Orleans Water Quality Advisory Panel

Water Quality and Wastewater Planning

Program Status Update

December 14, 2016

Agenda

- **Approval of Meeting Minutes of October 19, 2016 and November 9, 2016**
- **Public Comment**
- **Tri-Town STP Decommissioning and Demolition Update**
- **NT Technology Demonstration Project Status**
- **Downtown 25% Design Update**
  - Exit 12 Groundwater Disposal Site Status
  - Other Downtown Area Disposal Sites
  - Plan for Update of Downtown Area Collection System Preliminary Design (Workshop #1)
- **Monitoring and Modeling Plan (AMP) Update**
- **Break**
- **Freshwater Ponds Planning Update**
- **Amended CWMP Document: Next Steps**
- **Update and Preliminary Results of Financial Analyses**
- **Other Items & Public Comment**

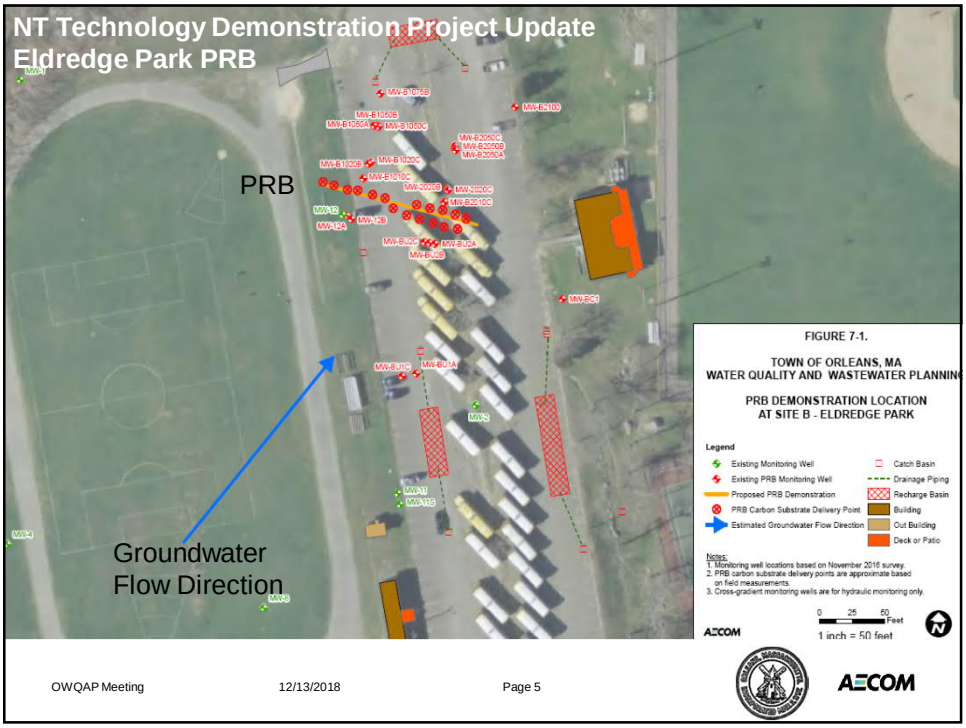
Tri-Town Septage Treatment Facility Decommissioning and Demolition Update

- **Decommissioning Plan**
  - Completed
- **Design Phase**
  - Completed
- **Schedule**
  - Bid Advertisement: December 7, 2016
  - Mandatory Pre-Bid Conference: January 11, 2017 at 10:00 am
  - Bid Opening: February 8, 2017 at 9:00 am
  - Town Meeting Appropriations (Brewster, Eastham & Orleans) – May 2017
  - Demolition – September 2017 thru April 2018
- **Estimated Construction Costs**
  - Tri-Town Septage Treatment Facility: $2,300,000
  - Compost Shelter: $450,000

NT Technology Demonstration Project Update Aquaculture

- **Lonnies Pond Project - Shellfish Maintenance / Overwintering and Water Quality Monitoring Ongoing**
- **Kent's Point Oyster Bed Propagation – Working with Working Group to Finalize Location and Begin Implementation**
- **Enhanced Aquaculture in Pleasant Bay and Town Cove – Questionnaire being Finalizing for targeted communication with Growers (thoughts on actions required to increase shellfish propagation, current constraints on ability to expand, etc.)**
- **Town Cove Project - Quahog Inventory Survey Beginning**
  - SMAST to maximize work to local parties

NT Technology Demonstration Project Update
Eldredge Park PRB

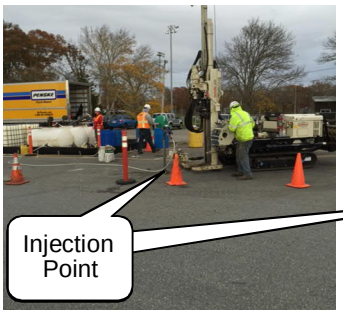


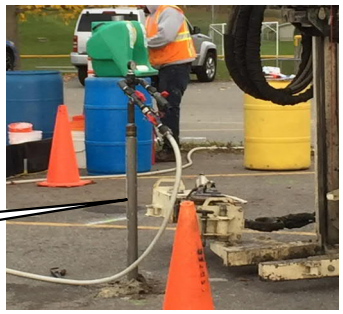
AECOM

NT Technology Demonstration Project Update
Eldredge Park PRB - Example Injection Point Data

Injection over 32 feet interval bottom to top

Date Completed	Injection Point ID	Screen Interval (ft bgs)	Diluted EVO Injection Time (mins)	Diluted EVO Volume (gal)	SRS-NR Flow Rate (gpm)	Well Head Pressures (psi)
16-Nov-16	W-3	64-68	8	75	9.38	6
16-Nov-16	W-3	60-64	10	75	7.50	10
16-Nov-16	W-3	56-60	18	75	4.17	18
16-Nov-16	W-3	52-56	8	75	9.38	16
16-Nov-16	W-3	48-52	7	75	10.71	8
16-Nov-16	W-3	44-48	11	75	6.82	16
16-Nov-16	W-3	40-44	13	75	5.77	16
16-Nov-16	W-3	36-40	9	75	8.33	16





AECOM

NT Technology Demonstration Project Update
Eldredge Park PRB - Installation and Testing

- **Initial testing of PRB monitoring wells - baseline concentrations measured as high as 35 mg/L nitrate-nitrogen**
- **Wide range of nitrate concentrations at different sampling locations**
- **PRB Injection Completed week of 14 November**
  - No migration of EVO detected during injection (monitoring turbidity and dissolved organic carbon at 10, 20, 50 and 100 feet downgradient)

Permeable Reactive Barriers - Landfill Site

- **Prepared investigation plan and cost for additional wells to assess 1,4-dioxane and nitrogen flux**
- **Prepare response to comments received regarding Town Cove nitrogen and septage lagoons on 10/13/16**
- **Update of nitrogen flux estimate and rerun of MEP model with new boundary condition to update threshold reduction**
- **Evaluation of data and recommended plan for FY2018 Warrant**
- **Plan to address 1,4 Dioxane**
  - Working with Town Departments and DEP to expedite dioxane solution
  - Test all wells downgradient of landfill for total N, nitrate, ammonia, dioxane as required by DEP
  - Field confirm and map remaining potable and non-potable wells
  - Map water system and determine cost to connect potable wells to system
  - Confirm with DEP adequacy of plan and additional requirements

NT Technology Demonstration Project Update
Nitrogen Reducing Barriers (NRB)

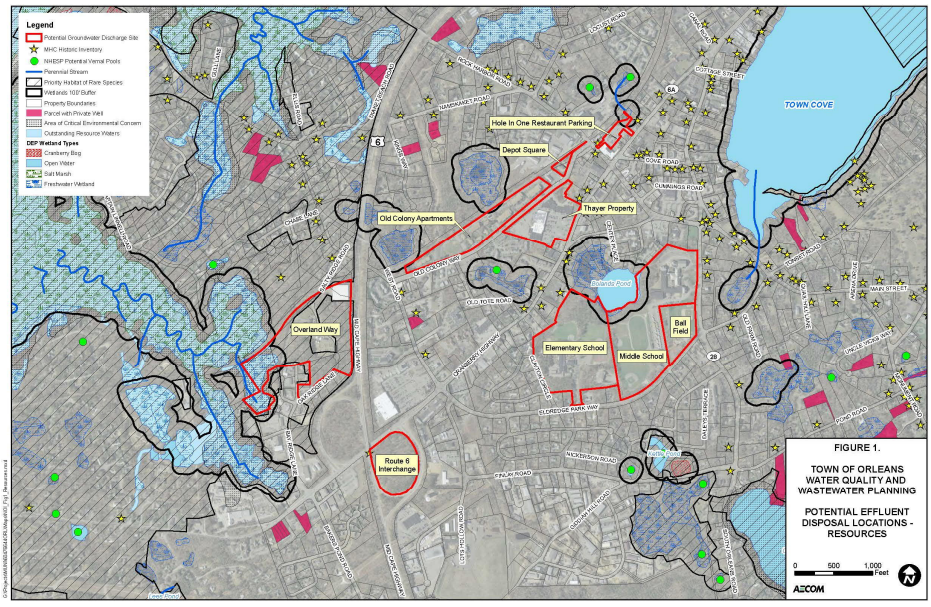
- **AECOM Prepared a Draft Technical Memorandum on On-Site Horizontal Nitrogen Reducing Barriers Feasibility – 10/06/16**
- **Coordinating with County Department of Health:**
  - Confirmed County Site Requirements for Demonstration Projects
    - Flat, residential site preferred
    - 2.2 times square footage for Title 5 system
    - 8 to 9 feet depth to groundwater
    - Compliant Title 5 system in place or to be constructed
    - Drip disposal systems acceptable
    - Two monitoring wells per system required (to be installed)
  - Working with Bob Canning to identify candidate sites in Orleans
  - County targeting $10,000 assistance per project for materials and installation
  - $300,000 state aid to County not appropriated yet.

Downtown Area Preliminary Design Report - 25% Design

- **Scope of Work**
  - Completing topography, subsurface investigation and cultural resource evaluation
  - Evaluating all 391 lots using information on existing system, elevation data
  - Update collection technology evaluation and refine system configuration
  - Update preliminary WWTF process design
  - Two workshops planned: December 20, 2016 and date TBD in early 2017
  - Prepare 25% design data & updated program cost estimates
- **Key Scope of Work Products**
  - Recommend system configuration, technologies and costs
  - Preliminary phasing plan based
  - Evaluation of D/B and D/B/O options and recommend procurement plan

Downtown Area Effluent Disposal Evaluation

- Overland Way – Site 1/1A
- Route 6 Interchange (Exit 12 Cloverleaf)
- Thayer Site (Orleans Market Place)
- Old Colony Apartments (Old Colony Way)
- Hole in One Restaurant (Cranberry Highway)
- Depot Square (Old Colony Way)
- Orleans Elementary School (46 Eldredge Parkway)
- Nauset Regional Middle School (70 Eldredge Parkway)
- Firebirds Ball Field (76 Eldredge Parkway)



Downtown Area Effluent Disposal Evaluation (cont.)

Evaluation Criteria

- **Site Suitability**
  - Property Ownership
  - Distance from WWTF
  - Site Topography
  - Uses of Site
  - Depth to Groundwater
  - Potable Water Wells
  - Land Area Available for Discharge
- **Other Considerations**
  - Community Considerations
- **Permitting**
  - Wetlands
  - ACEC
  - Priority/Estimated Habitat of Rare Species
  - MHC Sites
- **Engineering Factors**
  - Nitrogen Impacted Estuary
  - Results of Previous Studies
  - Effluent Quality - Nitrogen
  - Groundwater Discharge Method(s)

Downtown Area Effluent Disposal Evaluation (cont.)

Potential Effluent Discharge Location	Score	Rank
Overland Way – Site 1/1A	1	1
Route 6 Interchange (Exit 12 Cloverleaf)	4	4
Thayer Site (Orleans Market Place)	3	2
Old Colony Apartments (Old Colony Way)	7	7
Hole in One Restaurant (Cranberry Highway)	9	9
Depot Square (Old Colony Way)	5	5
Orleans Elementary School (46 Eldredge Parkway)	6	6
Nauset Regional Middle School (70 Eldredge Parkway)	2	2
Firebirds Ball Field (76 Eldredge Parkway)	8	8

Downtown Area Effluent Disposal Evaluation (cont.)

- **Overland Way (1)**
  - Pros – Town Owned, Discharge Most/All Flow, Adjacent to Proposed WWTF, Well Studied Site (USGS), Previously Approved for Groundwater Discharge, Discharge to Watersheds with no Nitrate TMDL, Several Discharge Options.
  - Cons – Near ACEC, wetlands, Priority/Estimated Habitat of Rare Species, and MHC sites.
- **Route 6 Interchange (4)**
  - Pros – Near Proposed WWTF, Discharge Most/All Flow, Depth to Groundwater, Several Discharge Options.
  - Cons – Owned by State (MassDOT), Partial Discharge to Watershed with Nitrate TMD, Near ACEC, wetlands, Priority/Estimated Habitat of Rare Species, and MHC sites.
- **Thayer Site (2)**
  - Pros – Approved Groundwater Discharge Permit.
  - Cons – Not Town Owned, Some Discharge to Watersheds with Nitrate TMDL, Discharge below Projected, Limited Discharge Options.

Downtown Area Effluent Disposal Evaluation (cont.)

- **Old Colony Apts. (7)**
  - Pros – Has Existing Septic Discharge.
  - Cons – Not Town Owned, Some Discharge to Watershed with Nitrate TMDL, Discharge below Projected Flow, Limited Discharge Options.
- **Hole in One Rest. (9)**
  - Pros – Has Existing Septic Discharge,
  - Cons – Not Town Owned, Some Discharge to Watershed with Nitrate TMDL, Discharge below Projected Flow, Limited Discharge Options.
- **Depot Square (5)**
  - Pros – Town Owned.
  - Cons – Small Parcel, Some Discharge to Watershed with Nitrate TMDL, Discharge below Projected Flow, Limited Discharge Options.

Downtown Area Effluent Disposal Evaluation (cont.)

- **Orleans Elementary School (6)**
  - Pros – Town Owned, Existing Septic Discharge.
  - Cons – Discharge to Watershed with Nitrate TMDL Cannot Discharge Projected Flow, Limited Discharge Options.
- **Nauset Regional Middle School (2)**
  - Pros – Approved Groundwater Discharge Permit, Discharge Most/All Flow, Proposed PRB (Nitrate Reduction).
  - Cons – Not Town Owned, Discharge to Watershed with Nitrate TMDL Limited Discharge Options.
- **Firebirds Ball Field (8)**
  - Pros – Town Owned.
  - Cons – Discharge to Watershed with Nitrate TMDL, Cannot Discharge Projected Flow, Limited Discharge Options.

Monitoring and Modeling Plan (AMP) Update

- **SMAST Scope of Work and Delivery Commitment**
  - Report on Meeting with SMAST (Howes and Eichner)
- **Cedar Pond and Rock Harbor Creek Update**
  - Still awaiting response yet from MEPA
- **Namskaket Management Plan**
  - Convening scoping team
  - Layout planning team, goals, approach and first steps

Monitoring and Modeling Plan (AMP) Update
SMAST Technical Assistance: FY17/18 Scope

- **Water Quality Project Baselines**
  - Marine and fresh waters
  - Organize WQ data base, QA/QC, gap analyses
  - Baselines for demonstration projects
- **Shellfish Demonstration Project Implementation**
  - Lonnies Pond continuation
  - Town Cove quahog inventory
  - Kent's Point demonstration plan
  - Expansion of existing grants
- **MEP Model Updates**
  - Pleasant Bay MEP prep in cooperation with PBA Towns
  - Nauset: Remodel/confirm N thresholds with new boundary condition and nitrogen flux estimates

Monitoring and Modeling Plan (AMP) Update (cont.)
SMAST Technical Assistance: FY17/18 Scope

- **Cedar Pond – Rock Harbor Creek Planning**
  - Monitoring and technical assistance
  - Preliminary alternatives review for plan update...or
  - Rerun MEP for saline Cedar Pond and evaluate
- **Namskaket Watershed Plan (with Brewster)**
  - Consolidate and review data bases
  - Define stresses, threats
  - Scope additional studies and watershed plan scope
- **Fresh Water Ponds**
  - Update and organize data base
  - Update pond trophic screening and prioritization
  - Develop draft plan and budget for priority project

Town of Orleans Massachusetts

Break

Fresh Water Ponds Planning Update

- **Convened Work Group: First Meeting on November 29**
- **Meeting: Tuesday, December 13, 1:00 PM Nauset Room**
  - Presentation on DPW Stormwater Program
  - How to link stormwater program to Freshwater Ponds Planning
  - Process for updating of ponds prioritization (from 2007 CWMP work)
  - Refine SMAST scope to fit Ponds Work Group needs
- **Consolidate/update/review data bases**
- **Update pond impairment screening**
- **Shortlist and recommend initial pond project**
- **Develop implementation scope and budget for Spring TM**

Update and Preliminary Results of Financial Analyses

❖ New Financial Scenarios Modeled

- Model runs conducted in October-November demonstrate how user costs affected by interest rate, length of borrowing, grant funding, use of alternative procurement methods, and allocation of costs among different user groups

.

- Latest model results organized to show seven "Cases" to demonstrate effects of putting all capital costs for all program components (traditional and non-traditional) on tax rate (at request from Finance Committee)
- The user costs in following Table reflect average costs based on number of users for each area. Linkage of model to water use data and property assessments by parcel is in process with results available in January
- Using actual water use and property assessment data will increase some user costs while decreasing others, compared to average costs.

.

Update of Public-Private Partnership and Financial Evaluations (cont.)

Example Cases (Finance Committee Request: All Capital Costs on Taxes)

- **Case A, Baseline**: 100% capital cost on tax rate; 100% O/M/R/R on user charge; 4% conventional financing; 20 years
- **Case B, Historic EPA Grant Funding**: Same as Case A but with 90% Grant/Loan forgiveness with balance of capital cost using conventional financing
- **Case C, Introduce SRF at 2% Financing**: Same as Case A but 2% SRF financing instead of 4% conventional financing
- **Case D, Introduce 0% SRF Financing**: Same as Case C but 0% instead of 2% SRF financing
- **Case E, Introduce the 25% Grant/Loan Forgiveness**: Same as Case D but with 25% Grant/Loan forgiveness with balance of capital cost at 0% financing
- **Case F, Extend Borrowing:** Same as Case E but extend borrowing to 30 years
- **Case G, Multiple Discounts:** Same as Case F but also include D/B/O with 21% savings on capital and additional 7% savings on O&M; 5% local options tax savings; septage revenue; and reduce contingency on capital from 25% to 15%

Town of Orleans
Water Quality and Wastewater Planning Program
Compatible with Cost Estimates Version 44
Customer Rate Scenarios

Assumptions	Case A (Baseline) Capital - 100% Tax O&M&R&M - 100% User Fees Financing - 4% 20-year Conventional	Case B Same as Case A, including Conventional Financing, plus 90% Grant/Loan Forgiveness	Case C Same as Case A, but with 2% SRF Financing	Case D Same as Case A, but with 0% SRF Financing	Case E Same as Case D plus 25% Grant/Loan Forgiveness	Case F Same as Case E, but with 30-year SRF Financing	Case G Same as Case F, plus 25% Grant, 21% D/B, 7% D/B/O, 5% Local Options Tax Savings, Septage Revenue, and Contingency for Capital/ Replacement costs reduced from 25% to 15%
Special Assessment	0%	0%	0%	0%	0%	0%	0%
Bond Years	20	20	20	20	20	30	30
Interest on Bond	4%	4%	2%	0%	0%	0%	0%
Grant / Loan Forgiveness	0%	90%	0%	0%	25%	25%	25%
Design / Build	0%	0%	0%	0%	0%	0%	21%
Design / Build / Operate	0%	0%	0%	0%	0%	0%	7%
Septage Revenue (Annual)	$0	$0	$0	$0	$0	$0	$584,000
Local Options Tax	0%	0%	0%	0%	0%	0%	5%
Total Equivalent Annual Cost	$6,780,184	$3,727,780	$6,367,869	$5,832,577	$5,221,589	$5,235,024	$4,682,510
Capital Costs							
Downtown Area	$44,370,400	$4,437,040	$44,370,400	$44,370,400	$33,277,800	$33,277,800	$24,506,274
Meetinghouse Pond Area	$30,445,400	$3,044,540	$30,445,400	$30,445,400	$22,834,050	$22,834,050	$16,607,657
Non-Traditional Technology Area	$20,721,100	$2,072,110	$20,721,100	$20,721,100	$15,540,825	$15,540,825	$14,306,175
Totals	$95,536,900	$9,553,690	$95,536,900	$95,536,900	$71,652,675	$71,652,675	$55,420,106
Total Annual Charge							
Downtown Area - Commercial	$2,415	$1,394	$2,277	$2,098	$1,894	$1,692	$1,498
Downtown Area - Residential	$2,415	$1,394	$2,277	$2,098	$1,894	$1,692	$1,498
Meetinghouse Pond Area	$2,820	$1,798	$2,682	$2,503	$2,298	$2,097	$1,672
Non-Traditional Technology Area	$1,634	$612	$1,496	$1,316	$1,112	$910	$648
Septic System Only	$1,135	$114	$997	$818	$614	$412	$319

Footnotes:
Capital and financing costs are recovered via an increase in property taxes with each property in Town paying an equal amount.
Annual costs (O&M, replacement, and monitoring) are recovered via user charges with each area's users paying an equal share of that area's annual costs.
Replacement cost of conventional on-site systems is $800 annually.
Replacement cost of I/A systems is $1,530 annually and would be required in nitrogen-sensitive areas if non-traditional technologies do not remove desired levels of nitrogen.

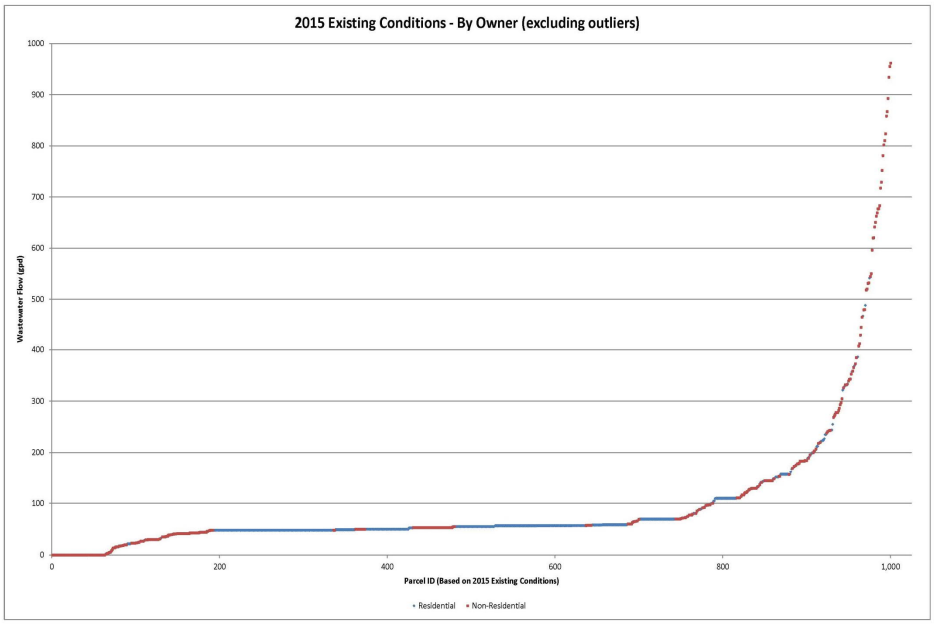
Town of Orleans
Water Quality and Wastewater Planning Program
Customer Rate Scenarios

Assumptions	Case A (Baseline) Capital - 100% Tax O&M&R&M - 100% User Fees Financing - 4% 20-year Conventional	Case B Same as Case A, including Conventional Financing, plus 90% Grant/Loan Forgiveness	Case C Same as Case A, but with 2% SRF Financing	Case D Same as Case A, but with 0% SRF Financing	Case E Same as Case D plus 25% Grant/Loan Forgiveness	Case F Same as Case E, but with 30-year SRF Financing	Case G Same as Case F, plus 25% Grant, 21% D/B, 7% D/B/O, 5% Local Options Tax Savings, Septage Revenue, and Contingency for Capital/ Replacement costs reduced from 25% to 15%
Total Annual Charge							
Downtown Area - Commercial	$2,415	$1,394	$2,277	$2,098	$1,894	$1,692	$1,498
Downtown Area - Residential	$2,415	$1,394	$2,277	$2,098	$1,894	$1,692	$1,498
Meetinghouse Pond Area	$2,820	$1,798	$2,682	$2,503	$2,298	$2,097	$1,672
Non-Traditional Technology Area	$1,634	$612	$1,496	$1,316	$1,112	$910	$648
Septic System Only	$1,135	$114	$997	$818	$614	$412	$319

Footnotes:
Capital and financing costs are recovered via an increase in property taxes with each property in Town paying an equal amount.
Annual costs (O&M, replacement, and monitoring) are recovered via user charges with each area's users paying an equal share of that area's annual costs.
Replacement cost of conventional on-site systems is $800 annually.
Replacement cost of I/A systems is $1,530 annually and would be required in nitrogen-sensitive areas if non-traditional technologies do not remove desired levels of nitrogen.

Key Issues and Conclusions

- New Runs made only to evaluate ranges based on 100% property tax allocation
- User Fees for O&M&R costs are major factor in total annual rates:
  - Non-Traditional O&M costs are higher than for traditional solutions
  - Monitoring costs and uncertainty of performance are key factors
- "Best Case" Plan (Case G) *average residential* annual charges are above affordability range for sewered areas:
  - Does not reflect demand charge for high water users
  - Does not reflect property valuation factors
  - Does not reflect phasing timeframes for capacity requirements
- Meetinghouse Pond annual charges are higher than downtown due to fewer users with separate WWTP
- Annual costs for unsewered nitrogen sensitive areas on NT Technologies may need to be spread among other categories
- **Overall Factor:** Construction of collection, treatment and disposal systems in one 20- to 30-year program is key difference compared to systems in other built over several generations
  - Program phasing will be imperative



Update and Preliminary Results of Financial Analyses

- **Next Steps**
  - Input implementation phasing plan for program, including Downtown, into model
  - Incorporate water use and property assessment data by January
  - Review O&M and R&R costs to identify any other opportunities to further reduce costs (if possible)
  - Continue to evaluate feasibility of other procurement methods
  - Continue to investigate other state funding sources to further reduce costs to Town
  - Provide update to Downtown user group in January

Amended CWMP Document: Next Steps

- **Updated Draft Amended CWMP submitted to Town 12/02/16**
- **BOS to provide comment and "agreement" on 12/14/16 to distribute the Amended CWMP to CCC and MassDEP for their review and comment on compliance with regulatory processes**
- **Continue to update Amended CWMP throughout Spring 2017**
- **Final Amended CWMP to be completed and submitted by June 30, 2017**

Proposed OWQAP and Other Meetings

- **OWQAP Meeting**
  - January 11, 2017, 9:00 am to Noon
- **Public Information Activities**
  - NT Technologies Working Groups
    - Shellfish Working Group - November 12, 2016, 2:00 pm
    - PRB / NRB Working Group - TBD
    - Downtown Collection System Working Group – December 20, 2016, 1:00 pm
    - Freshwater Ponds Working Group – January 10, 2017
  - Status Reports on NT Demonstration Projects

Other Items and Public Comment

- **Public Comments and Questions**

Town of Orleans Massachusetts

Thank You