



Town of

*Orleans*  
Massachusetts

## Board of Selectmen

# Water Quality and Wastewater Planning

## Aquifer Recharge Update and Recommendations

February 14, 2018

# Aquifer Recharge Update and Recommendations

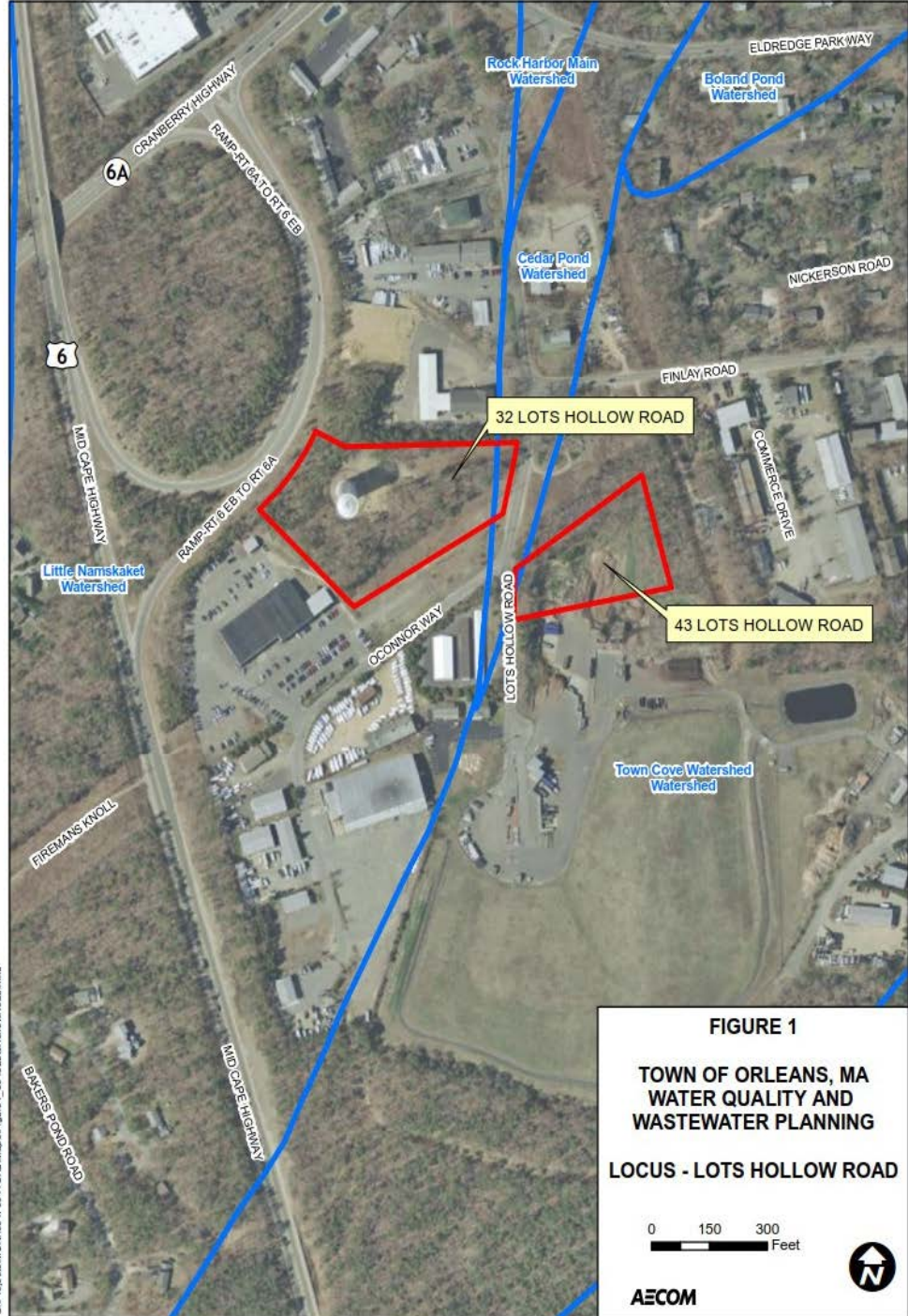
## ❖ 32 Lots Hollow Road and 43 Lots Hollow Road

- Location Map
- Summary of the Testing Performed
- Summary of Ongoing Work
- Schedule of Activities

## ❖ Cloverleaf Site at Route 6 Exit 12

## ❖ Recommendations





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# 32 Lots Hollow Road

## Summary of the Testing Performed

- ❖ **Completed Installation of Several Soil Borings and Monitoring Wells (Depths to 135 Feet Deep)**
- ❖ **Soils Appear to be Favorable for Wick Discharge – Fine to Coarse Sand**
- ❖ **Depth to Water Table Favorable for Wick Discharge – 100 to 105 Feet**
- ❖ **Site Visit with MassDEP Completed on January 29, 2018**
- ❖ **Completed Installation of Test Wick on February 7, 2018**
- ❖ **Performed Step Test on Test Wick on February 7, 2018**
- ❖ **Thirty-Day Loading Test Under Way**





**Legend**

- + Proposed Monitoring Well
- + Existing Monitoring Well
- Soil Boring
- + Proposed Test Pit
- Proposed Test Wick
- 32 Lots Hollow Road
- Proposed Wick Discharge Area
- MEP Subwatershed

**AECOM**

0 30 60 Feet

**FIGURE 2.**

**TOWN OF ORLEANS, MA  
WATER QUALITY AND  
WASTEWATER PLANNING**

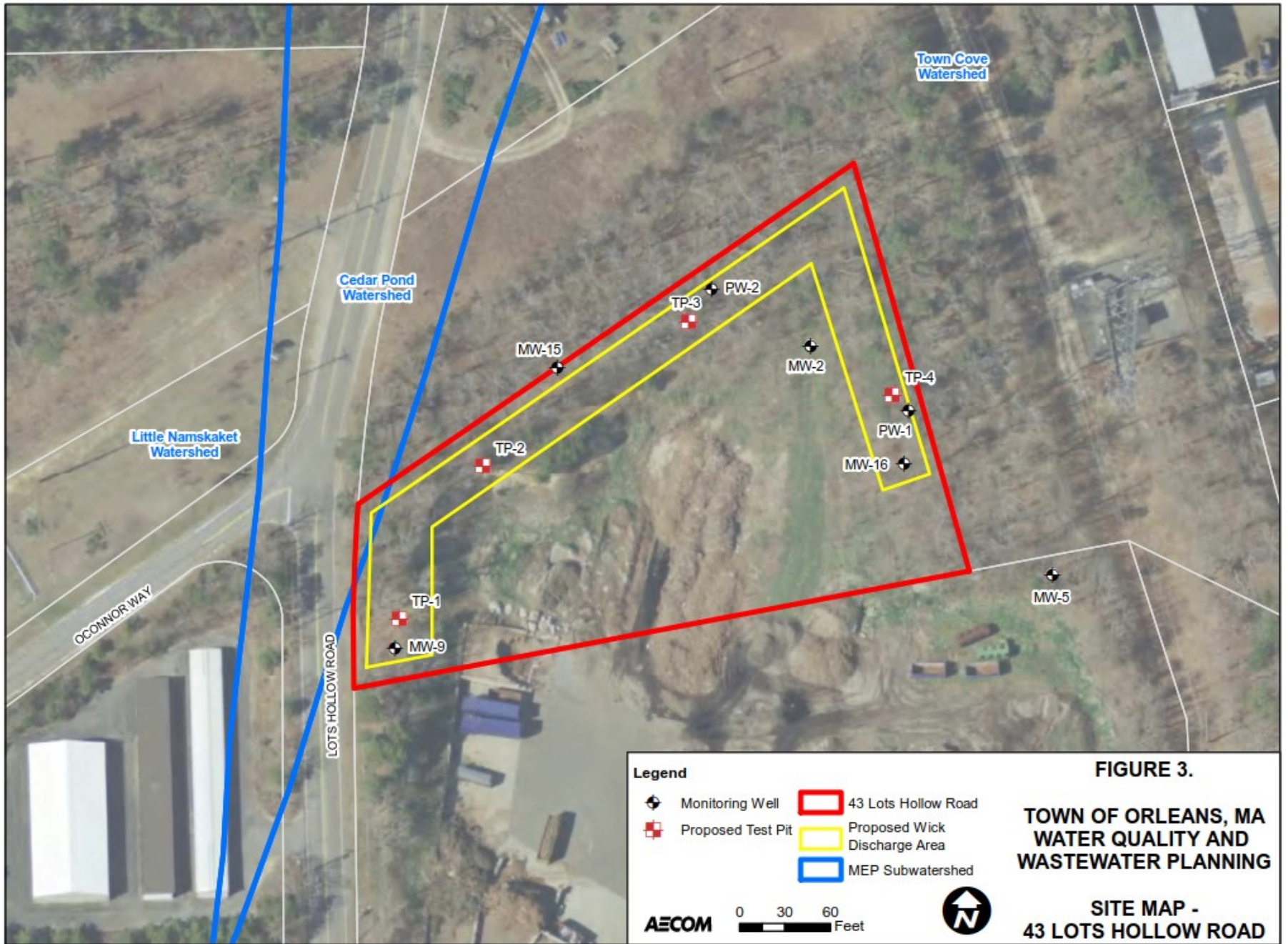
**SITE MAP -  
32 LOTS HOLLOW ROAD**

# 43 Lots Hollow Road

## Summary of the Testing Performed (cont.)

- ❖ **Completed Installation of Several Soil Borings and Monitoring Wells (Depths to 248 Feet Deep)**
- ❖ **Completed 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 – 80 to 90 Feet**
- ❖ **No Wick Loading Tests to be Performed at this Time – Utilize Data From 32 Lots Hollow Road Wick Loading Test and Landfill Pumping Test**





**Legend**

- Monitoring Well
- Proposed Test Pit
- 43 Lots Hollow Road
- Proposed Wick Discharge Area
- MEP Subwatershed

**AECOM**

0 30 60 Feet



**FIGURE 3.**

**TOWN OF ORLEANS, MA  
WATER QUALITY AND  
WASTEWATER PLANNING**

**SITE MAP -  
43 LOTS HOLLOW ROAD**

# 32 Lots Hollow Road and 43 Lots Hollow Road Summary of Ongoing Work

## ❖ Wick Testing Evaluation and Report

- Evaluate Discharge Capacity of Test Wick
- Estimate Capacity and Number of Final Wicks

## ❖ Conduct Groundwater Modeling

- Modifying the Existing USGS Monomoy Lens Groundwater Model
- Performed Preliminary Groundwater Modeling Scenarios/Results
- Evaluate Potential Impacts of Groundwater Discharge to Existing Groundwater Flow and Quality

## ❖ Hydrogeologic Evaluation Report

- Preliminary Wick Design
- Estimate Number, Location and Capacity of Wicks
- Discuss O&M of Final Wicks
- Identify Reserve Discharge Area(s)



# 32 Lots Hollow Road and 43 Lots Hollow Road Summary of Ongoing Work (cont.)

## ❖ **Groundwater Model Updates**

- Calibrating Model to Water Level Data
- Updating Model to Pumping Test and Other Data

## ❖ **Discharge at 32 Lots Hollow Road**

- 400,000 gpd Discharge

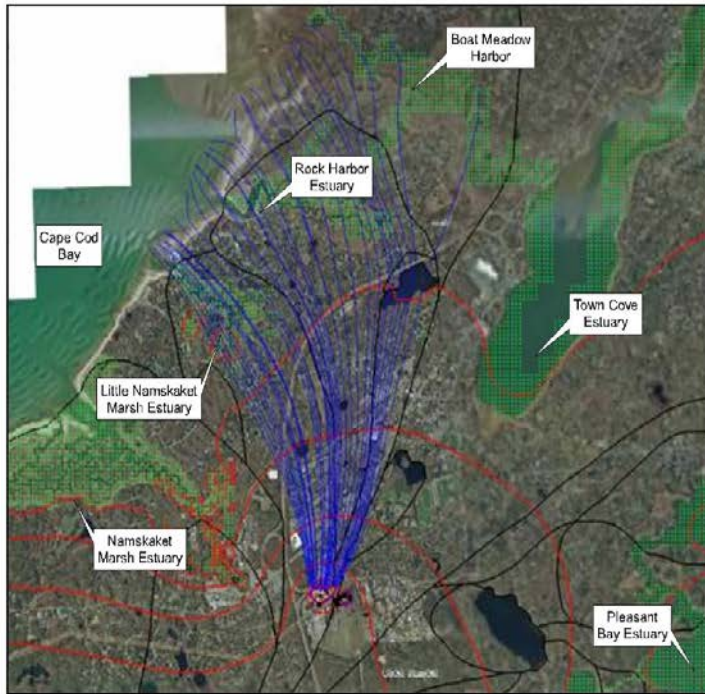
## ❖ **Discharge at 43 Lots Hollow Road**

- 400,000 gpd Discharge

## ❖ **Discharge at 32 Lots Hollow Road and 43 Lots Hollow Road**

- 200,000 gpd Discharge at 32 Lots Hollow Road
- 200,000 gpd Discharge at 43 Lots Hollow Road





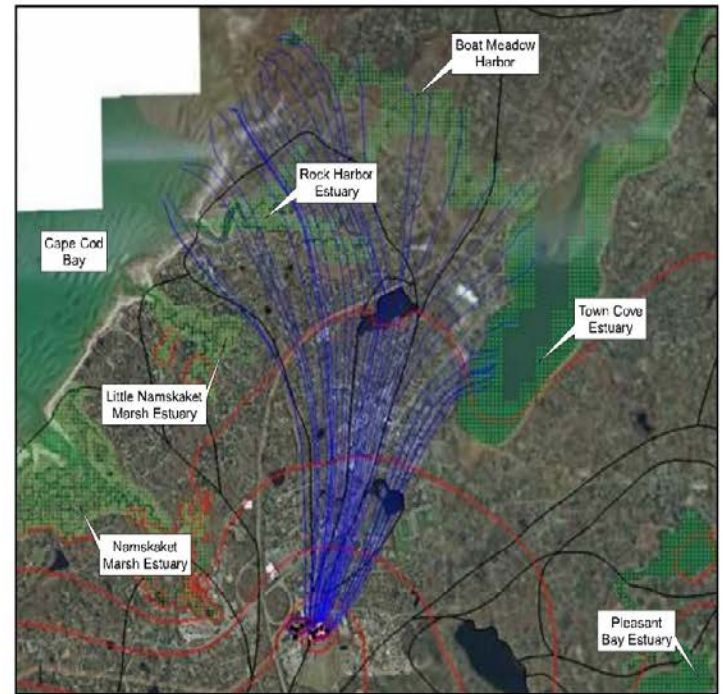
**FIGURE 4**

**LOTS HOLLOW ROAD  
TOWN OF ORLEANS  
WATER QUALITY AND  
WASTEWATER PLANNING**

**SIMULATION A -  
32 LOTS HOLLOW ROAD  
400,000 gpd**

- Legend**
- Groundwater Discharge Area
  - Model Drain Nodes (Estuary)
  - Simulated Groundwater Contours (5-ft contours)
  - Simulated Groundwater Discharge Flow Path

**AECOM**



**FIGURE 5**

**LOTS HOLLOW ROAD  
TOWN OF ORLEANS  
WATER QUALITY AND  
WASTEWATER PLANNING**

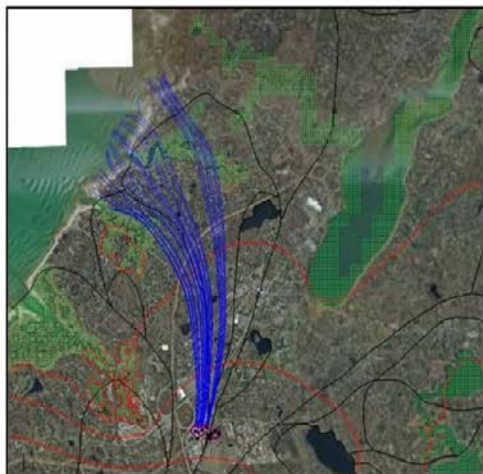
**SIMULATION B -  
43 LOTS HOLLOW ROAD  
400,000 gpd**

- Legend**
- Groundwater Discharge Area
  - Model Drain Nodes (Estuary)
  - Simulated Groundwater Contours (5-ft contours)
  - Simulated Groundwater Discharge Flow Path

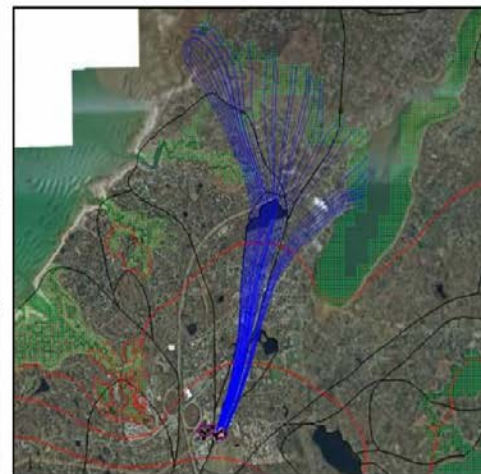
**AECOM**



Base Run - 0 GPD



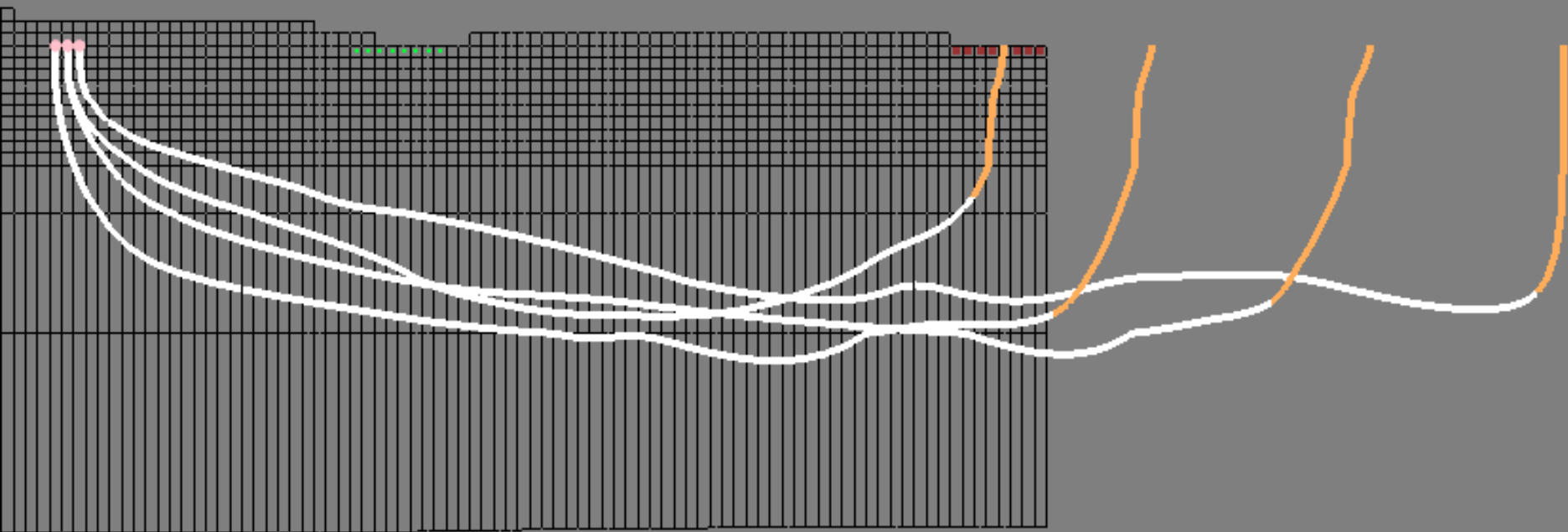
Base Run - 0 GPD

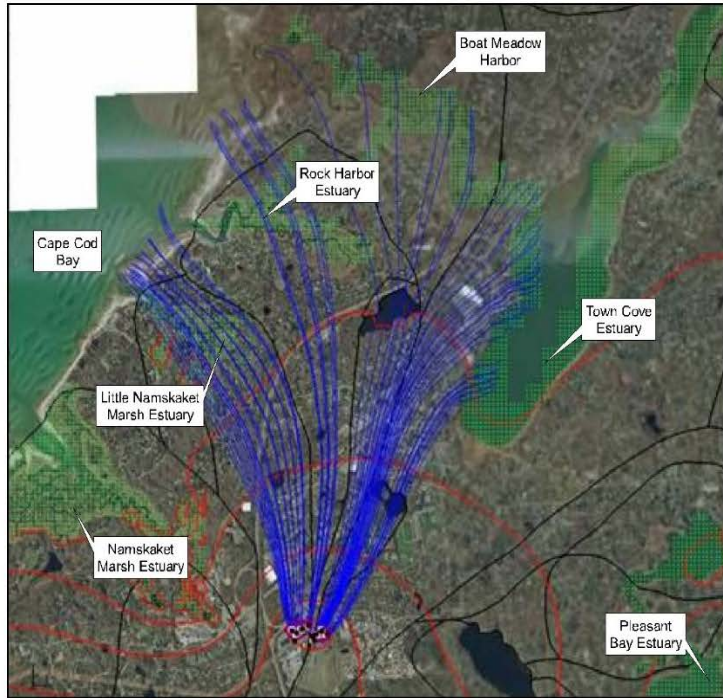


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**FIGURE 6**

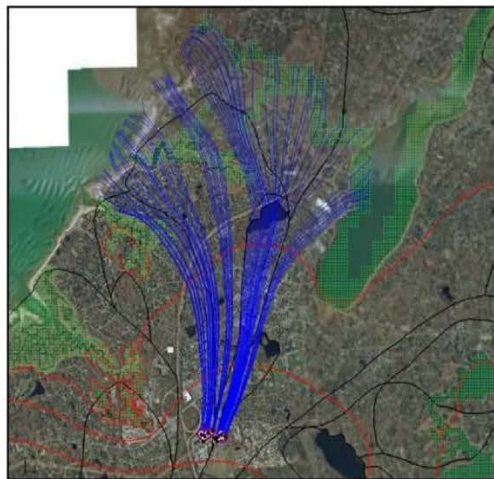
**LOTS HOLLOW ROAD  
TOWN OF ORLEANS  
WATER QUALITY AND  
WASTEWATER PLANNING**

**SIMULATION C -  
32 AND 43 LOTS HOLLOW ROAD  
400,000 gpd**

**Legend**

- Groundwater Discharge Area
- Model Drain Nodes (Estuary)
- Simulated Groundwater Contours (5-ft contours)
- Simulated Groundwater Discharge Flow Path

Base Run - 0 GPD



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# 32 Lots Hollow Road and 43 Lots Hollow Road Schedule of Activities

- ❖ **Confirm Field Investigation Requirements with MassDEP (Completed)**
- ❖ **Prepare and Submit a Hydrogeologic Evaluation Proposal (Completed)**
- ❖ **Conduct Drilling Investigations (Completed)**
- ❖ **Perform Step Test on Test Wick (Completed)**
- ❖ **Complete Loading Test on Test Wick (March 12, 2018)**
- ❖ **Conduct Groundwater Modeling (Late February)**
- ❖ **Wick Testing Evaluation and Report (Late March)**
- ❖ **Submit Hydrogeologic Evaluation Report to MassDEP (Late March)**
- ❖ **MassDEP Approval of Hydrogeologic Evaluation Report (May 2018)**



# Aquifer Recharge Cloverleaf Site at Route 6 Exit 12 Status

## ❖ **Completed Original Scope of Work**

- Field Testing
- Soil and Water Analysis
- Groundwater Modeling
- Hydrogeologic Evaluation Report
  - Submitted to MassDEP on 11/06/17
  - Approved by MassDEP on 02/02/18

## ❖ **MassDOT Conference Call (01/24/18)**

- MassDOT Granting a Site Access Permit to Allow Further Site Investigations Including a Wick Loading Test
- MassDOT Working to Draft an Easement Agreement Allowing a Discharge

## ❖ **Anticipated Action Item(s)**

- Install a Test Wick and Additional Monitoring Wells
- Perform a Wick Loading Test and Wick Testing Evaluation and Report
- Submit and Obtain MassDEP Approval of Wick Loading Test
- Finalize MassDOT Easement Agreement Allowing a Discharge



# Aquifer Recharge Recommendations (Conditional Upon MassDEP Approval)

- ❖ **Conduct Wick Loading Test at Cloverleaf Site at Route 6 Exit 12**
- ❖ **Identify the Following Locations as Primary Aquifer Recharge Sites**
  - 32 Lots Hollow Road
- ❖ **Identify the Following Locations as Backup Aquifer Recharge Sites and/or Future Primary Aquifer Recharge Sites**
  - 43 Lots Hollow Road
  - Cloverleaf Site at Route 6 Exit 12
  - 223 Beach Road
- ❖ **Other Locations for Future Investigations?**





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Thank You