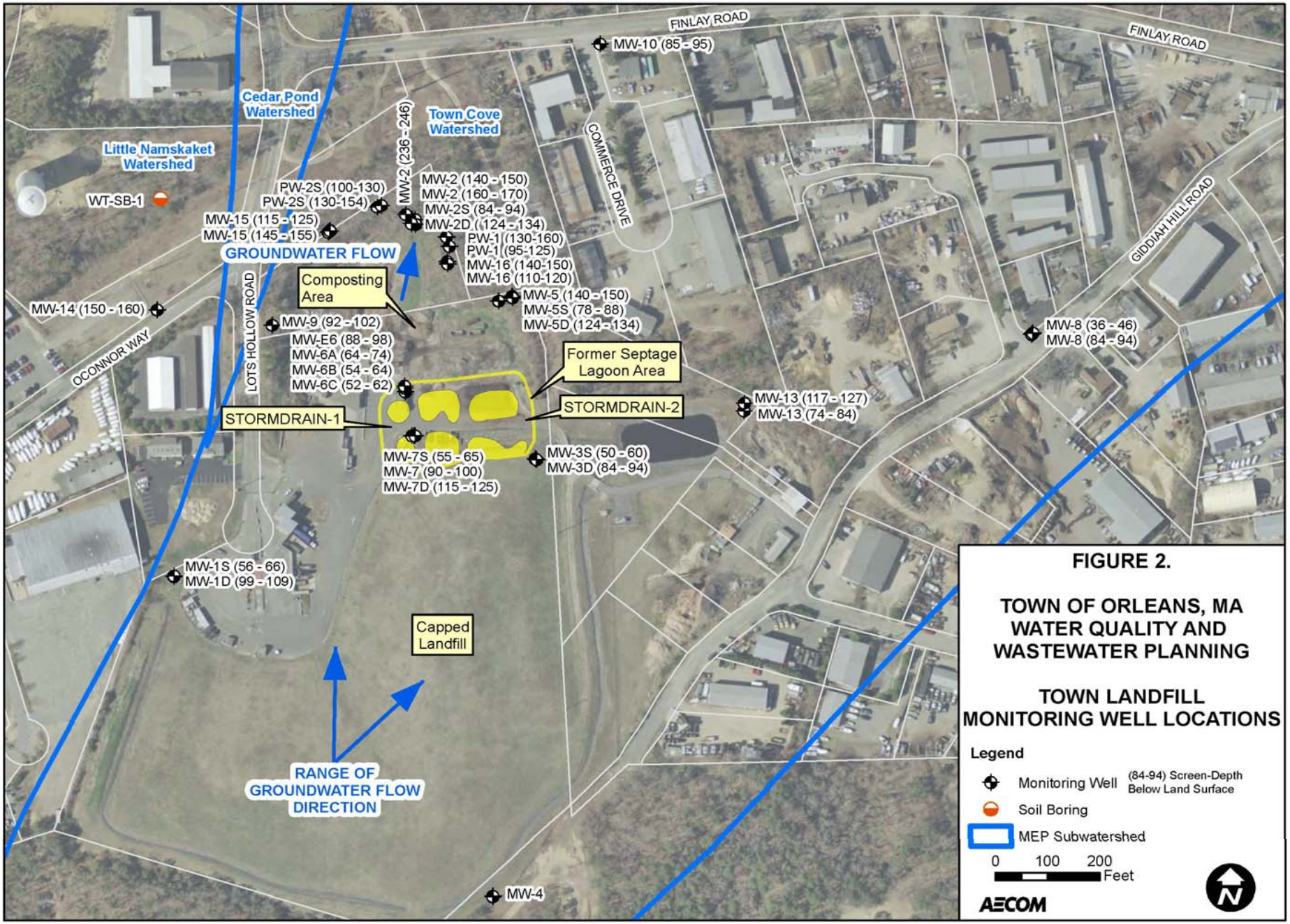


Summary of the Testing Required

- **Confirm with MassDEP the Field Investigation Requirements**
- **Prepare a Hydrogeologic Evaluation Proposal**
- **Conduct Field Investigations**
  - Oversee Drilling and Test Pit Excavation
  - Collect and Analyze Groundwater and Soil Samples
  - Perform Soils Conductivity Testing
  - Analyze and Summarize Field Data
- **Perform Wick Testing**
  - Coordinate with Board of Water and Sewer Commissioners on Placement
  - Install Test Wick
  - Install Observation Wells
  - Perform 8-hour Step Test
  - Perform 30-day Loading Test

Summary of the Testing Required (cont.)

- **Wick Testing Evaluation and Report**
  - Evaluate Discharge Capacity of site
  - Evaluate Capacity and Number of Final Wicks
- **Conduct Groundwater Modeling**
  - Modify USGS Model for Site Specific Conditions
  - Perform and Evaluate Groundwater Modeling Scenarios/Results
  - Evaluate Impacts of Discharge to Existing Groundwater Flow and Quality
- **Submit Hydrogeologic Evaluation Report to MassDEP**
  - Wick Design - Proposed Number, Location and O&M
  - Secondary Discharge Area(s)
- **Submit a Groundwater Discharge Permit Application to MassDEP**
- **Complete Field Investigations and Analysis in Preparation for May 2018 Town Meeting**

Town of Orleans Massachusetts

Non-Traditional Project Update

Non-Traditional Project Update – Aquaculture
Lonnie's Pond Management Plan

- **Full Scale Implementation Scenarios Presented to Shellfish and Waterways Committee**
  - Town-Led Scenarios: Harvestable oyster products only
  - Grower-Led Scenarios
    - 25% through 100% MEP goal scenarios
    - Harvestable/Marketable oysters and Year 1 seed scenarios
- **Lonnie's Pond Demonstration Year 3**
  - Recommended to evaluate Y1 and Y2 oyster densities
  - $93,500 additional funding estimated for Year 3 January through June 2018
  - SMAST to continue to evaluate nitrogen removal via denitrification, although Plan focuses on full-scale scenario to meet TMDL/MEP WITHOUT consideration of denitrification
- **Lonnie's Pond Year 1 Final Report**

Non-Traditional Project Update – Aquaculture
Shellfish and Waterways Committee Comments

- **“Transferability” to other ponds/MassDEP requirements**
- **Miscellaneous clarity comments**
- **Written SOPs for field work**
- **Review by SMAST/Kris Clark**
- **Questions on Demo and Full Scale Cost and Configuration**

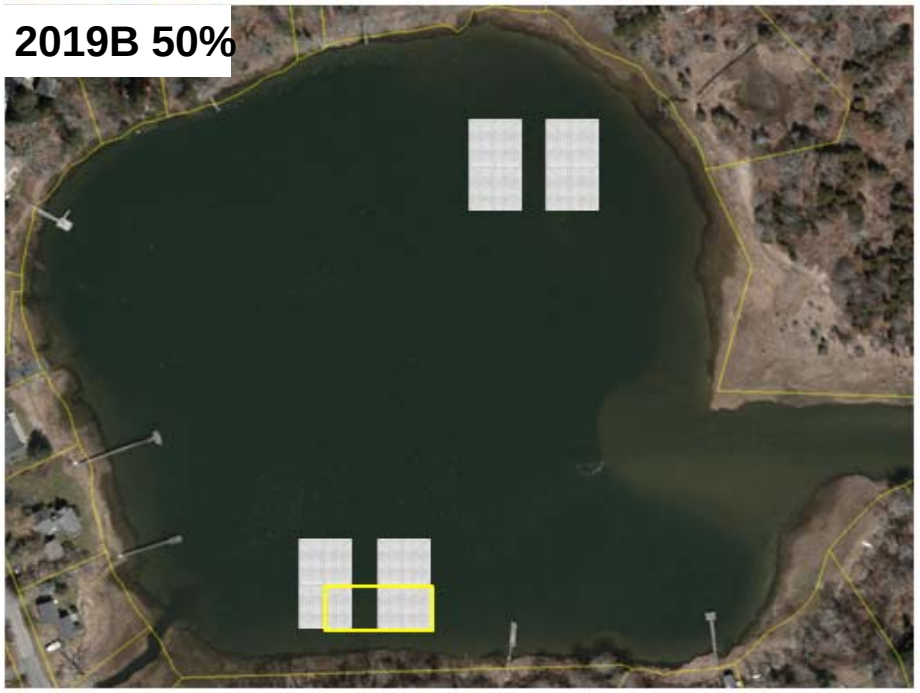
Non-Traditional Project Update – Aquaculture Demonstration 2018 and Full Implementation Costs

- **Destiny of excess oysters**
- **Pathway to sell 1-inch seed**
- **More detail on cost estimates**
- **Why focus on 1-inch (Y1) oysters**
- **Space needed for larger oysters**

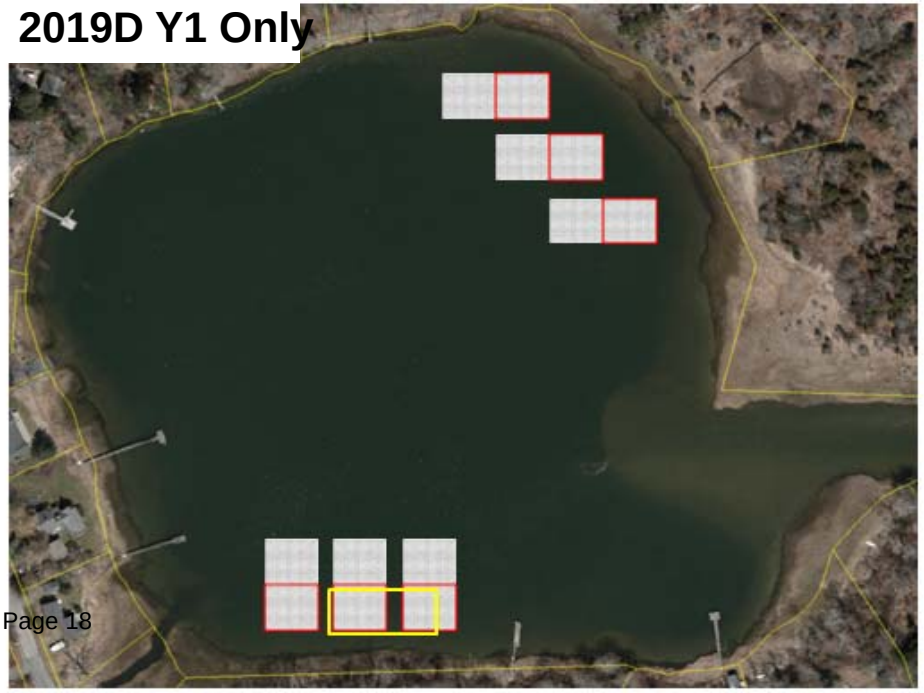
Non-Traditional Project Update – Aquaculture Implementation Scenarios

- **Grower- Centered Options**
  - Grow marketable oysters to meet 100% of MEP Goal
  - Grow marketable oysters to meet 50% of MEP Goal
  - Grow marketable oysters to meet 25% of MEP Goal
  - Grows seed oysters up to 1” and sell each year
- **Town- Centered Options**
  - Grow harvestable oysters to meet 50% of MEP Goal
  - Grow harvestable oysters to meet 25% of MEP Goal

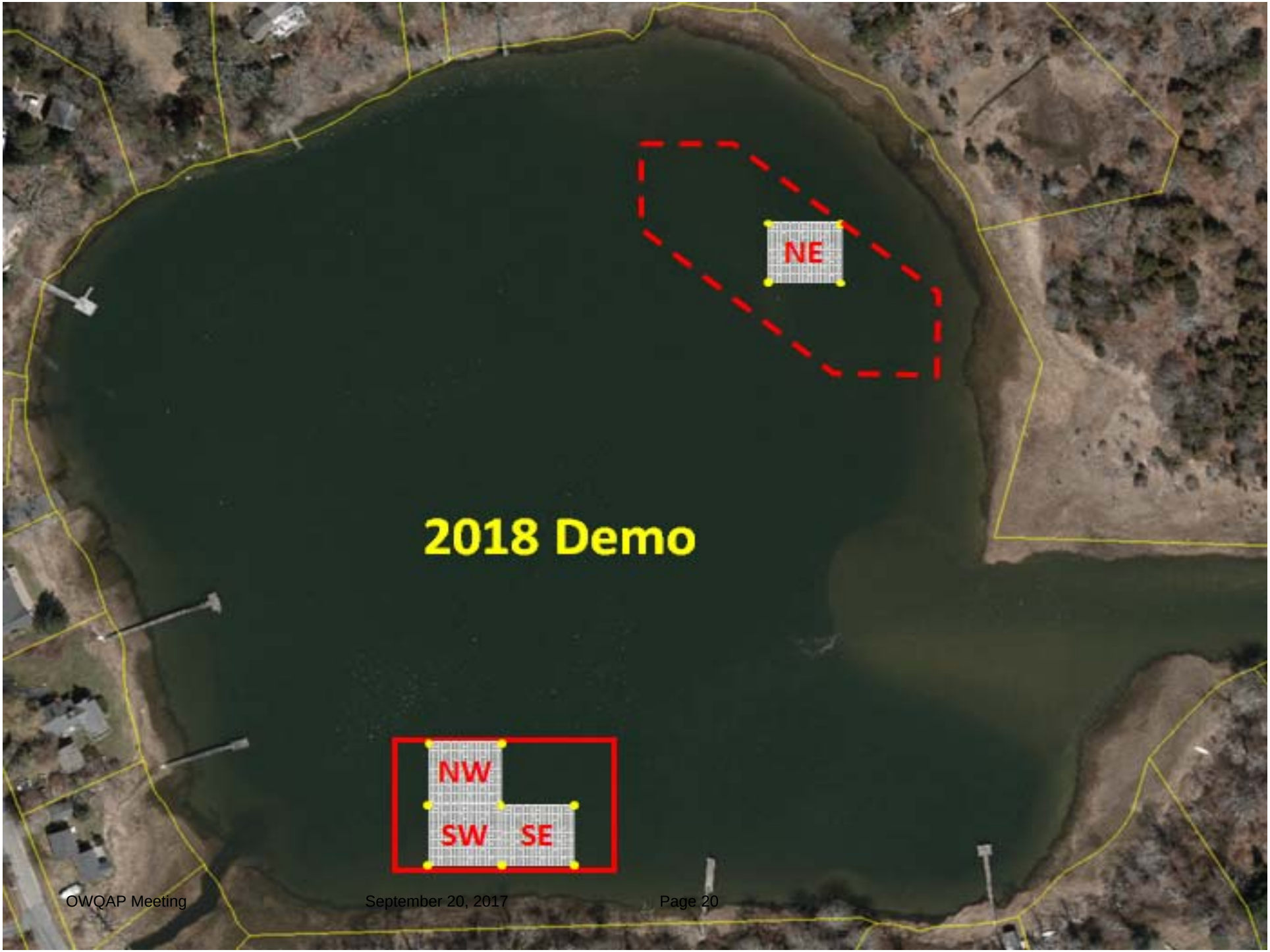

2019A Max


2019B 50%


2019C 25%


2019D Y1 Only

	2019A	2019B	2019C	2019D	Town 2019B	Town 2019C
	Max Coverage	50% MEP	25% MEP	Y1 Only	50% MEP	25% MEP
Y1 Bags	1,650	843	422	6,280	843	422
Y2 Bags	6,600	3,372	1,688		3,372	1,688
Total Bags	8,250	4,215	2,110	6,280	4,215	2,110
Area Utilized	1.5	0.78	0.38	1.2	0.78	0.38
Y1 Oysters Started	1,740,000	888,000	445,000	6,610,000	888,000	445,000
Y2 Oysters Started	1,650,000	843,000	422,000	-	843,000	422,000
Live Oysters Extracted	1,530,000	784,000	392,000	6,280,000	784,000	392,000
Sale Price of Program Oysters	$ 0.35	$ 0.35	$ 0.350	$ 0.120	$ -	$ -
Total Market Value of Program Oysters	$ 535,500	$ 274,400	$ 137,200	$ 715,920	$ -	$ -
Total Capital for Floating Gear	$ 86,209	$ 25,444	$ -	$ 100,591	$ 25,444	$ -
Labor for Fabrication of Floating Gear	$ 71,625	$ 21,188	$ -	$ 47,000	$ 15,255	$ -
Over-winter Gear (Fab Labor & Materials)	$ 13,281	$ 672	$ -	$ 85,625	$ 604	$ -
Capital for Other Equipment	$ 95,375	$ 80,475	$ 62,175	$ 46,975	$ 7,800	$ 7,800
Y1 Capital Requirement	$ 266,490	$ 127,778	$ 62,175	$ 280,191	$ 49,103	$ 7,800
Amortized Financed Gear Cost	$ 64,841	$ 31,090	$ 15,128	$ 68,175	$ 9,821	$ 1,560
Seed Cost	$ 55,680	$ 28,416	$ 14,240	$ 211,520	$ 28,416	$ 14,240
Field Labor Cost	$ 278,063	$ 153,881	$ 76,488	$ 262,319	$ 110,795	$ 55,071
Business Overhead / Administration	$ 76,854	$ 49,546	$ 40,813	$ 100,863	$ 9,300	$ 9,300
Total Annual Expenses	$ 475,438	$ 262,933	$ 146,668	$ 642,876	$ 158,331	$ 80,171
Program Oversight	$ 3,360	$ 3,360	$ 3,360	$ 3,360	$ 3,360	$ 3,360
Town Net Cost	$ 3,360	$ 3,360	$ 3,360	$ 3,360	$ 158,331	$ 80,171
Grower Net Profit	$ 60,062	$ 11,467	$ (9,468)	$ 73,044		
Net Profit % of Gross Revenue	11%	4%	-6.9%	10.2%		
N Removed by Uptake, kg	290	148	74	297	148	74
N Removed in Shells (Mortality), kg	3	2	1	2	2	1
Annual N Removal, All Pathways, kg	293	150	75	298	150	75
% of MEP Annual Removal Target	99%	51%	25%	100%	51%	25%
Ongoing Labor Requirement (hrs/yr)	8,165	4,604	2,540	8,995	4,404	2,340
Labor Full Time Equivalents	4.1	2.3	1.3	4.5	2.2	1.2
Town $/kg of Target N Removed	$ 11	$ 22	$ 45	$ 11	$ 1,055	$ 1,069


NE
2018 Demo
NW
SW
SE

Non-Traditional Project Update – Aquaculture
Lonnie's Pond Management Plan (cont.)

- **Next Steps/Issues to Resolve for Long-term Implementation**
  - Issues to discuss with MassDEP: details of watershed permit and compliance requirements for town vs commercial grower
  - Permitting requirements
  - Potential RFP for grower implemented scenario

Non-Traditional Project Update (cont.)
Eldredge Park PRB

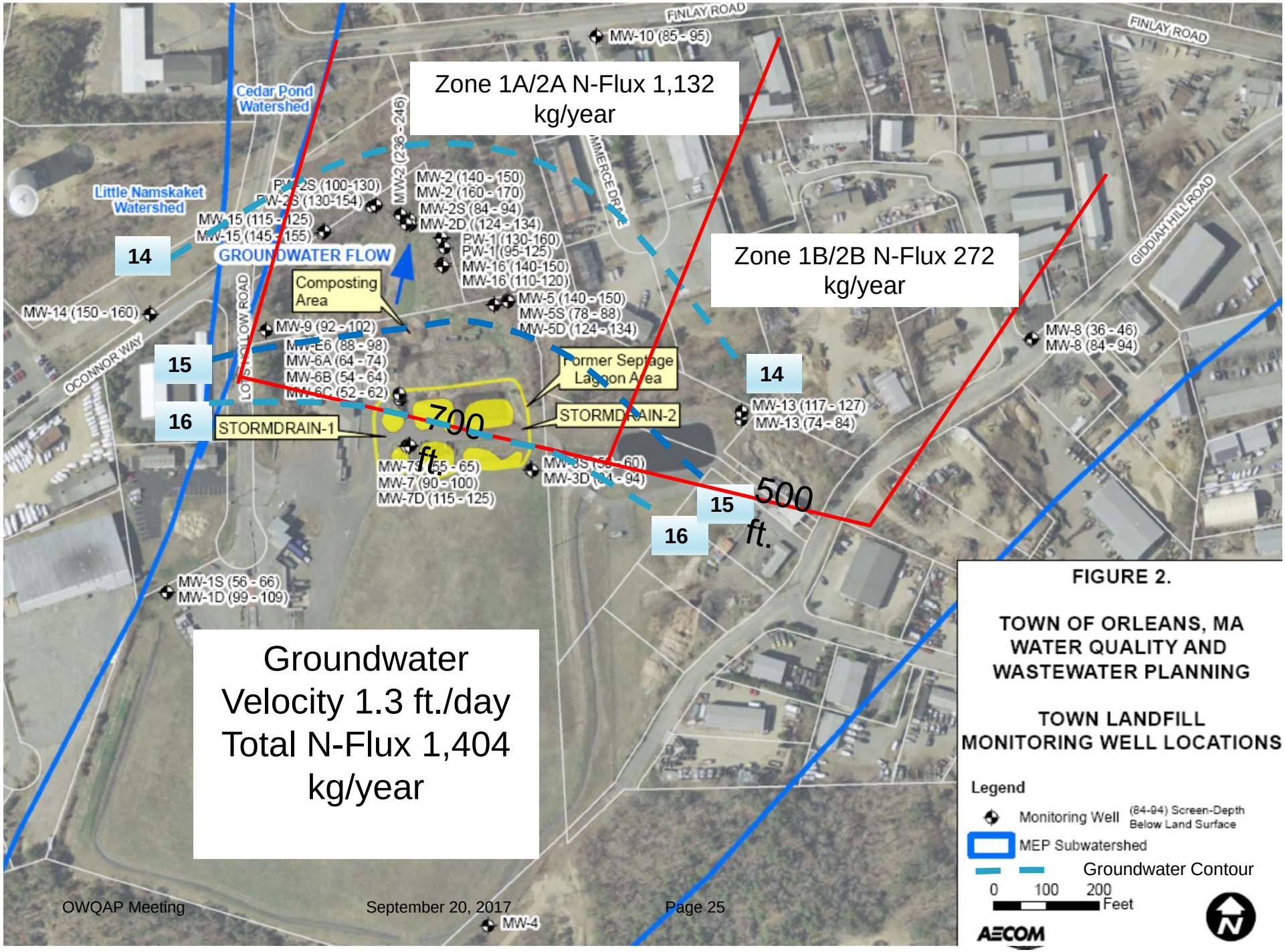
- **Quarterly Sampling Occurred on July 29, 2017 (Seven Months Post Injection)**
  - 24 Monitoring Wells Were Sampled and Analyzed for Nitrate and Other Key Parameters at 24 Monitoring Wells
  - Water Levels Were Recorded at These Wells and 10 Additional Wells
- **Quarterly Report**
  - Data Analysis Being Review by SMAST
  - School's On-Site School Disposal System being Collected and Reviewed
- **Next Quarterly Sampling Event – Week of September 18, 2017**

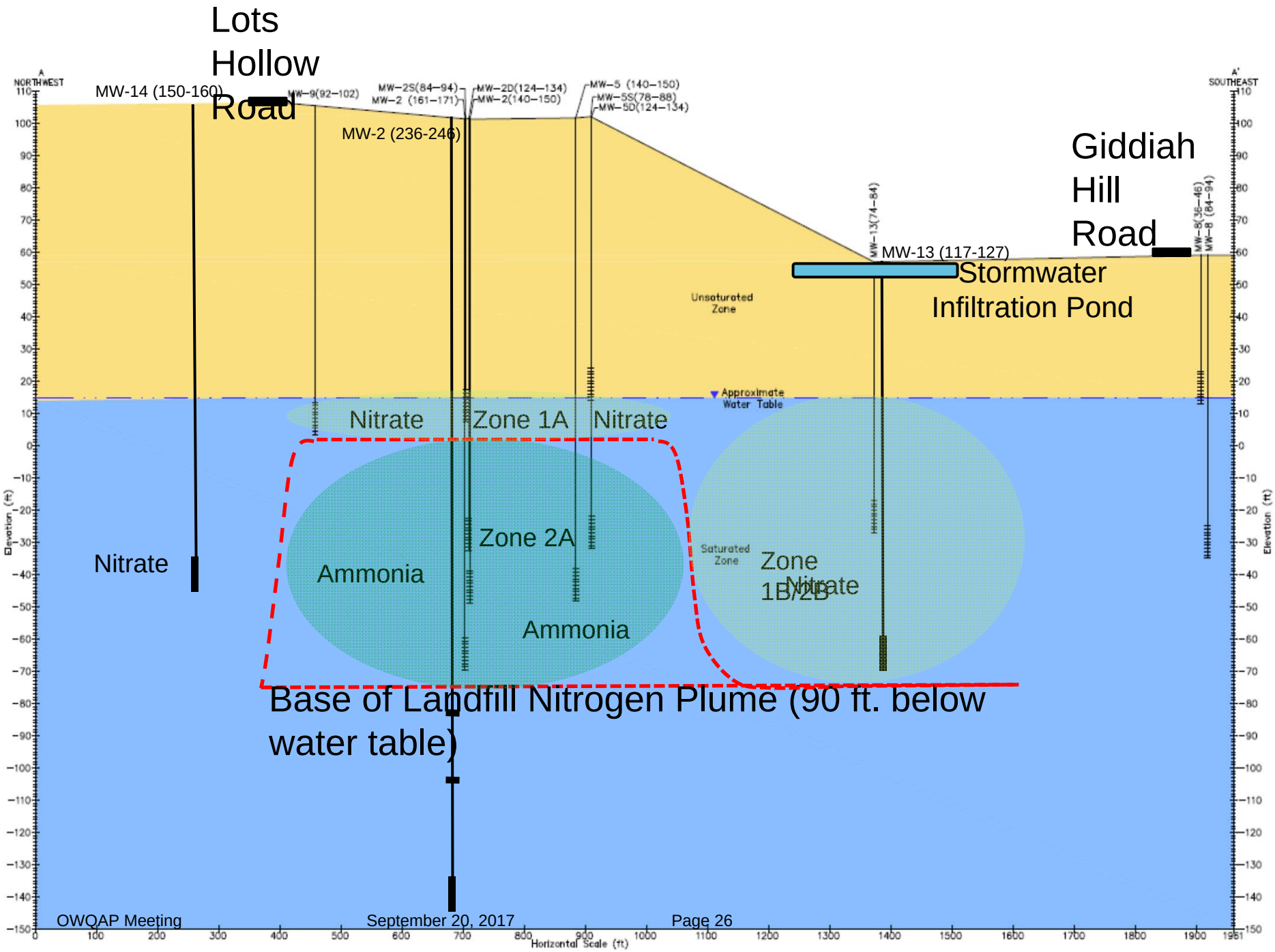
Town of Orleans Massachusetts

Landfill Nitrogen Investigations, Results and Next Steps

Landfill Nitrogen Investigations, Results and Next Steps Status Update

- **Completed Field Investigations and Pumping Tests - Ongoing Coordination with UMass Dartmouth's School for Marine Science & Technology (SMAST)**
- **Completed Assessment of Landfill Nitrogen Flux**
- **Preparing Landfill Action Plan for Nitrogen Control in Coordination with DPW Construction Project**

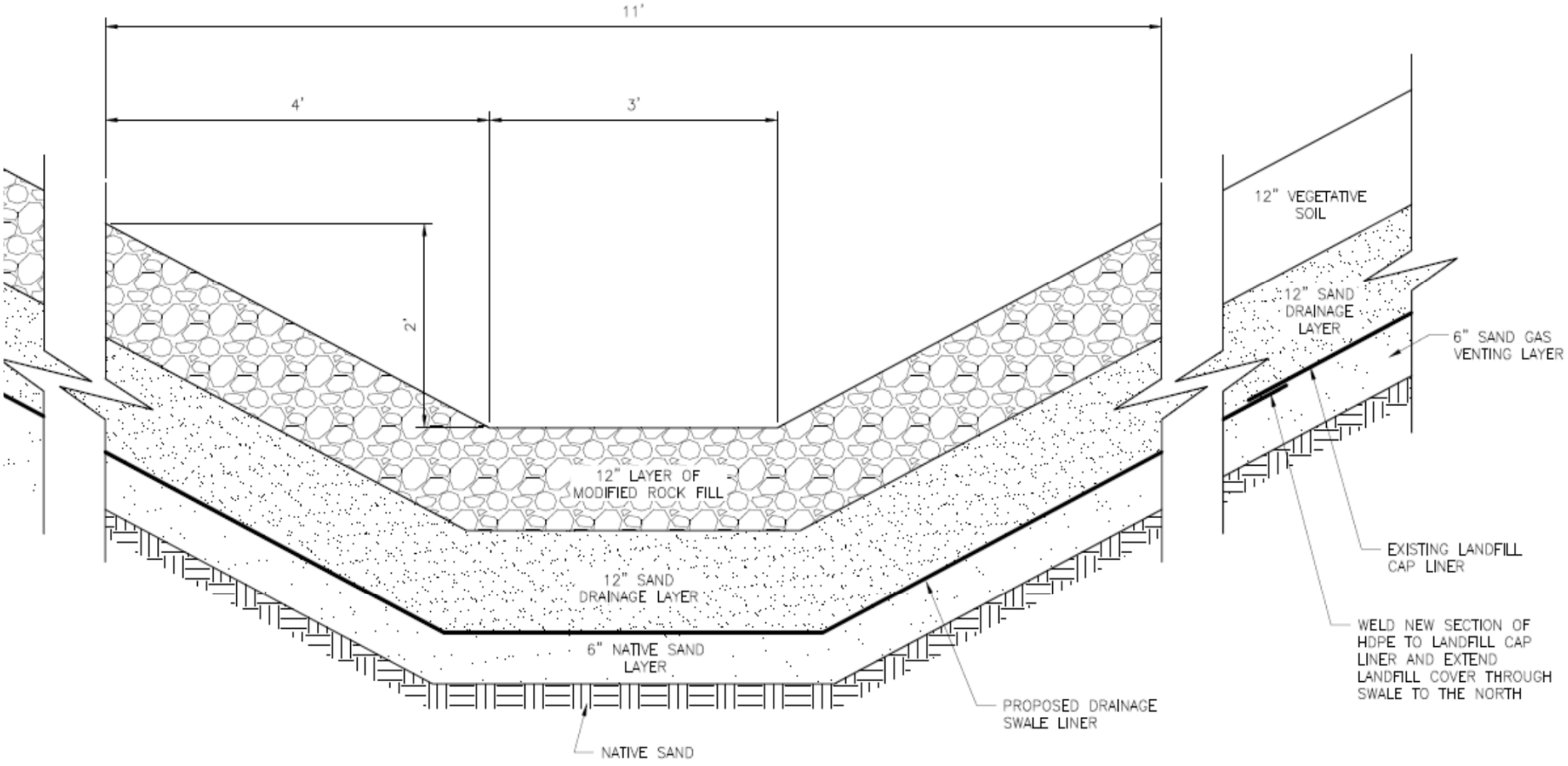

Zone 1A/2A N-Flux 1,132 kg/year
Zone 1B/2B N-Flux 272 kg/year
Groundwater Velocity 1.3 ft./day
Total N-Flux 1,404 kg/year
FINLAY ROAD
MW-10 (85 - 95)
Cedar Pond Watershed
Little Namskaket Watershed
MW-2 (236 - 246)
PW-2S (100-130)
PW-2S (130-154)
MW-2 (140 - 150)
MW-2 (160 - 170)
MW-2S (84 - 94)
MW-2D (124 - 134)
MW-15 (115 - 125)
MW-15 (145 - 155)
PW-1 (130-160)
PW-1 (95-125)
MW-16 (140-150)
MW-16 (110-120)
14
GROUNDWATER FLOW
Composting Area
MW-14 (150 - 160)
MW-5 (140 - 150)
MW-5S (78 - 88)
MW-5D (124 - 134)
MW-9 (92 - 102)
MW-E6 (88 - 98)
MW-6A (64 - 74)
MW-6B (54 - 64)
MW-6C (52 - 62)
15
16
Former Septage Lagoon Area
STORMDRAIN-1
STORMDRAIN-2
700 ft.
500 ft.
MW-7S (55 - 65)
MW-7 (90 - 100)
MW-7D (115 - 125)
MW-3S (58 - 60)
MW-3D (84 - 94)
MW-13 (117 - 127)
MW-13 (74 - 84)
MW-8 (36 - 46)
MW-8 (84 - 94)
MW-1S (56 - 66)
MW-1D (99 - 109)
MW-4
O'CONNOR WAY
LOWER HOLLOW ROAD
GIDDIAH HILL ROAD
FIGURE 2.
TOWN OF ORLEANS, MA
WATER QUALITY AND WASTEWATER PLANNING
TOWN LANDFILL
MONITORING WELL LOCATIONS
Legend
Monitoring Well
(84-94) Screen-Depth Below Land Surface
MEP Subwatershed
Groundwater Contour
0 100 200
Feet
AECOM


Lots Hollow Road
MW-14 (150-160)
MW-9(92-102)
MW-2S(84-94)
MW-2 (161-171)
MW-2D(124-134)
MW-2(140-150)
MW-5 (140-150)
MW-5S(78-88)
MW-5D(124-134)
MW-2 (236-246)
Giddiah Hill Road
MW-13(74-84)
MW-13 (117-127)
MW-8(36-46)
MW-8 (84-94)
Stormwater Infiltration Pond
Unsaturated Zone
Approximate Water Table
Nitrate
Zone 1A
Nitrate
Zone 2A
Ammonia
Ammonia
Saturated Zone
Zone 1B/2B
Nitrate
Nitrate
Base of Landfill Nitrogen Plume (90 ft. below water table)
NORTHWEST
SOUTHEAST
Elevation (ft)
Horizontal Scale (ft)

Landfill Nitrogen Investigations, Results and Next Steps
Draft Action Plan for Nitrogen Control

- **Modify DPW Materials Area to Include Impermeable Pavement over Septage Lagoons**
- **Modify the Yard Waste Receiving Area to Include impermeable base**
- **Modify Leaching Drainage Swale on North Side of Landfill Cap with Impermeable Base**
- **Add Stormwater Nitrate Treatment to Infiltration Ponds**
- **Offset future nitrogen load to Town Cove with additional wastewater treatment or innovative alternative methods (PRB/Shellfish Propagation)**

Landfill Nitrogen Investigations, Results and Next Steps
Lining/Reconstruction of Riprap Rock Swale North Side of Landfill



SWALE DETAIL - ABOVE LINER

SCALE: 1"=1'-0"

Town of Orleans Massachusetts

Financial Plan Update

Town of Orleans Massachusetts

Break

Financial Plan Update
Model Updates

- **Revise to Calculate the Range of Estimated Betterment from "Best" to "Worst" Case Scenarios**
- **Include only " Capital Costs" (No Annual Operating Costs)**
- **Create Visual to Best Display the Results – Similar Model Runs Compared on One Graph**
- **Complete Model Updates and Model Runs by Early January 2018 in Preparation for May 2018 Town Meeting**

Financial Plan Update (cont.)
"Best" to "Worst" Case Scenarios

- **BEST CASE – Current Plan NPV of Traditional Technology and Non-Traditional Technology of Total Capital Costs**
  - 100% on Tax Rate
  - 80% Betterment and 20% Tax Rate
  - 50% Betterment and 50% Tax Rate
- **WORST CASE – Approved CWMP NPV of Total Capital Costs**
  - 100% on Tax Rate
  - 80% Betterment and 20% Tax Rate
  - 50% Betterment and 50% Tax Rate
- **Current Plan NPV of Traditional Technology Total Capital Costs**
  - 100% on Tax Rate
  - 80% Betterment and 20% Tax Rate
  - 50% Betterment and 50% Tax Rate

Town of Orleans Massachusetts

Freshwater Ponds Remediation Update

Freshwater Ponds Remediation Update

- **Freshwater Ponds Work Group incorporated into Marine & Fresh Water Quality Committee**
- **Field Work completed for Uncle Harvey's Pond and Pilgrim Lake;**
  - Data analyses being completed
- **First-cut Screening of Alternatives Completed for Uncle Harveys:**
  - Aeration and Chemical Treatment being carried forward
  - Watershed Management part of either plan
  - Public input, life-cycle costs and permitting being undertaken
- **Management Plan with Recommendations to be Submitted**
  - Draft by November 30 to include preliminary design and cost estimates
- **Full Implementation to Follow**
  - FY2018 Budget from May 2017 includes some funds for implementation
  - May require additional budget in Spring TM depending on plan recommendations

Freshwater Ponds Remediation Update (cont.)

- **Next Steps**
  - Implementation of UHP plan in 2018
  - Pilgrim Lake: Complete data analyses, diagnostic survey, alternative screening, cost estimates in Winder/Spring 2018
  - Crystal Lake field work in Spring/Summer 2018
- **Next Meeting:** September 25, 2017; 10:00 AM, Skaket Room

Town of Orleans Massachusetts

Recommendations of OWQAP on Key Warrant Questions

Recommendations of OWQAP on Key Warrant Questions

- **Funding of Construction of Downtown Collection System Main Spine with MassDOT Intersection Project - $3,697,700 (refer to handout)**
- **Authorize Negotiation of Lease with MassDOT for Use of Route 6, Exit 12 for Groundwater Recharge**
- **Funding of Year 3 of Lonnies Pond Demonstration Project (Thru June 30, 2018) - $93,950 (refer to handout)**
- **Independent Review of 25% Design of Downtown Area System - $75,000**

Town of Orleans Massachusetts

Other Items and Public Comment

Other Items and Public Comment
Recent and Proposed Public Information Activities

- **OWQAP**
  - October 18, 2017 (to be confirmed)
- **Shellfish and Waterways Improvement Advisory Committee**
  - Management Plan Review - October 10, 2017
  - FY19 Budget Priorities – September 20, 2017
- **Marine & Fresh Water Quality Committee**
  - October 23, 2017
- **Special Town Meeting**
  - STM - October 16, 2017
  - Ballot Question – October 24, 2017

Town of Orleans Massachusetts

Thank You