

Town of Oak Bluffs

Comprehensive Wastewater Management Planning Project (CWMP)

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October 2019
BOS / Wastewater Commission Joint Meeting



Agenda

- 1 Background
- 2 Needs Assessment Summary (Phase 1)
- 3 Alternatives Analysis (Phase 2)
- 4 Next Steps – Recommended Plan (Phase 3)
- 5 Project Schedule



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CWMP Project Goals

- Comprehensively and effectively manage wastewater and nitrogen in the most cost effective manner while meeting nitrogen TMDLs
- Improve water quality
- Protect public health
- Sustain and enhance the Town's economic vitality and property values
 - Valuation of the Ecosystem Services Provided by Oak Bluffs' Public Coastal Resources (presented at 9/2017 Conservation Committee Meeting)



CWMP Project Highlights

- Build upon WW management and nitrogen studies completed for the original CWMP, Lagoon Pond OB/Tisbury Joint Committee, Martha's Vineyard Commission and others
- Initiate planning for nutrient impacted estuaries (20 year planning period)
- Consider future population growth, economic growth, redevelopment
- Evaluate and recommend wastewater management solutions
- Determine most cost effective solution for wastewater needs



CWMP

Needs Assessment (Phase I) - Establish projected wastewater needs for 20 year planning period

Alternatives Analysis (Phase II) – Review alternatives to meet wastewater needs, develop model and identify alternative scenarios

Recommended Plan (Phase III) - Develop recommended plan to meet wastewater needs, financial plan and schedule



Town Wastewater Planning History

- Oak Bluffs initiated wastewater planning efforts in mid 1970's
- A Comprehensive Wastewater Management Plan (CWMP) was accepted by the Town at Special Town Meetings in 1998 (20 year planning period)
- CWMP recommended construction of a centralized treatment facility
 - Completed in 2002
 - Sized to treat wastewater from lots requiring offsite solutions (small lots, including business district)
- Town has initiated CWMP for planning period 2020 - 2040



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CWMP

Needs Assessment (Phase I)

- Evaluate existing conditions
- Review regulatory requirements
- Assess Town wastewater needs

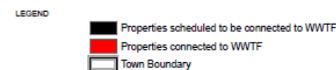
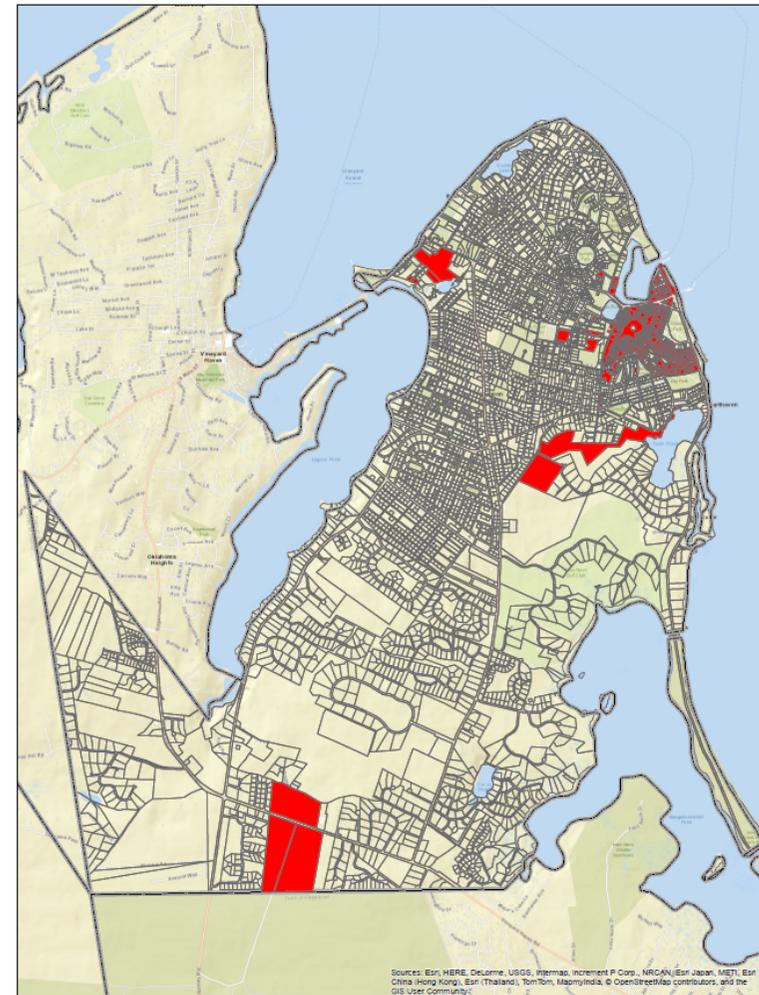
Alternatives Analysis (Phase II)

Recommended Plan (Phase III)



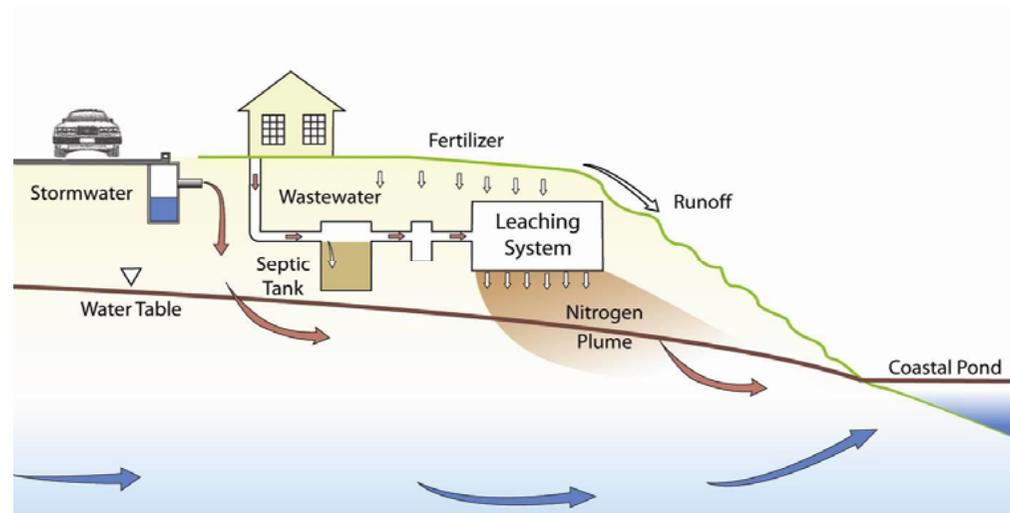
Existing Wastewater Infrastructure

- Majority of properties are served by on-site wastewater disposal systems (septic systems)
 - Septage trucked to other municipalities on Martha's Vineyard
- Centralized wastewater treatment facility (WWTF) constructed in 2002 to treat wastewater from lots requiring offsite solutions (small lots)
 - Majority of properties in the original service area connected to the centralized system
 - Permitted flow = 340,000 gpd



Regulatory Driver

- Massachusetts Estuaries Project (MEP) Reports developed by MassDEP and UMass/SMASST
- Classifies nitrogen sensitivity for southeastern Massachusetts coastal bays and estuaries (identifies degree of nitrogen impairment in water bodies)
- Total Maximum Daily Limits (TMDLs) for nitrogen were established based on findings of report (to restore health of water body)
- TMDLs established for:
 - Lagoon Pond
 - Sengekontacket Pond
 - Farm Pond
 - Lake Tashmoo



Regulatory Driver

- “TMDL Reports” developed based on findings of MEP efforts, but issued by the Commonwealth of Massachusetts
- Communities required to develop plans to restore the health of impaired waterbodies and demonstrate progress toward implementation of the plans (through a CWMP)
- MassDEP monitors progress towards implementation of plans - restoration of waterbodies is an extended process, so MassDEP looks for reasonable progress



Problem Areas

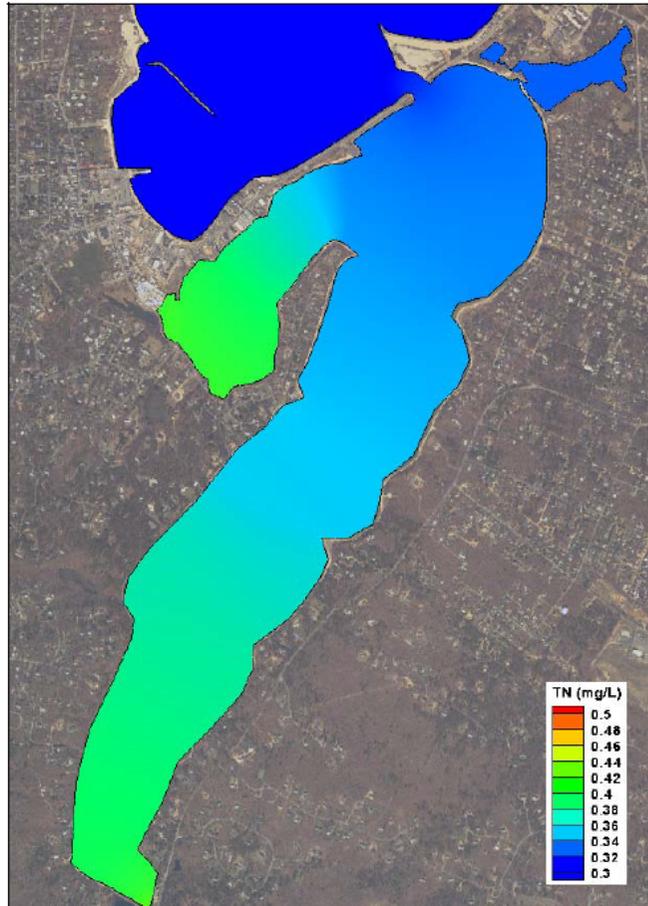


Figure VI-4. Contour plot of average total nitrogen concentrations from results of the present conditions loading scenario, for the Lagoon Pond system.

Lagoon Pond Target Concentration at Sentinel Station = 0.352 mg/L

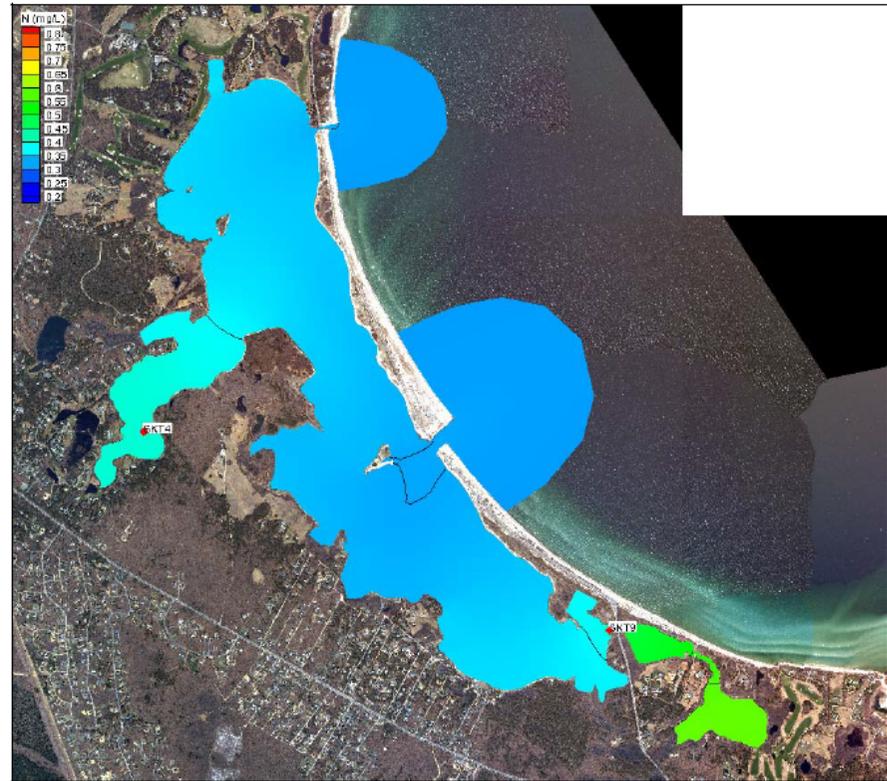
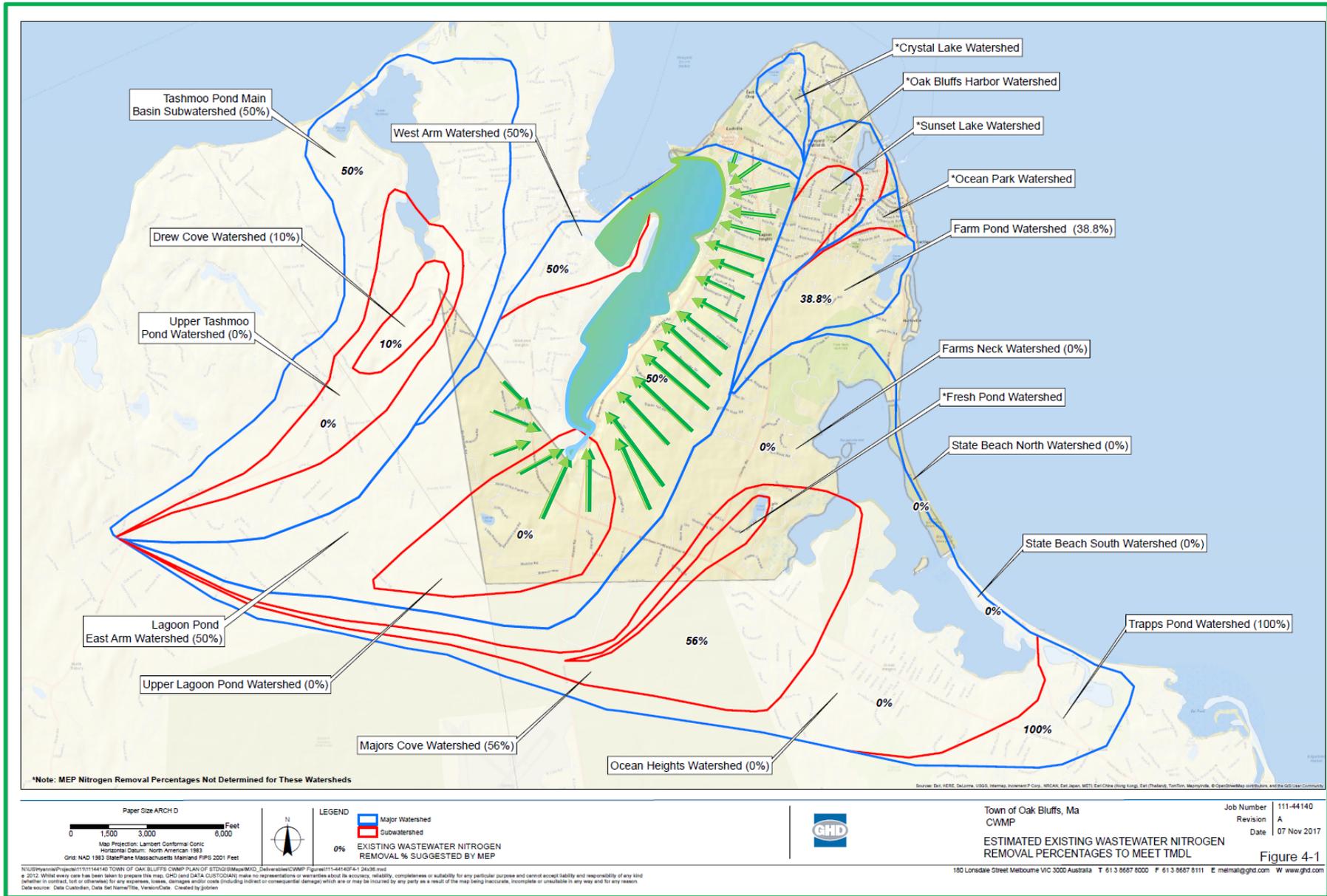


Figure VI-4. Contour plots of average total nitrogen concentrations from results of the present conditions loading scenario, for Sengekontacket Pond System. The approximate locations of the sentinel threshold stations for Sengekontacket Pond System (SKT-4 and SKT-9) are shown.

Sengekontacket Target Concentration at Majors Cove Sentinel Station = 0.354 mg/L



Estimated removal percentages for current conditions – 100% of additional future flow in impaired estuaries will also need to be removed to meet TMDLs

Nitrogen Removal Requirements

Watershed	Estimated 2040 Nitrogen Removal Required in Oak Bluffs (kg/yr)	Estimated equivalent households*
Farm Pond	930	186
Lake Tashmoo	71	14
Lagoon Pond	5,873	1,170
Oak Bluffs Harbor	262	52
Sengekontacket Pond	1,279	256
Total	8,415	1,680

* For comparison purposes only, an individual household contributes approximately 5 kg/yr



Planning Period Wastewater Needs

- Nutrient Management Needs (as identified in MEP reports)
 - Need to meet TMDLs for impaired estuaries
 - Need to accommodate population growth in problem areas
- Centralized wastewater treatment facility
 - Need to accommodate infill properties and consider development within existing collection system (business district and commercial areas)
 - Need to address facility approaching design capacity
 - Need to address facility near end of its design life
- Collection System
 - Need to address pump station equipment near end of design life
 - Need to address pump station vulnerability (3 stations, 100-year flood)



Planning Period Wastewater Needs

- Wastewater needs

	gpd (maximum month)
Existing Flow	244,000
Future Flow	Up to 917,000*
Existing Effluent Disposal Capacity	620,000**
Minimum flow to be addressed by non sewerage solutions	297,000

*** Future Flow allows for growth of up to 3% per year (similar to past CWMP)**

**** Includes portions that will need to be restored**



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CWMP

Needs Assessment (Phase I)

Alternatives Analysis (Phase II)

- Development of alternative solutions for established needs
- Model development
- Screening to identify most feasible alternatives - feasible solutions (technical as well as management) are then grouped into a limited number of alternative scenarios for detailed evaluation.

Recommended Plan (Phase III)



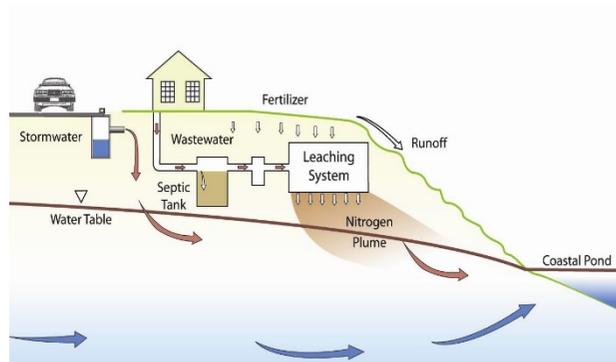
Alternatives Screening

- Waterbody restoration is expected to be accomplished through a mix of alternatives
- Considers all practical solutions
 - Sewering alternatives (On-site Innovative/Alternative Systems, shellfish, permeable reactive barriers, phragmites, composting toilets, zoning solutions for controlled growth, etc.) – many require piloting
 - Decentralized (cluster) collection and treatment
 - Centralized collection and treatment



Alternatives Screening

- Reduction (I/A, WWTF)
 - Treatment before disposal to groundwater
- Remediation (PRBs)
 - Treatment in groundwater
- Restoration (Inlet Widening)
 - Treatment in waterbody



Reduction - Treatment before disposal to ground	Hydroponic Treatment	Restoration - Treatment in water body	Aquaculture - Shellfish Cultivated Above Estuary Bed
	Toilets: Composting		Aquaculture - Mariculture
	Toilets: Incinerating		Inlet / Culvert Widening
	Toilets: Packaging		Coastal Habitat Restoration
	Toilets: Urine Diverting		Floating Constructed Wetlands
	Fertilizer Management		Pond and Estuary Circulators
	Remediation of Existing Development		Surface Water Remediation Wetlands
	Compact and Open Space Development		Pond and Estuary Dredging
	Transfer of Development Rights		Constructed Wetlands - Surface Flow
	Title 5 Septic System Replacement (Base Line Condition)		Constructed Wetlands - Subsurface Flow
	Innovative/Alternative (I/A) Systems		Constructed Wetlands - Groundwater Treatment
	Innovative/Alternative (I/A) - Enhanced Systems		Phytoremediation
	Cluster Treatment System - Single Stage		Stormwater BMP Phytobuffers
Cluster Treatment System - Two Stage	Stormwater BMP - Vegetated Swale		
Conventional Treatment	Stormwater BMP - Gravel Wetland		
Advanced Treatment	Stormwater: Bioretention / Soil Media Filters		
Satellite Treatment	Stormwater: Constructed Wetlands		
Satellite Treatment - Enhanced	Phytoremediation		
	Permeable Reactive Barriers (PRBs) - Trench Method (Aquifer Thickness - 30 feet)	Remediation - Treatment in groundwater	Permeable Reactive Barriers (PRBs) - Injection Well Method (Aquifer Thickness - 30 feet)
	Fertigation Wells - Turf		Fertigation Wells - Cranberry Bogs
	Stormwater Management		

Screening of Alternatives

- Evaluate alternatives based on:
 - Local experience
 - Ability to implement/ add to existing
 - Regulatory requirements/ status (pre-approval vs pilot)
 - Other factors
 - Relative capital costs (compared to sewerage)
 - Relative operations and maintenance costs
 - Flexibility
 - Environmental considerations including energy use and sensitive environmental receptors
 - Effluent quality
 - Potential for air emissions/odors
 - Land requirements
 - Anticipated public acceptance
 - Ease of implementation
 - Maintenance requirements and complexity of operation



Development of Wastewater Management Options

- Use model to evaluate applicability of alternatives (ie. I/As)
- With input from the Town identify up to 3 options for cost evaluation while continuing consideration of reliability, regulatory status, etc.
- Ultimate selection of preferred option will be part of the Recommended Plan
- Goal: Accommodate wastewater needs in an efficient and cost effective manner



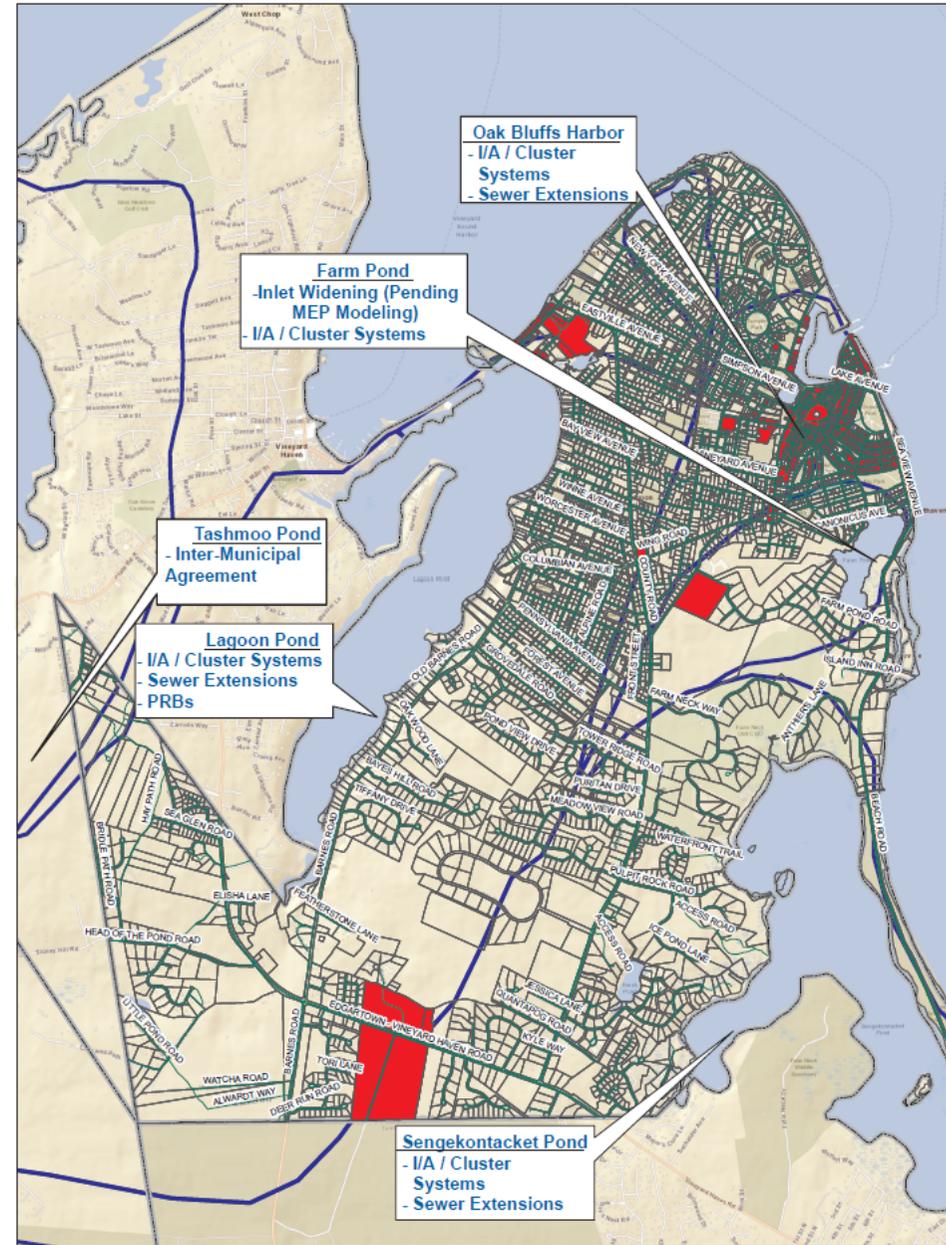
Options

- Option 1
 - TMDL compliance achieved by optimizing non-sewering nitrogen removal alternatives including:
 - Inlet widening
 - I/A systems (10 mg/L TN)
 - Cluster systems
 - PRBs
 - Centralized collection & treatment
- Option 2
 - TMDL compliance achieved by using only MassDEP approved technologies
 - Inlet widening
 - I/A systems (19 mg/L TN)
 - Cluster systems
 - Centralized collection & treatment
- Option 3
 - No action alternative



Option 1

Watershed	Nitrogen Removal Required (kg/yr)
Farm Pond	930
Lake Tashmo	71
Lagoon Pond	5,873
Oak Bluffs Harbor	262
Sengekontacket Pond	1,279
Total	8,415



LEGEND

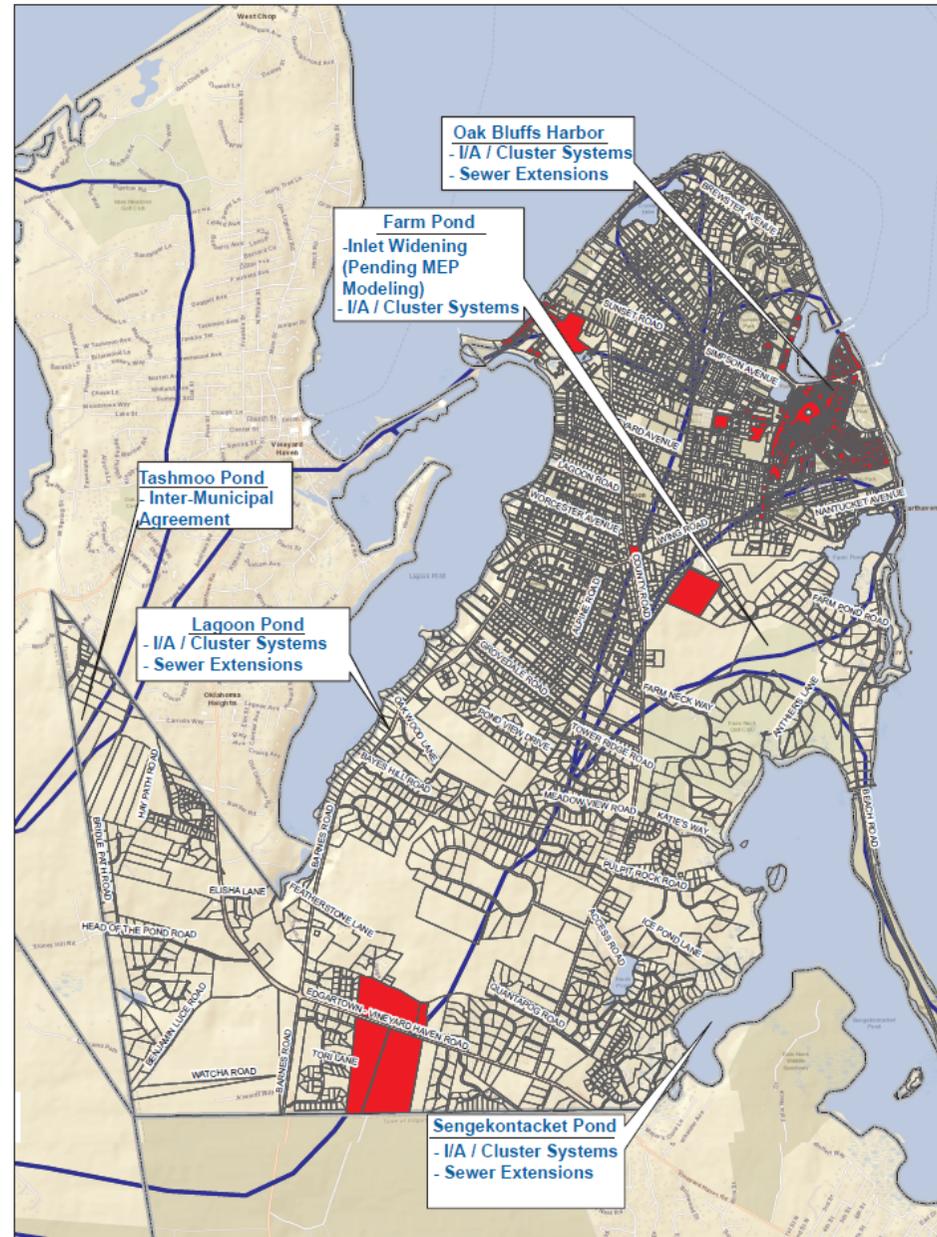
- Existing Sewered Parcel
- Major Watershed Boundaries

Note: I/A Total Nitrogen Effluent Concentration = 19 mg/l



Option 2 (Backup)

Watershed	Nitrogen Removal Required (kg/yr)
Farm Pond	930
Lake Tashmoo	71
Lagoon Pond	5,873
Oak Bluffs Harbor	262
Sengekontacket Pond	1,279
Total	8,415



LEGEND
■ Existing Sewered Parcel
▬ Major Watershed Boundaries

Note: I/A Total Nitrogen Effluent Concentration = 19 mg/l



Option 3 – No Action

- Financial impacts may include:
 - MassDEP Consent Order to achieve TMDLs and associated fines for not doing so in a timely manner
 - Potential litigation
 - Loss of future funding for projects through SRF or other means



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CWMP

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Alternatives Analysis (Phase II)

Recommended Plan (Phase III)

- Development of a Recommended Plan to meet established wastewater needs
- Financial Plan
- Implementation Plan
- Schedule

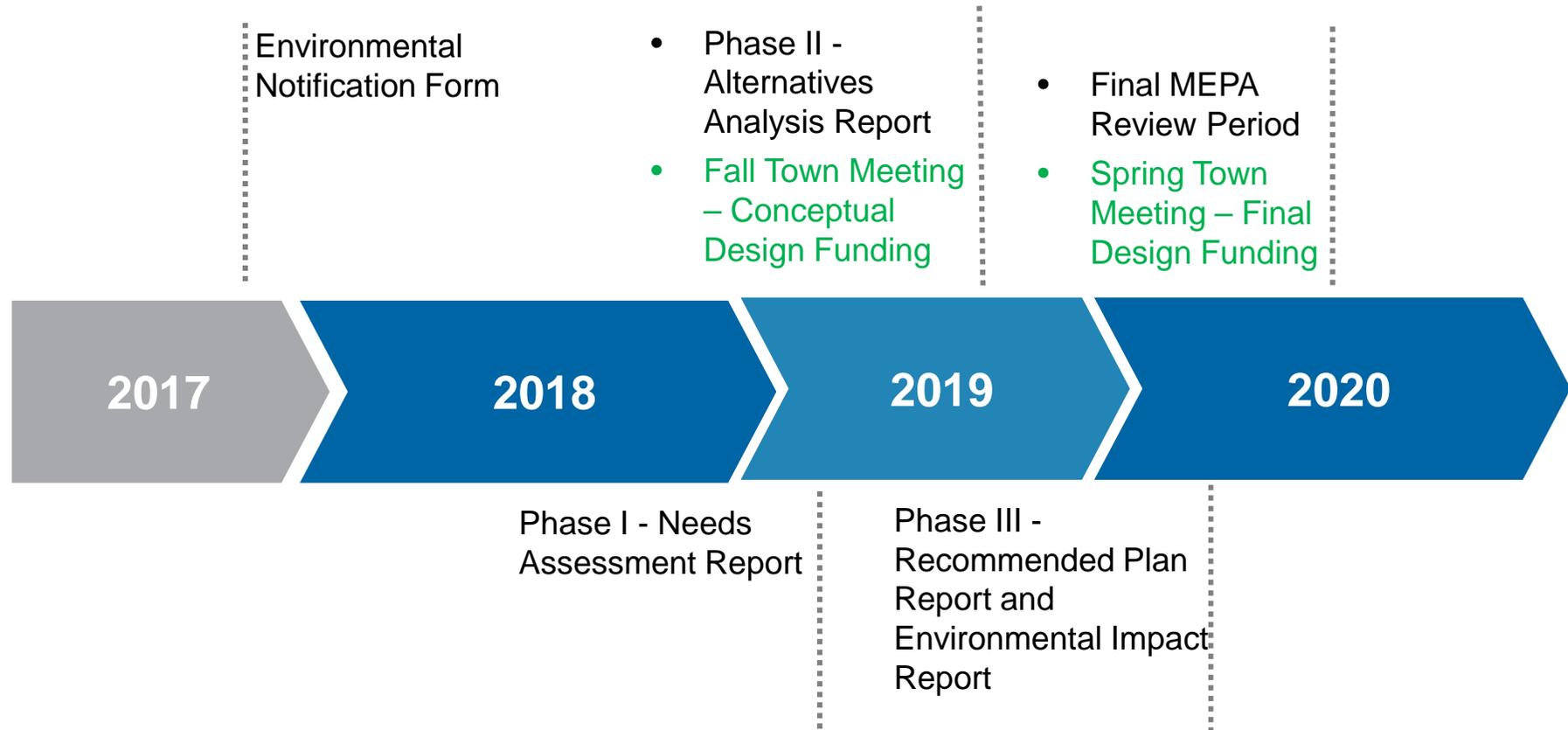


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Tentative Project Schedule



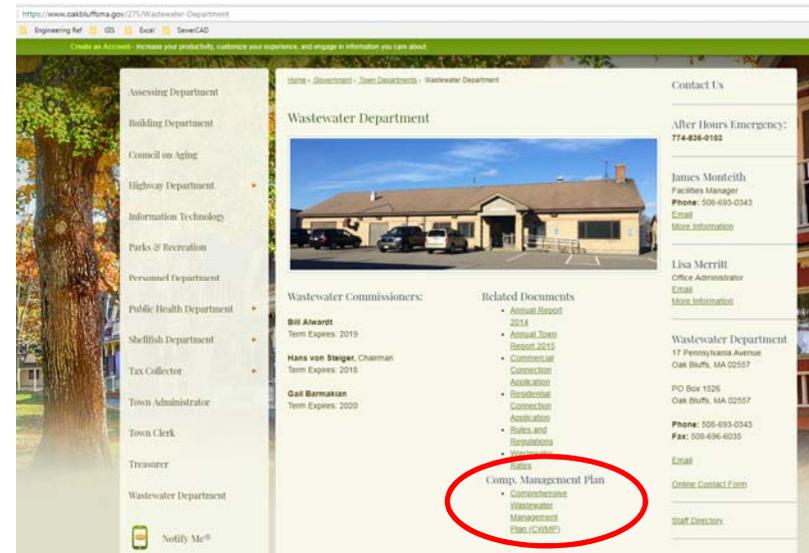
Next Steps

- Finalize Phase II and initiate work on Phase III
- Phase III cost effective analysis and development of recommended plan
- Public hearing/MEPA review
- Finalize the CWMP



Public Participation

- Environmental review (MEPA) – Publicly available documents
- Public Involvement - Board of Selectmen, Wastewater Commissioners, Finance Committee, Capital Planning Committee, Planning Board
- Website





Questions and Discussion