AECOM
9 Jonathan Bourne Drive
Pocasset, MA 02559
www.aecom.com

508.833.6950 tel
508.833.6951 fax

Memorandum

To	George Meservey, Director of Planning & Community Development Michael Domenica, PE, Program Manager
CC	Betsy Shreve, AICP, AECOM Project Director Sia Karplus, Science Wares, Inc. Paula Winchell, AECOM
Subject	**Town of Orleans, MA** **Water Quality and Wastewater Planning** **Task Number 4 – Adaptive Management Plan – Deliverable 4.f.6 - Final Technical Memorandum for Stormwater and Fertilizer Monitoring**
Project Number	60476644
From	Thomas Parece, P.E., AECOM Project Manager
Date	05/25/16

1. Purpose of Technical Memorandum (TM)

The Town of Orleans has taken a proactive approach to implementing stormwater and fertilizer management for water resources protection. Two separate consultants are currently providing evaluations related to stormwater and fertilizer, including GHD, Inc., and AMEC Foster Wheeler. In addition, Orleans submitted a NPDES Phase II Small MS4 General Permit Annual Report to the Environmental Protection Agency in April 2016, included as Appendix A. The purpose of this Technical Memorandum is to summarize and present results from these studies that are relevant to the town's Adaptive Management Plan under the Amended CWMP currently being developed and how the stormwater and fertilizer programs will impact the wastewater management requirements and plans going forward.

2. Description of Stormwater Programs

A. Outfall Evaluations

In 2013, GHD, Inc. prepared a detailed report on stormwater outfalls in Orleans entitled *Orleans Town-Wide Preliminary Stormwater Assessment* (Appendix B). This report contains the following sections:

- Fact Sheet for public education and outreach regarding stormwater issues;
- Conceptual Cost Estimate Memorandum that provide an "order of magnitude" cost for addressing the 98 stormwater outfalls identified as part of the preliminary stormwater assessment;

- Stormwater Mitigation Team Presentations that provide details on the project scope, Massachusetts Estuaries Project (MEP) stormwater nitrogen (N) assumptions and loadings, technologies for stormwater N removal, and the finding of the outfall evaluations (e.g., contributing areas, site visit findings, base calculations and data sources). A possible approach for prioritizing stormwater planning efforts as well as a revised Town Drainage Code is also described;

- Sampling Plan that summarizes existing stormwater sampling data and details a plan for future stormwater sampling;

- Outfall Worksheets that describe the drainage area and existing conditions for 98 stormwater outfalls, including photo documentation;

- Outfall Location Map for all areas affected by Massachusetts List of Impaired Waters (303d) listings. Map is also provided in a GIS format; and

- Outfall Prioritization Spreadsheets including a matrix of categories and a set of rules for a ranking system, as well as three outfall prioritization tables based on three different considerations.

    - Prioritization based on Public Benefit;

    - Prioritization based on Phosphorous (P) Sensitivity; and

    - Prioritization based on Watershed N Sensitivity.

The following outfalls that are identified on the Outfall Prioritization Spreadsheets are located within watersheds with *very high* sensitivity to N:

- Loomis Lane (Meetinghouse Pond subembayment);

- 19 School Road (Meetinghouse Pond subembayment);

- 69 Barley Neck Road.(Little Pleasant Bay subembayment);

- 30 Cedar Cover/Barley Neck Road (Lower River subembayment);

- 2 Pochet Road (Pochet subembayment);

- 37 High Tide Lane (Meetinghouse Pond subembayment); and

- 18 Karen Way (Meetinghouse Pond subembayment).

There are over fifty outfalls identified within watersheds with *high and medium* sensitivity to N. The following are in subembayments that are listed on the Massachusetts Integrated List of Waters (303d) and have been assigned a Total Maximum Daily Load (TMDL) for N.

- 142 Portanimicut Road (Pah Wah subembayment);

- 158 Namequoit Road (Pah Wah subembayment);

- 5 Asas Landing Town Cove subembayment);

- 24 Ridgewood Road (Namequoit/Paw Wah subembayment border);
- 9 Samoset Road (Pochet subembayment);
- 35 Countryside Drive (Pochet subembayment);
- 100 Namequoit Road (Namequoit subembayment);
- 37 Monument Road (Upper River subembayment);
- Intersection of Harwich Road and Rt. 28 (Pleasant Bay subembayment); and
- 50 Winslow Road (Sarah's Pond watershed).

Appendix C includes a spreadsheet with the preliminary classification of the stormwater systems in Orleans that was developed as part of the 2013 Orleans Town-Wide Preliminary Stormwater Assessment.

In March 2016, GHD, Inc. was contracted to complete the following Scope of Services as a continuation of the preliminary assessment effort that was completed in 2013. The following tasks are scheduled to be completed in the fall of 2016.

- Classify 35 stormwater systems by type of Best Management Practice (BMP), such as leaching basin, infiltration, bio-filter and constructed wetland;
- Perform a field review of each BMP including visual observation of exterior and interior components (if applicable). Field inspection will include visual review of structural condition (if any visual stresses are shown), review of infiltration pores to determine functionality (if applicable), review of surface material and profile to determine functionality, and review of current status of surface ground conditions. Surface treatment systems will also be reviewed for vegetative health and condition of plantings. Any irregularities observed in the BMPs will be documented;
- Provide an Operation and Maintenance (O&M) guidance document for each type of stormwater BMP that is classified including a recommendation for the frequency of the maintenance schedule for each of the 35 BMPs; and
- Create an inventory spreadsheet of installed BMPs to include system type, installation date (if known), maintenance requirements and other relevant attributes.

B. AMEC Stormwater Projects

In 2014 AMEC Foster Wheeler was contracted to perform a stormwater and nutrient management analysis. The purpose of this project is to evaluate stormwater management town-wide, conduct an initial analysis of pollutant loads, identify current and future mitigation practices and define a cost-effective strategy to meet town water quality improvement goals. A key deliverable of this project is a comprehensive GIS database layer that can be updated with new information over time to refine and update the town's stormwater management program. This project began in 2014 and is expected to be completed by the end of 2016. The main tasks included in this project are data collection, baseline mapping, calculating current baseline stormwater nutrient and pathogen loads, defining a set of stormwater BMPs to meet the town's goals for reducing stormwater pollution (both nutrients and pathogens) and evaluating this program in terms of dollars per pound of nutrients or counts of pathogens remediated.

The result of the data collection and baseline mapping tasks will be a GIS layer that represents baseline pollutant loads from stormwater runoff that is input to using a stormwater analysis tool entitled AMEC Load Estimation and Reduction Tracking (ALERT). This GIS layer is being assembled by consolidating GIS layers and associated data from a variety of sources, including MassGIS and work of other consultants for Orleans as well as incorporating outfall drainage area and water quality data.

In order to evaluate the potential for BMPs to reduce stormwater pollution, a separate GIS layer is being assembled that includes the suite of stormwater BMPs that are currently installed as well as conceptual BMPs developed as part of the Orleans Town-Wide Preliminary Stormwater Assessment. This GIS layer will include the calculated load reductions attributable to these BMPs. New potential BMPs will also be identified as part of this task and information on groundwater flow patterns will be reviewed as it relates to selection of appropriate BMPs. Once the specific mix of new and existing BMPs is defined, the ALERT tool will be used to evaluate several aspects of the overall stormwater management plan for Orleans, including:

- Pollutant reduction achieved by the specific mix of BMPs;
- Additional acres of catchment area to be treated to meet nutrient and pathogen reduction goals; and
- Total costs (installation and O&M) associated with this program.

A Technical Memorandum (TM) will be produced by the end of 2016 that documents this stormwater plan, and includes a description of the methodology used to define this plan, including the AMEC tool. This TM will also define a number of key parameters related to stormwater planning, such as:

- Baseline stormwater pollutant loads;
- Existing stormwater BMPs and pollutant-removal benefits;
- Pollutiant-removal benefits of proposed stormwater BMPs;
- Prioritization of stormwater management basins (watersheds);
- Evaluation of proposed BMPs, benefits and costs.

Proposed and previously-installed BMPs, will likely result in reductions in N, P and total suspended solids. An important finding of this TM will be the quantification of nutrient reductions associated with the town's ongoing stormwater BMP program. This TM will also report on the feasibility of retrofitting certain existing BMPs to enhance pollutant removal. In addition, project costs will be used to calculate dollars per kilogram for removal associated with stormwater BMPs. It is expected that this plan will identify specific stormwater projects to be installed based on funding availability.

This effort is anticipated to be completed by the fall of 2016 and will be used as the basis for defining future capital projects to design and install stormwater BMPs for water quality improvement and should be used when the Massachusetts Estuaries Project updates the model and reports for Pleasant Bay and Nauset Harbor. Target N reductions will thus reflect Orleans-specific stormwater loads. Information related to stormwater-derived phosphorus should be included in the development of a Ponds Management Plan in FY 2017.

C. NPDES Phase II Small MS4 General Permit Annual Report

This annual report states that the town is continuing to evaluate program needs based on the draft 2014 Phase II Permit and using these evaluations and other activities (e.g., Comprehensive Wastewater Management Plan and BMP projects) to continue developing a Stormwater Management Plan (SWMP). The following key stormwater management planning activities were listed in this annual report:

- Detailed mapping of the downtown area was conducted SMC Engineering, Inc. to identify all municipal infrastructure with an emphasis on drainage and other utilities. This effort was coordinated with Green Seal Environmental, Inc. to complete the mapping of drainage systems through the remainder of the Town. The result of these efforts will be a field verified drainage map that identifies each structure, pipe and existing stormwater BMP. The mapping effort is substantially complete and will be finalized in the summer of 2016.

- There were several stormwater projects completed since May 1, 2015 that were identified in the town's 2016 NPDES permit:

    - Eldridge Playground Improvement Project – tree plantings and improvements were completed in April 2016 to infiltrate stormwater from the tennis courts;

    - Rock Harbor Dredging – completed in spring 2015;

    - Rock Harbor Parking Lot – stormwater improvement BMPs were designed and construction will be completed in early 2017;

    - Portanimicut Road – design began for stormwater improvements (infiltration and erosion control) to be constructed in 2016;

    - Gibson Road – outfall improvements (infiltration) are under design for the direct discharge to Town Cove;

    - Rock Harbor Road – design began for multiple locations to provide stormwater treatment (infiltration) for direct outfalls.

As part of the NPDES planning process, the town's stormwater mitigation efforts are reviewed on an ongoing basis by the Stormwater Team, which consists of the DPW and Natural Resources Director, DPW Manager, Town Planner, Health Agent, Conservation Officer and the Chairperson of the Marine and Freshwater Quality Task Force.

3. Description of Fertilizer Program

A. Town Bylaw

In addition to the efforts to reduce N loading from stormwater, the Town of Orleans continues to implement BMPs to reduce the use of fertilizers and pesticides. The Pleasant Bay Alliance developed a fertilizer and pesticide use policy for municipal properties in April 2012. The Town developed a Fertilizer Nitrogen Control bylaw that passed at the 2014 Annual Town Meeting.

The purpose of the bylaw is to restrict the use of N based fertilizers throughout Town and includes the following provisions:

- No application of N between October 16 and April 14;
- No application of N before or during heavy rain; and
- No application of N within 100 feet of Resource Areas.

In support of these efforts, the Orleans Pond Coalition maintained a robust public education campaign in Year 13 to inform residents and businesses about the proper use of and alternatives to fertilizers. Brochures regarding proper fertilizer and pesticide use are available at the Town Hall. Orleans is one of four Massachusetts towns (Falmouth, Mashpee and Nantucket) to have such a bylaw.

B. Fertilizer use enforcement

The Zoning Enforcement Officer is responsible for ensuring compliance with the provisions the Fertilizer Nitrogen Control Bylaw. When this bylaw was initially adopted, a letter was sent to affected households. Annually, the Building Department sends a letter to companies that apply fertilizer in Orleans. Violations are enforced on a complaints-driven basis.

4. Information Relevant to Adaptive Management Plan

Because these programs are scheduled for completion at the end of 2016, and TMs have not yet been submitted to the town, there is no new information on the nutrient removal attributed to stormwater BMPs or fertilizer reduction available at this time. The following stormwater and fertilizer initiatives are recommended to support the town's wastewater and water quality planning efforts:

- Factor the results of the stormwater nitrogen analysis that is currently underway by Amec Foster Wheeler into the MEP updates that are planned for both Pleasant Bay and Nauset Harbor;
- Factor fertilizer reductions attributable to the town's bylaw into the MEP updates that are planned for both Pleasant Bay and Nauset Harbor;
- As part of review of the Amec Foster Wheeler TM, determine the feasibility of prioritizing implementation of cost-effective stormwater projects that can remove a significant fraction of the nitrogen loads in nitrogen-sensitive subembayments;
- As part of review of the Amec Foster Wheeler TM, determine whether stormwater BMPs in areas that were ranked very high, high and medium for N sensitivity in the 2013 Orleans Town-Wide Preliminary Stormwater Assessment, particularly those in terminal ponds such as Meetinghouse Pond, Pochet and Paw Wah pond should be prioritized, and
- As part of the review of the Amec Foster Wheeler TM, determine whether the stormdrain at Kescayo Gansestt (Lonnie's) Pond should be prioritized.

Appendix A

Final Orleans Phase II Annual Report - Year 13

Municipality/Organization: Orleans, MA

EPA NPDES Permit Number: MAR041146

MaDEP Transmittal Number: W- 035744

Annual Report Number & Reporting Period: **No. 13: May 1, 2015-April 30, 2016**

NPDES PII Small MS4 General Permit Annual Report

Part I. General Information

Contact Person: Frank Nichols Title: Manager, Public Works

Telephone #: 508-240-3700 ext. 364 Email: fnichols@town.orleans.ma.us

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: JFKelly

Printed Name: John F. Kelly

Title: Town Administrator

Date: 4/27/16

Part II. Self-Assessment

The Town of Orleans has completed the required self-assessment and has determined that our municipality is in compliance with all permit conditions.

Notable Accomplishments/Improvements in Permit Year 13:

Water Quality Task Force & Comprehensive Wastewater Management Plan

The Town of Orleans continues to develop significant ongoing programs to improve marine and fresh water quality and work towards the goals of the Phase II Permit and the final TMDLs for pathogens and nutrients. The efforts of the Marine and Fresh Water Quality Task Force, Orleans Pond Coalition, past and planned BMP construction projects and the development of the December 2010 Comprehensive Wastewater Management Plan (CWMP) have or will result in significant water quality and habitat improvements. The CWMP received final approval from the MA DEP on February 14, 2012. Subsequently, the Town's consultants completed an evaluation of full lifecycle costs for the CWMP and for a small pipe (STE) collection system to provide further support for recommendations in the CWMP. A year-long public engagement process culminated in the approval of a hybrid plan revision of the CWMP. This hybrid plan focuses on non-traditional methods of nitrogen removal with the addition of specific sewer systems in the Downtown and Meetinghouse Pond watershed. In 2015, the Orleans Water Quality Advisory Panel (OWQAP) approved a consensus plan and $700K in funding has been allocated to advance these approaches. The next steps of this process also include disposal site evaluation that will be considered for funding at the 2016 Town Meeting.

In addition to the efforts to reduce nitrogen loading from septic sources, the Town of Orleans continues to implement BMPs to reduce the use of fertilizers and pesticides. The Pleasant Bay Alliance developed a fertilizer and pesticide use policy for municipal properties in April 2012. The Town developed a Fertilizer Nitrogen Control bylaw that passed at the 2014 Annual Town Meeting. The purpose of the bylaw is to restrict the use of nitrogen based fertilizers throughout Town and it includes the following provisions: no application of nitrogen between October 16 and April 14; no application before or during heavy rain; and no application within 100 feet of Resource Areas. In support of these efforts, the Orleans Pond Coalition maintained a robust public education campaign in Year 13 to inform residents and businesses about the proper use of and alternatives to fertilizers. Brochures regarding proper fertilizer and pesticide use are available at the Town Hall. Orleans is one of three Massachusetts towns (Falmouth and Nantucket) to have such a bylaw.

In Year 11, a Cedar Pond Management Plan was produced by the UMASS – Dartmouth School of Marine Science and Technology (SMAST) and the Water Quality Task Force and was unanimously approved by the Board of Selectmen. In the Cedar Pond Management Plan, SMAST recommended replacing the boards in the old weir to hold back the pond and limit salt water intrusion. In Year 12, the Town began the permitting process for the reinstallation of the water control boards for Cedar Pond. In Year 13, the

project was permitted, appealed and MassDEP issued a superseding Order of Conditions to require an environmental impact assessment report. The Town has funded the assessment to be completed in 2016.

The Town completed a study in early 2016 for Town Cove at the Nauset Harbor inlet to evaluate dredging to increase tidal flushing for the Nauset Estuary. A Town Meeting article is proposed to advance the project.

Orleans Water Quality Advisory Panel

In Year 13, the Orleans Water Quality Advisory Panel (OWQAP) continued to guide studies and assessments, define preferred approaches, seek consensus and build widespread community support for a customized, affordable water quality management plan for the Town of Orleans. The panel consists of stakeholder representatives (Orleans Selectmen and representatives of engaged citizen constituencies), and liaisons from key town boards and commissions, organizations, neighboring towns, and regional, state, and federal partners. It is staffed and assisted by Water Resources Associates and AECOM.

The OWQAP has met monthly during the last year and all meetings were open to the public. After examining a broad range of options, the Panel has reached agreement on a set of principles and some key elements of an Amended Water Quality Management Plan (the Plan) and associated Adaptive Management Plan. This Agreement includes and requires successful completion of numerous steps to resolve uncertainties and confirm key elements, such as treatment and disposal site suitability and availability, development of demonstration sites for non-traditional (NT) technologies, and further work to find an equitable distribution of costs necessary to the development of an acceptable and executable engineering plan that adheres to the key elements.

Tri-Town Septage Facility

The Tri-town septage facility serves Orleans and two other towns, Brewster and Eastham, and lower Cape for septic waste disposal by providing essential nitrate removal. The agreement between the three towns to use the facility expired on May 30, 2015. Following discussions between the three towns, a decision was made to close the plant as of June 1, 2016 and the facility will be removed, followed by site restoration. Septic waste will be handled by hauling from individual properties to an approved out of town facility.

Pleasant Bay Resource Management Plan Update

The Pleasant Bay Resource Management Plan was updated in 2013 and the updated plan was adopted in May 2013. The plan will further the Town's ongoing effort to work collaboratively with neighboring Towns to promote the natural resource health and public enjoyment of Pleasant Bay. The plan is updated every 5 years.

Stormwater Management Planning

The Town and its consultant continued to evaluate program needs based on the draft 2014 Phase II Permit. The Town anticipates using this information and the results from other activities (e.g., CWMP, BMP projects) to develop an appropriate strategy to address the requirements related to TMDLs and impaired water bodies, as part of the Stormwater Management Plan (SWMP) development

under the final permit (once issued). The Town continued to work towards development of a comprehensive SWMP to meet future regulatory requirements and water quality goals. The following key stormwater management planning activities occurred in Year 13:

- Detailed mapping of the downtown area was conducted SMC Engineering, Inc. to identify all municipal infrastructure with an emphasis on drainage and other utilities. This effort was coordinated with Greenseal Environmental, Inc. to complete the mapping of drainage systems through the remainder of the Town. The result of these efforts will be a field verified drainage map that identifies each structure, pipe and existing stormwater BMP. The mapping effort is substantially complete and will be finalized in the summer of 2016.
- As part of the 208 Plan Update for Cape Cod, the Town is required to establish watershed management teams. The Town began evaluating teams for specific waters to meet the requirements of the 208 Plan approval.
- The results of the above efforts are being incorporated into a stormwater pollutant load analysis and dynamic planning tool by Amec Foster Wheeler and will provide the following information: baseline stormwater pollutant loads; analysis of existing stormwater BMPs and benefits; prioritization of stormwater management basins (watersheds); and an evaluation of proposed BMPs, benefits and costs. This effort is anticipated to be completed by the fall of 2016. This information will be used as the basis for future capital projects to design and install stormwater BMPs for water quality improvement.
- The above efforts were reviewed on an ongoing basis by the Stormwater Team, which consists of the DPW and Natural Resources Director, DPW Manager, Town Planner, Health Agent, Conservation Officer and the Chairperson of the Marine and Freshwater Quality Task Force.

Public Education & Involvement Activities

The Town of Orleans conducted the following major events to promote awareness of water resources and engage the community:

- Celebrate Our Waters Event: The Orleans Pond Coalition hosted a "Celebrate Our Waters" event on September 18, 19, and 20, 2015. The celebration was well attended with approximately 3,000 people and it included events in Eastham and in Brewster to highlight "shared waters".
- Arbor Day Celebration: The Orleans Tree Department and Orleans Improvement Association teamed with Ameri-Corp Cape Cod honoring Arbor Day by conducting the following projects:
    - Bolands Pond: as discussed in the Year 12 report, efforts began to restore the Bolands Pond area, which consists of a 4.7 acre kettle pond and 9 acres of upland forest that includes both native and invasive vegetation. The activities included installation of an outdoor classroom and trail system to aid in the removal of invasive plant species. The Nauset Regional Middle School and Orleans Elementary School students assisted with the cleanup and restoration of the forest and participated in the outdoor classroom program. The property was maintained during Year 13.
    - Uncle Harvey Pond: the Town partnered with a private land owner to remove invasive species (phragmites).

Barnstable County Coastal Resources Committee

Orleans has a standing member on the Barnstable County Coastal Resources Committee (BCCRC), which meets quarterly. This committee serves as a contact between towns and the County on coastal issues. The committee is the local governance committee for the Cape Cod region of the Massachusetts Bays Program.

Stormwater BMP Assessment, Design & Construction

There were several stormwater and water quality improvement projects designed and constructed in Year 13:

- Eldridge Playground Improvement Project – tree plantings and improvements were completed in April 2016 to infiltrate stormwater from the tennis courts.
- Rock Harbor Dredging – completed in spring 2015.
- Rock Harbor Parking Lot – stormwater improvement BMPs were designed and construction will be completed in early 2017.
- Portanimicut Road – design began for stormwater improvements (infiltration and erosion control) to be constructed in 2016.
- Gibson Road – outfall improvements (infiltration) are under design for the direct discharge to Town Cove.
- BMP Database – the Town began efforts to complete a comprehensive assessment of all stormwater BMPs (approx. 35) in Town to develop an operation and maintenance plan. This effort is anticipated to be completed by fall 2016.
- Water Quality Monitoring – ongoing water quality monitoring was conducted throughout Year 13 at the creeks that enter Cape Cod Bay, Pleasant Bay (21 locations), and Nauset Bay (3 locations). The Town also increased funding for 2016 to include additional monitoring locations in Nauset Bay to support the Massachusetts Estuary Program (MEP) update.
- Rock Harbor Road – design began for multiple locations to provide stormwater treatment (infiltration) for direct outfalls.

As discussed above, the Town is working to develop a comprehensive planning tool to evaluate priority areas for capital projects to design and install stormwater BMPs for water quality improvements. Once this information is available, the Town anticipates proceeding with the design and construction of additional priority BMPs.

Stormwater Team

In Permit Year 11, the Town of Orleans established a stormwater committee called the "Stormwater Team." The Stormwater Team was developed to provide broader insight to evaluate stormwater projects and for the planning and prioritization of stormwater improvements. Members include the DPW Director, DPW Manager, Town Planner, Health Agent, Conservation Officer and the Chairperson of the Marine and Freshwater Quality Task Force. Various members of the Stormwater Team participated in specific planning and implementation related to water quality improvement throughout Year 13.

Part III. Summary of Minimum Control Measures

1. Public Education and Outreach

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
A.1	Develop and Broadcast Via PA CATV Storm Water Video	Frank Nichols, Public Works Manager	One per year – in conjunction with County Group	The video "After the Storm" is available through an internet media player on the DPW web page. The DPW Director presents to the Board of Selectmen on a quarterly basis and provides an update on stormwater management activities. These meetings are broadcast on the local cable network.	Broadcast other pertinent videos on local cable or other media outlets.
Revised			# website hits/views for video		
A.2	Household Hazardous Waste Control	Frank Nichols, Public Works Manager	Annual HHW Collection	Collection days were held in Eastham and Orleans on July 18th and September 19, 2015. A total of 193 Orleans households participated and a total of 30,080 lbs and 6,720 gallons of household hazardous waste were collected from both communities. Event organizers tracked the effectiveness of the various advertisement methods and ~56% of Orleans participants heard of the events through the brochure, ~ 18% heard of the event through the newspaper, and the remainder through signs, radio/tv, and other means. The Orleans Transfer station offers annual paint collections (October 12th) and offers collection of waste gasoline, waste oil and waste antifreeze free to Transfer Station ticket holders. In 2015 the Transfer Station collected and disposed of 1,350 gallons of waste oil, 605 gallons of waste gasoline and 300 gallons of waste antifreeze.	Continue reciprocal HHW collections with the Town of Eastham. Continue tracking resident participation and results.
Revised			# residents participating		

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
A.3	Education Flyers	Frank Nichols, Public Works Manager	Distribute 2 per year at Transfer Station	Flyers were replaced with numerous other educational events that were held this permit year. An educational sign was developed for Priscilla Landing and will be posted in May 2016. See also "Notable Accomplishments" section.	Consider distributing educational flyers and/or other materials and track materials taken. Continue to consider alternative methods to provide public education and outreach addressing HHW collection and stormwater management concepts.
Revised			# flyers taken by residents		

1a. Additions

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
A.4	Web Page Information	Frank Nichols, Public Works Manager & Peter VanDyck, IT Coordinator	Short Article – one per year	As discussed under BMP A.1, the video "After the Storm" is linked through the Highway Department's webpage. The webpage also links to EPA's NPDES Stormwater Program web page and the Town's stormwater bylaws. Agendas, meeting minutes, and additional information are posted on a webpage for the Marine and Fresh Water Quality Task Force. The Town also maintains a webpage for reports, meeting minutes and other documents related to the CWMP. The Orleans Pond Coalition maintained and updated its website to continue to promote general awareness of water bodies in Orleans. The website integrates the Town's efforts to protect and improve water quality through the implementation of the CWMP, fertilizer management programs and "Mutt Mitts" program for dog waste.	Continue to maintain existing web pages related to stormwater and water quality. Evaluate additional web page links and begin tracking the number of hits. Consider short articles or topics that can be posted annually on web pages. Evaluate methods to integrate stormwater program information and educational opportunities between the Town web pages and the website maintained by the Orleans Pond Coalition
Revised			# website hits		

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
A.5	Other Public Education In Year 13	Frank Nichols, Public Works Manager		Copies of "The Orleans Blue Pages" water quality protection booklet (50+ pages) developed by the Orleans Pond Coalition were made available at no cost for residents at Town Hall. Copies are also available for free download from the Orleans Pond Coalition website.	Continue existing public awareness activities and evaluate methods to track materials taken, posters, displays and audience (number) reached.
Revised	Other Public Education Activities in Year 13		# copies of "Orleans Blue Pages" taken by residents # posters displayed & handouts		
A.6	Storm Drain Stenciling	Frank Nichols, Public Works Manager	Stencil storm drains leading to critical priority outfalls.	No storm drain stenciling occurred during the permit term. The Town began reviewing options for markers and stencils.	Continue storm drain stenciling activities at highly visible areas and areas that drain directly to priority outfalls and waterways. More actively solicit volunteers through the Marine and Fresh Water Quality Task Force or with schools.
Revised		Marine & Fresh Water Quality Task Force	# stenciled drains per year		

2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
B.1	Water Quality Monitoring Program	Marine & Fresh Water Quality Task Force	Ongoing	In Permit Year 13, the Marine & Fresh Water Quality Task Force performed water quality monitoring activities. Summer sampling of embayments continued and included 23 locations on Cape Cod Bay, Nauset Estuary, and Orleans' portion of Pleasant Bay. 53 volunteers collected 585 samples on five sampling days. Additional samples were taken from the Atlantic Ocean off Nauset Spit and 17 freshwater ponds in spring and late summer of 2015. The Marine & Fresh Water Quality Task Force met once per month to review monitoring activities and results related to priority water bodies and potential improvement projects. The following areas are considered high priority areas in town: Cedar Pond, Meetinghouse Pond, Meetinghouse River, Town Cove, Bolands Pond, Ellis Pond, and inland ponds and estuaries. Activities related to Cedar Pond, Meetinghouse Pond, Town Cove and Bolands Pond are discussed in "Notable Accomplishments".	Evaluate priorities and continue monitoring water quality and tracking which program results were most effective. Use monitoring results to develop remediation plans for high priority areas. Continue to support Task Force and hold monthly meetings.
Revised		Town Administrator & Board of Selectmen	# samples collected, water bodies assessed each year & water quality improvements		

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
B.2	Estuaries Program	Director of Planning and Development	Ongoing	Subsequently, the Town's consultants completed an evaluation of full lifecycle costs for the CWMP and for a small pipe (STE) collection system to provide further support for recommendations in the CWMP. A year-long public engagement process culminated in the approval of a hybrid plan revision of the CWMP. This hybrid plan focuses on non-traditional methods of nitrogen removal with the addition of specific sewer systems in the Downtown and Meetinghouse Pond watershed. In 2015, the Orleans Water Quality Advisory Panel (OWQAP) approved a consensus plan and $700K in funding has been allocated to advance these approaches. The next steps of this process also include disposal site evaluation that will be considered for funding at the 2016 Town Meeting.	Continue to promote the CWMP and implement recommendations and strategies. Continue to incorporate elements of the CWMP into the SWMP to meet the new permit requirements, as appropriate.
Revised	Estuaries Program & Comprehensive Wastewater Management Plan		Regulatory review of CWMP. Assessment of potential cost-saving alternatives.		

2a. Additions

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
B.3	Storm Drain Stenciling	Frank Nichols, Public Works Manager	Stencil storm drains in downtown area and other at systems leading to critical priority outfalls.	Refer to BMP A.6.	Refer to BMP A.6.
Revised		Volunteers	# stenciled drains per year & # volunteers		

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
B.4	Outfall Monitoring	Frank Nichols, Public Works Manager	Perform dry weather outfall monitoring of all outfalls that were initially observed to have flow during the GIS locating.	Highway Department staff continue to receive training on data collection and illicit discharge detection during catch basin cleaning activities. Greenseal Environmental noted dry weather flow during mapping efforts in Year 12 and documented the locations. The Town conducted additional mapping efforts in Year 13 and the town-wide map is substantially complete. Once it is finalized, the Town plans to review dry weather flows at storm drain outfalls. The Town discovered an unauthorized sump pump discharge from an industrial facility. The facility is under an enforcement action from the Board of Health to remove the sump discharge and improve stormwater management.	Incorporate inspection results into the prioritization scheme for future improvement projects. Continue to support the efforts of the Marine & Fresh Water Quality Task Force and coordinate efforts with the Orleans Pond Coalition volunteers.
Revised	Volunteer Outfall Monitoring Program	Marine & Fresh Water Quality Task Force	# volunteer participants		
B.5	Maintain Animal Waste Collection Bags in Key Areas of Concern	Orleans Pond Coalition		"Mutt Mitts" animal waste collection bags were maintained by 30 volunteers from the Orleans Pond Coalition at key areas of concern for residents to properly dispose of waste. Town Departments assisted with proper waste disposal. Approximately 44,000 bags were used across 51 stations.	Continue maintenance of "Mutt Mitts" program and ensure proper disposal of wastes. Continue to track the number of bags taken and evaluate if high occurrences of improper disposal warrant a targeted education campaign.
Revised		Frank Nichols, Public Works Manager			
B.6	Water Day Celebration	Orleans Pond Coalition	List of activities & participants	The Orleans Pond Coalition hosted a "Celebrate Our Waters" event on September 18, 19 and 20, 2015. The event was well attended with approximately 3,000 people. The celebration expanded to include events in Eastham and Brewster.	Organize another "Celebrate Our Waters" event with the Orleans Pond Coalition. Incorporate stormwater education topics and activities into the event.
Revised					
B.7	Operation Orleans	Orleans Tree Dept. & Conservation Trust	List of activities & participants	The Orleans Tree Department teamed with Ameri-Corp Cape Cod honoring Arbor Day by continuing the Bolands Pond Project. Invasive species were removed at Uncle Harvey Pond. Refer to "Notable Accomplishments" for further descriptions of the events.	Continue to maintain the Bolands Pond project and evaluate other projects/opportunities for Orleans Green Week.
Revised	Orleans Green Week				

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
B.8	Shoreline Cleanup	Orleans Pond Coalition	Areas cleaned, waste collected & participants	A volunteer cleanup is held every May at Nauset Beach. The cleanup occurs along 9 miles of shoreline and the 2015 event resulted in approximately 30 cubic yards of waste collected.	Continue the volunteer cleanup at Nauset Beach.
Revised					

3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
C.1	Storm Water System Mapping and Database Development	Frank Nichols, Public Works Manager	Comprehensive town-wide survey by year 2 – as funding allows	Greenseal Environmental noted dry weather flow during mapping efforts in Year 12 and documented the locations. The Town conducted additional mapping efforts in Year 13 and the town-wide map is substantially complete. Once it is finalized, the Town plans to review dry weather flows at storm drain outfalls. The current storm drain map is available on the town GIS Portal.	Continue to update the drainage system base map as needed.
Revised					
C.2	Review Existing By-Laws	Director of Planning and Development	Review existing by-laws and adopt storm water ordinance FY06	As discussed in previous reports, a Floor Drain Regulation went into effect on July 1, 2010. The Illicit Discharge Bylaw was adopted at the May 2013 Town Meeting. The Bylaw addresses all illicit discharges to the MS4 and water bodies in Orleans.	Monitor and enforce the Illicit Discharge Bylaw and local requirements related to floor drains, dumping, and pet waste control.
Revised					

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
C.3	Identify and Document Illicit Connections	Frank Nichols, Public Works Manager	Review C.1 results, finalize database by Year 4	The Highway Department inspects all catch basins during cleaning operations and completes a form to document the condition and any potential illicit discharges. The Town began evaluating options for using smartphones and Ipads for inspections. Greenseal Environmental noted dry weather flow during mapping efforts in Year 12 and documented the locations. The Town conducted additional mapping efforts in Year 13 and the town-wide map is substantially complete. Once it is finalized, the Town plans to review dry weather flows at storm drain outfalls. The Town discovered an unauthorized sump pump discharge from an industrial facility. The facility is under an enforcement action from the Board of Health to remove the sump discharge and improve stormwater management.	Continue to inspect outfalls with previous dry weather flows to verify that an illicit discharge is not present. Continue to review mapping results with catch basin, pipe cleaning and inspection information. Incorporate existing procedures into future IDDE procedures and the O&M Plan under Control Measure 6.
Revised	Identify & Remove Illicit Connections & Discharges		# discharges identified, removed within 1 year of discovery		

3a. Additions

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
C.4	Comprehensive Wastewater Management Plan	Director of Planning and Development	Progress towards a final CWMP	In Year 13, the Orleans Water Quality Advisory Panel (OWQAP) met monthly and continued to guide studies and assessments, define preferred approaches, seek consensus and build widespread community support for a customized, affordable water quality management plan for the Town of Orleans. Additional information is discussed under "Notable Accomplishments".	Continue to monitor how elements from the CWMP or other Plans and the SWMP overlap to identify any practices that could satisfy requirements of both.
Revised					

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
C.5	Public Education for Illicit Discharges	Frank Nichols, Public Works Manager		As outlined in BMPs A.1 through A.6 and B.5, various entities have incorporated information regarding illicit discharges into existing public education and public involvement activities.	Continue to incorporate illicit discharge information into existing public education and involvement activities and evaluate results.
Revised					

4. Construction Site Stormwater Runoff Control

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
D.1	Review Existing By-Laws	Director of Planning and Development	Review existing by-laws and adopt construction ordinance	The Town previously adopted the Drainage and Erosion and Sediment control bylaw at Town meeting in May 2008. The Highway Department continued to inspect sites throughout Town for potential erosion issues and three issues were identified through inspections and calls from the public. The Highway Department notified the landowners through emails and site visits to evaluate the erosion problem. One problem was corrected shortly after notification and the Town is working to address the remaining two sites.	Continue to enforce bylaws and document actions.
Revised					
D.2	Propose amendments and articles at Town Meeting	Director of Planning and Development	Spring 06	As discussed in previous reports, the Town adopted the Drainage and Erosion and Sediment control bylaw at Town meeting in May 2008. No amendments were deemed necessary at this time.	Continue to evaluate effectiveness of bylaws and amend if necessary.
Revised			Ongoing		

4a. Additions

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
D.3	Establish a Procedure for Receipt of Information by Public	Frank Nichols, Public Works Manager	# calls received & record of corrective actions	Three calls were received this year and the Town is working to address the outstanding issues (refer to BMP D.2).	Continue to respond to calls regarding construction site erosion and sediment issues.
Revised					

5. Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
E.1	Review Existing By-Laws	George Meservey, Director of Planning and Development	Review existing by-laws and adopt Runoff Control Ordinance	The Town previously adopted the Drainage and Erosion and Sediment control bylaw at Town meeting in May 2008. Any plans for significant development are reviewed for compliance through the Site Plan Review committee.	Continue to enforce bylaw and review plans through Site Plan Review committee.
Revised					
E.2	Propose amendments and articles at Town Meeting	George Meservey, Director of Planning and Development		Refer to BMP E.1. No amendments were deemed necessary at this time.	Continue to evaluate effectiveness of bylaws and amend if necessary.
Revised			Ongoing		

5a. Additions (none at this time)

6. Pollution Prevention and Good Housekeeping in Municipal Operations

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
F.1	Street Sweeping	Frank Nichols, Public Works Manager	Sweep as part of annual winter cleanup and as needed	There are 54 miles of street in the Town and all streets were swept at least twice during the permit year. Additional streets are swept 2-3 times during the year including known areas of high sediment/sand accumulation, downtown areas, and paved areas that discharge to environmentally sensitive areas. In 2013, the Town purchased a new generative air sweeper to improve street sweeping operations and water quality. Approximately 537 tons of street sweepings were collected during the year and reused in accordance with the existing BUD. The Town plans to separate urban versus rural street sweepings and modify the landfill permit to allow composting of rural sweepings.	Continue annual street sweeping program and focus additional sweeping efforts on needed and environmentally sensitive areas.
Revised					

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
F.2	Catch Basin Cleaning	Frank Nichols, Public Works Manager	Clean all basins in town on yearly rotating schedule	~810 basins were cleaned and all 1,500 were inspected once. Approximately 189 tons of catch basin cleanings were collected during the year. In addition, all existing stormwater BMPs were inspected and if necessary cleaned of sediment. Approximately 200 feet of storm drain pipes and 100 feet of culverts were cleaned. None of these were camera inspected due to the fact that many were culverts that were able to be visually inspected. Materials were reused in accordance with the existing BUD.	Continue annual catch basin cleaning Program. Consider evaluating drainage areas to prioritize cleaning efforts as appropriate.
Revised					
F.3	Develop Drainage System Improvement Plan	Frank Nichols, Public Works Manager	Prepare Capital Plan Article for FY10	The Ongoing Capital Plan includes an allotment of $165,560 for water quality related drainage improvements. A construction plan for water quality improvements projects is updated annually based on the results and input from the Marine and Fresh Water Quality Task Force. See "Notable Accomplishments" for a more detailed description of activities and projects related to this BMP.	Continue funding the drainage system components of the Capital Plan to remediate outfalls and construct stormwater BMPs.
Revised			Update Capital Plan Annually		
F.4	Propose Amendments and Articles at Town Meeting	Frank Nichols, Public Works Manager	Spring 06	Consistent with the efforts under BMP F.3, The Town appropriated $165,560 for the design and construction of stormwater BMPs throughout the year. This funding is now available for stormwater planning efforts to evaluate the most appropriate locations for stormwater remediation projects. The Town focused on evaluating priority stormwater remediation projects. See "Notable Accomplishments" for a more detailed description of activities and projects related to this BMP.	Continue to fund water quality improvement planning and construction projects annually.
Revised			Prepare Capital Plan Articles Annually		

6a. Additions

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 12	Planned Activities – Next Permit Term
F.5	Maintain Animal Waste Collection Bags in Key Areas of Concern	Orleans Pond Coalition		"Mutt Mitts" animal waste collection bags were maintained by 30 volunteers from the Orleans Pond Coalition at key areas of concern for residents to properly dispose of waste. Town Departments assisted with proper waste disposal. Approximately 44,000 bags were used across 51 stations.	Continue maintenance of "Mutt Mitts" program and ensure proper disposal of wastes. Continue to track the number of bags taken and evaluate if high occurrences of improper disposal warrant a targeted education campaign.
Revised					
F.6	Nutrient Loading Reductions	Frank Nichols Public Works Manager	Implement Organic Based Land Management Program	As discussed under "Notable Accomplishments", the Pleasant Bay Alliance developed a fertilizer and pesticide use policy for municipal properties in April 2012. The Town developed a Fertilizer Nitrogen Control bylaw that passed at the 2014 Annual Town Meeting. The Organic Based Land Management Program continued for Town properties, consistent with NOFA guidelines. The program focuses on reducing nutrient loads through the use of cultural land management practices and organic enhancements for healthy turf and native vegetation. Compost from the Transfer Station was used for turf enhancement. The Town also only uses organic fertilizer. The organic fertilizer is made from compost teas and comes in kits that contain organic components rich in microorganisms highly beneficial to plant growth and health. The fertilizer is planned to be applied in spring, summer and fall depending on staffing availability. Modified mowing practices continued at the Town Cove conservation viewing areas to reduce the need for rigorous turf management. The Town has used limited organic-based pesticides for the last 8 years.	Continue organic based land management program to minimize nutrient loading. Evaluate methods to estimate the quantity of nutrients reduced through this program. Continue turf and pesticide management practices at Town Cove and other locations to reduce the need for chemical applications. Continue implementation of the fertilizer and pesticide use policy for municipal properties.
Revised					

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
F.7	Trash Management	Frank Nichols, Public Works Manager & Nathan Sears, Harbormaster and Natural Resources Manager	Maintain a proactive trash collection program	Town Departments maintained the active Trash collection program at appropriate town properties with waste receptacles. A dumpster is also maintained by the Harbor Master for fishing fleet waste at the Town harbor. This dumpster was put out during the fishing season to encourage proper waste disposal. The program provides a means of waste disposal at public areas to discourage littering. The Town provides and maintains portable toilets at Rock Harbor, Skaket Beach and Town recreation facilities.	Continue to service litter sanitary waste receptacles at appropriate locations around the Town.
Revised	Trash and Waste Management				
F.8	Inventory of BMP Locations & Needs	Frank Nichols, Highway Manager	Ongoing inventory of BMP locations and needs to address water quality issues	The locations of stormwater BMPs are maintained to develop projects for water quality improvement. This BMP supports BMPs F.3 and F.4. As discussed under "Notable Accomplishments", the Town's consultants are working to complete mapping efforts and the analysis of stormwater pollutant loads to develop a better understanding of priority stormwater management and improvement areas. This will serve as the basis for future BMP projects. The Town began efforts to complete a comprehensive assessment of all stormwater BMPs (approx. 35) in Town to develop an operation and maintenance plan. This effort is anticipated to be completed by fall 2016. BMP projects at Pochet Road and Tonset Road were constructed in Year 13. Additional planned and ongoing projects are discussed under "Notable Accomplishments".	Complete the Town-wide Stormwater Assessment and prioritize future BMP projects for funding. Continue to maintain and update the BMP inventory and develop projects with the Marine & Fresh Water Quality Task Force.
Revised					

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
F.9	Stormwater Training for Highway Staff	Frank Nichols, Highway Manager	Annual training on various topics, record of training attendance & materials	Highway Department staff are trained annually for the inspection and maintenance of the drainage system, including how to identify potential illicit discharges. Staff stormwater training is planned for summer 2016.	Continue to train staff annually and maintain copies of curriculum and attendance sheets. Review the stormwater training for Highway staff to determine if targeted educational topics could more effectively address current stormwater management needs.
Revised					
F.10	Municipal Facilities Evaluation	Frank Nichols, Highway Manager	Inventory of municipal facilities & report	In Year 10, the Town evaluated municipal facilities for pollution prevention and good housekeeping practices to determine if any improvements are needed. The Town continued to implement the recommendations in Year 13. The Town began or completed the following activities in Year 13: -Began the design for a new Police Department facility. -Increased landfill monitoring program. -Designed a new fuel depot with an article to fund the construction at the May 2016 Town Meeting. -Funding was approved for the design of a new DPW facility with a wash bay. -An environmental assessment was funded for the current DPW facility.	Implement recommendations based on the availability of funding.

7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA) *<<if applicable>>*

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 13	Planned Activities – Next Permit Term
Revised					

7a. Additions (none at this time)

7b. WLA Assessment

As discussed in this annual report, the Town of Orleans continues to develop significant ongoing programs that improve marine and fresh water quality and meet compliance responsibilities with the Phase II Permit and the pathogen and nutrient TMDLs. The efforts of the Marine and Fresh Water Quality Task Force, Orleans Pond Coalition, past and planned BMP construction projects and the efforts of the Orleans Water Quality Advisory Panel (OWQAP) have or will result in significant water quality and habitat improvements.

In Year 13, the Orleans Water Quality Advisory Panel (OWQAP) continued to guide studies and assessments, define preferred approaches, seek consensus and build widespread community support for a customized, affordable water quality management plan for the Town of Orleans. The panel consists of stakeholder representatives (Orleans Selectmen and representatives of engaged citizen constituencies), and liaisons from key town boards and commissions, organizations, neighboring towns, and regional, state, and federal partners. It is staffed and assisted by Water Resources Associates and AECOM. The OWQAP approved a consensus plan and $700K in funding has been allocated to advance these approaches. The next steps of this process also include disposal site evaluation that will be considered for funding at the 2016 Town Meeting.

The OWQAP has met for twelve half-day meetings since July 2014, all of which were open to public attendance and comment. After examining a broad range of options, the Panel has reached agreement on a set of principles and some key elements of an Amended Water Quality Management Plan (the Plan) and associated Adaptive Management Plan. This Agreement includes and requires successful completion of numerous steps to resolve uncertainties and confirm key elements, such as treatment and disposal site suitability and availability, development of demonstration sites for non-traditional (NT) technologies, and further work to find an equitable distribution of costs necessary to the development of an acceptable and executable engineering plan that adheres to the key elements.

The Town and its consultant continued to evaluate program needs based on the draft 2014 Phase II Permit. The Town anticipates using this information and the results from other activities (e.g., CWMP, BMP projects) to develop an appropriate strategy to address the requirements related to TMDLs and impaired water bodies, as part of the Stormwater Management Plan (SWMP) development under the final permit (once issued). The Town continued to work towards development of a comprehensive SWMP to meet future regulatory requirements and water quality goals.

Part IV. Summary of Information Collected and Analyzed

As discussed previously, numerous activities were conducted in Year 13 through several programs to improve marine and fresh water quality and work towards the goals of the Phase II Permit and the final TMDLs for pathogens and nutrients. In addition to this information, the Pleasant Bay Alliance developed the following report in July 2015: *"Pleasant Bay Alliance Water Quality Monitoring Program: Statistical Analysis of 2000-2014 Water Quality Monitoring Data".*

Part V. Program Outputs & Accomplishments (OPTIONAL)

Programmatic

Stormwater management position created/staffed	(y/n)	N
Annual program budget/expenditures	($)	$165,560

Education, Involvement, and Training

Estimated number of residents reached by education program(s)	(# or %)	100%
Stormwater management committee established	(y/n)	Y
Stream teams established or supported	(# or y/n)	N
Shoreline clean-up participation or quantity of shoreline miles cleaned	(y/n or mi.)	9 mi (Nauset Beach)
Household Hazardous Waste Collection Days		
▪ days sponsored	(#)	2
▪ community participation	(%)	193 homes
▪ material collected	(tons or gal)	15 T | 6,720 G
School curricula implemented	(y/n)	
Note: The Town also collected waste oil, gasoline and antifreeze at the Transfer Station that resulted in a total of 2,255 gallons.		

Legal/Regulatory

	In place prior to Phase II	Under Review	Drafted	Adopted
Regulatory Mechanism Status (indicate with "**X**")				
▪ Illicit Discharge Detection & Elimination				X
▪ Erosion & Sediment Control				X
▪ Post-Development Stormwater Management				X
Accompanying Regulation Status (indicate with "**X**")				
▪ Illicit Discharge Detection & Elimination				X
▪ Erosion & Sediment Control				X
▪ Post-Development Stormwater Management				X

Mapping and Illicit Discharges

Outfall mapping complete	(%)	100%
Estimated or actual number of outfalls	(#)	100
System-Wide mapping complete	(%)	98%
Mapping method(s)		
▪ Paper/Mylar	(%)	
▪ CADD	(%)	
▪ GIS	(%)	80%
Outfalls inspected/screened	(# or %)	100%
Illicit discharges identified	(#)	1
Illicit connections removed	(#) (est. gpd)	Ongoing
% of population on sewer	(%)	0%
% of population on septic systems	(%)	100%

Construction

Number of construction starts (>1-acre)	(#)	0
Estimated percentage of construction starts adequately regulated for erosion and sediment control	(%)	100%
Site inspections completed	(# or %)	Several
Tickets/Stop work orders issued	(# or %)	0
Fines collected	(# and $)	0
Complaints/concerns received from public	(#)	3

Post-Development Stormwater Management

Estimated percentage of development/redevelopment projects adequately regulated for post-construction stormwater control	(%)	100%
Site inspections completed	(# or %)	0
Estimated volume of stormwater recharged	(gpy)	NA

Operations and Maintenance

Average frequency of catch basin cleaning (non-commercial/non-arterial streets)	(times/yr)	1/yr
Average frequency of catch basin cleaning (commercial/arterial or other critical streets)	(times/yr)	1-2/yr
Total number of structures cleaned /inspected	(#)	810 cleaned 1,500 inspected
Storm drain cleaned	(LF or mi.)	300 LF
Qty. of screenings/debris removed from storm sewer infrastructure	(lbs. or tons)	189 Tons
Disposal or use of sweepings (landfill, POTW, compost, recycle for sand, beneficial use, etc.)		BUD
Cost of screenings disposal	($)	~$5,000

Operations and Maintenance (con't.)

Average frequency of street sweeping (non-commercial/non-arterial streets)	(times/yr)	2/yr
Average frequency of street sweeping (commercial/arterial or other critical streets)	(times/yr)	2-3/yr
Qty. of sand/debris collected by sweeping	(lbs. or tons)	537 Tons
Disposal of sweepings (landfill, POTW, compost, beneficial use, etc.)	(location)	BUD
Cost of sweepings disposal	($)	~$1,000
Vacuum street sweepers purchased/leased	(#)	0
Vacuum street sweepers specified in contracts	(y/n)	N

Reduction in application on public land of: ("N/A" = never used; "100%" = elimination)		
▪ Fertilizers	(lbs. or %)	100%
▪ Herbicides	(lbs. or %)	100%
▪ Pesticides	(lbs. or %)	100%

Anti-/De-Icing products and ratios	% NaCl % Sand/Salt	100% of the time None
Pre-wetting techniques utilized	(y/n)	N (pre-treated salt)
Manual control spreaders used	(y/n)	Y
Automatic or Zero-velocity spreaders used	(y/n)	Y*
Estimated net reduction in typical year salt application	(lbs. or %)	33% (since beginning of permit)
Salt pile(s) covered in storage shed(s)	(y/n)	Y
Storage shed(s) in design or under construction	(y/n)	Y**
*4 of 5 spreaders now have ground speed controllers		
**A new DPW facility is being designed for FY 18 construction		

Appendix B

Orleans Town-Wide Preliminary Stormwater Assessment

CLIENTS | PEOPLE | PERFORMANCE

Orleans Town-Wide Preliminary Stormwater Assessment

Town of Orleans, MA

Sandra L. Tripp, P.E., BCEE | GHD Senior Project Manager

Alex Rouchaleau, EIT| GHD Project Engineer

September 30, 2013

Table of Contents

Town of Orleans:
Preliminary Town-Wide Stormwater Assessment

Background

The Town's Stormwater Mitigation Task Force has initiated and supported the development of a Preliminary Town-Wide Stormwater Assessment. This fact sheet for public education and outreach has been developed as part of the assessment.

The Task Force is comprised of members of the Town of Orleans departments and has been assisted by GHD Inc. from the Hyannis, Massahcusetts office.

Problem Summary

There are many impervious surfaces (roads, roofs, etc.) in Orleans that generate stormwater runoff when it rains or snows. This stormwater is either discharged to the groundwater or is conveyed to freshwater ponds or marine estuaries through surface discharges (outfalls). Over 100 stormwater outfalls have been documented in Orleans. Stormwater from these outfalls carry pollutants such as excess nutrients (nitrogen and phosphorus), biological and/or infectious agents (measured as fecal coliform), sediments, and other pollutants that are washed off impervious surfaces. The nitrogen and phosphorus promotes eutrophication (fertilization that causes an overabundance of algae growth) in the Town's marine and fresh surface waters (respectively). The fecal coliform can shut down shellfishing resource areas; and the sediments can foul the bottoms of the surface waters and cause cloudy/dirty water, impacting nearby animals and vegetation.

In the past, fecal coliform and sediments have been the primary indicator of pollution in stormwater and are the current targets of new federal and state stormwater discharge permits. Recently, nitrogen and phosphorus in the stormwater have been documented as contributing to eutrophication in the surface waters.

Stormwater is a source of nitrogen to the Town's estuaries, as documented by the Massachusetts Estuaries Project (MEP). The MEP main findings were as follows:

- Stormwater nitrogen loading has been estimated at five to nine percent of the total loading to the estuaries.
- Stormwater flows are intermittent and can be very large.
- Some watersheds are more critical towards nitrogen and/or phosphorus loading, and should be prioritized.

The following pie chart diagram (Figure 1) is based on the MEP report of the Nauset Estuary (Town Cove) and illustrates the nitrogen sources for that estuary. Water body surface areas and natural surfaces are considered unmanageable nitrogen sources.

Stormwater Remediation Technologies

In the past, stormwater pretreatment in a catch basin and infiltration to the groundwater system has been a primary best available technology (BAT) for treating stormwater at outfalls and removing pollutants such as sediments, fecal coliform, and some of the nutrients in the stormwater. Soluble phosphorus is

generally adsorbed to soil particles as the water flows through the ground. Soluble nitrogen remains in solution in the groundwater and can travel with the groundwater to emerge in estuaries and contribute to eutrophication. Additional treatment is needed to mitigate the nitrogen in stormwater and typically is achieved biologically by microbial denitrification in a contained soil layer or by plant uptake. The best available technologies used for this type of treatment include:

- Detention Basins/Trenches—Depressions designed to retain a specified water quality volume for 24 to 48 hours, allowing for pollutant removal through plant uptake, sedimentation, and microbial activity. (Nitrogen Removal Rate: up to 25%)
- Bioretention/Rain Gardens—Landscaped runoff areas that effectively filter stormwater by using precise plantings and soil specifically designed for the mitigation site. (Nitrogen Removal Rate: up to 55%)
- Gravel Wetlands—Similar in appearance and function to a natural wetland, they removes pollutants, sedimentation, and excess nutrients through biological activity. (Nitrogen Removal Rate: up to 75%)

The University of New Hampshire Stormwater Center is a national leader in the research and application of these technologies and is the basis of the recommendations in this fact sheet.

Nitrogen Removal Technologies—Main Findings:

The following summarizes the main findings for the treatment of nitrogen in stormwater using current BATs:

- Significant land areas are typically required.
- Costs for the land and treatment facilities can be high.
- Facility maintenance is needed and annual costs range from 5 to 20 percent of total capital cost.
- Facility lifetime is estimated at 20 years.
- These technologies are relatively new for areas with porous soils.

Prioritized Project Summary

A computer generated prioritization of the Town's 100+ stormwater outfalls was developed with input from the Task Force. The prioritization incorporated field data, engineering calculations, as well as environmental and public benefit criteria. The stormwater outfall located at the intersection of Uncle Harvey's Way and Pochet Road was selected as the top priority project for remediation. Approximately 10 million gallons of stormwater runoff are discharged through this area annually, generating an estimated 115 pounds of nitrogen per year. Using bioretention as the treatment method, the estimated cost to remove 50 percent of the total nitrogen discharged is $8,100 per pound of nitrogen.

For more information, please contact:

Town of Orleans

T 508-240-3700

W www.town.orleans.ma.us

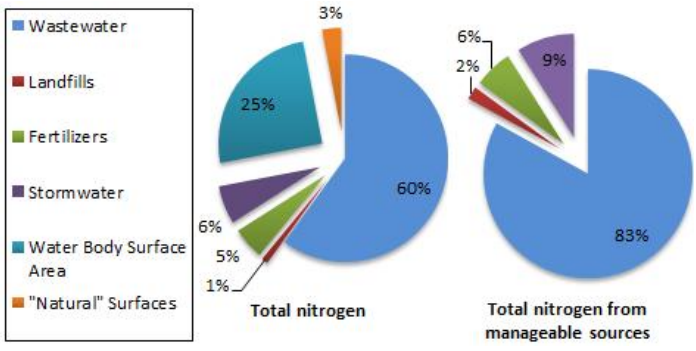


Figure 1: Nitrogen Sources Identified by MEP Nauset Marsh Estuary System

Figure 2: Site Photo of Pochet Road near Uncle Harvey's Way

Figure 1

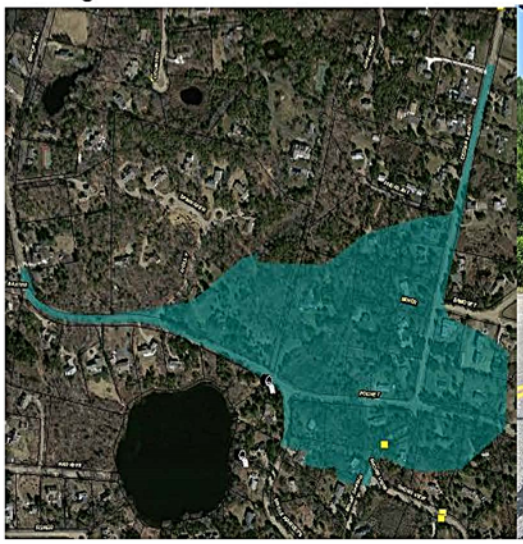
Discharge ID: 44-OUT-2 **Date:** 7/17/2013

Address: Intersection of Uncle Harvey's Way & Pochet Road **Weather:** Sunny, 85°

Drainage Area Description:

Residential area with average 3/4 acre lots and multiple large open space areas.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10	CM	28.88	71%	29%	15,347	30,695	132	10.10	52	Major roadway runoff draining off Pochet Road into wetland which discharges into culvert leading to Uncle Harvey's Pond	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium,* ***High****)*

Cleaning Recommendation:

Priority: *(****Low****, Medium, High, Very High)*

Mitigation Recommendations:

See attached memo

Legend

Bioretention Area

44-OUT-2 Outfall

Paper Size ANSI A

40 20 0 40 Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet

N

Town of Orleans, MA
CWMP

Outfall 44-OUT-2 Possible Stormwater Mitigation Locations

Job Number 86-15148
Revision A
Date 25 Sep 2013

Figure 2

G:\86\15148\GIS\Maps\MXD_Deliverables\44-OUT-2 Layout.mxd

1545 Iyannough Road Hyannis MA 02601 T 774 470 1630 F 774 470 1631 W www.ghd.com

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:atrouchaleau

CLIENTS | PEOPLE | PERFORMANCE

Orleans Town-Wide Preliminary Stormwater Assessment

Stormwater Mitigation Team Presentation
March 26, 2013

Nathan Weeks, P.E., BCEE | GHD Senior Project Manager

Alex Rouchaleau, EIT| GHD Project Engineer

Presentation Outline

- Project scope
- MEP nitrogen assumptions and loadings
- Technologies for stormwater nitrogen removal
- Stormwater outfalls and evaluations
  - Information sources
  - Site visits
  - Contributing areas
  - Calculations
- Possible prioritization criteria
- Possible approach for revised Town Drainage Code
- Next steps

Project Scope

1. Kickoff meeting
2. Team input, and order-of-magnitude costs
3. MEP nitrogen loading assumptions
4. Nitrogen loading graphics
5. Technologies for stormwater nitrogen removal
6. Develop Fact Sheet for public education

Project Scope (continued)

7. Identify stormwater outfalls
8. Stormwater sampling plan
9. Outfall watershed (contributing area) delineation
10. Estimated flows and loads
11. Next steps and prioritization
12. Tabular summary to illustrate prioritization
13. Identify highest priority project and estimate capital costs
14. Meetings

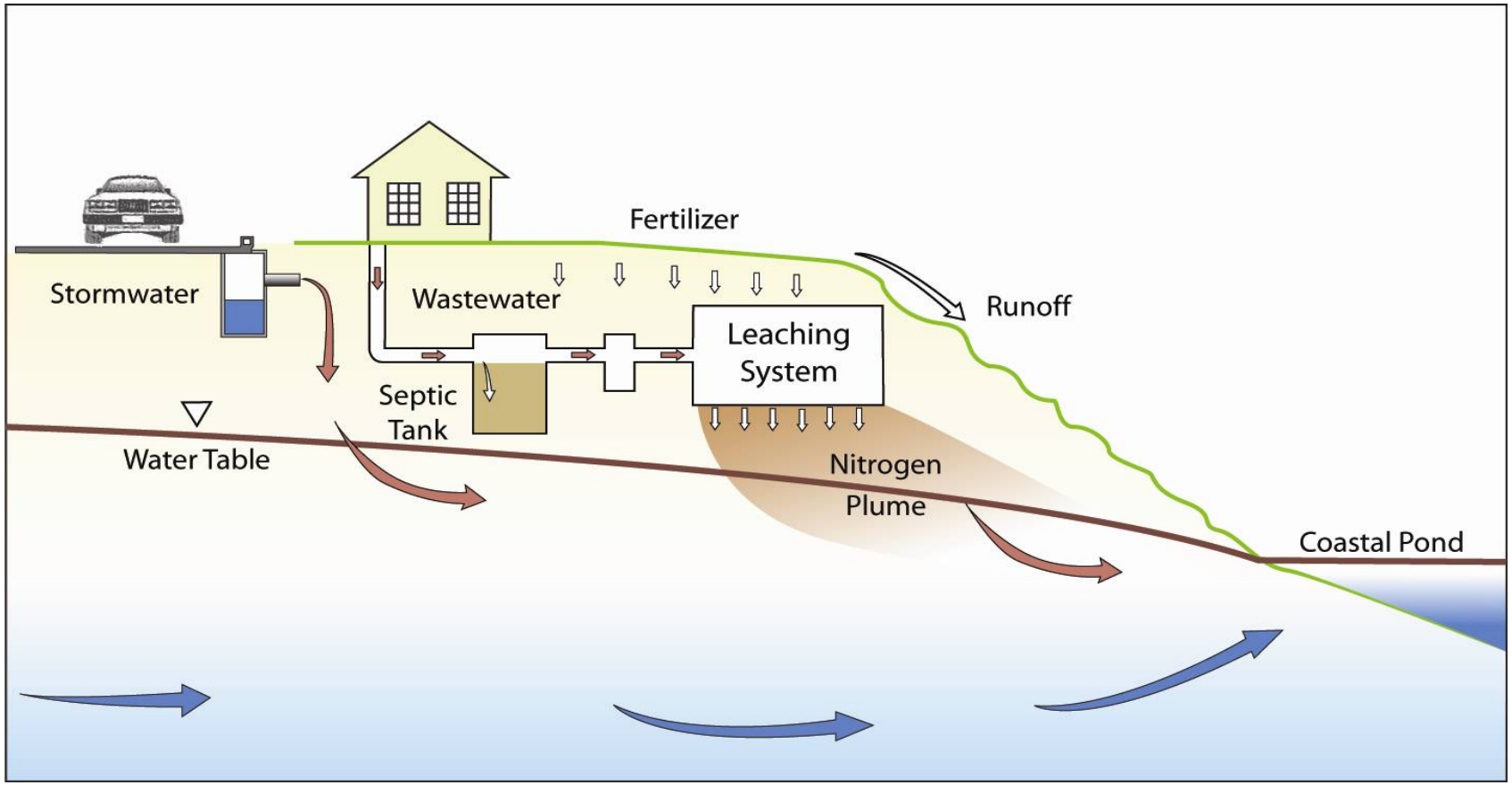
MEP Nitrogen Assumptions and Loadings

MEP assumptions

- Watersheds based on USGS models
- MassDOT GIS road coverage
- Parking lots digitized from aerial photos
- Driveways estimated at 1,500 s.f. area each with scaling factor applied
- Roof areas estimated based on Assessors data
- Typical nitrogen concentrations for runoff:
    - 1.5 mg/L for road runoff
    - 0.75 mg/L for roof runoff
    - (for comparison: 1.09 mg/L used for direct precipitation on embayments and ponds)

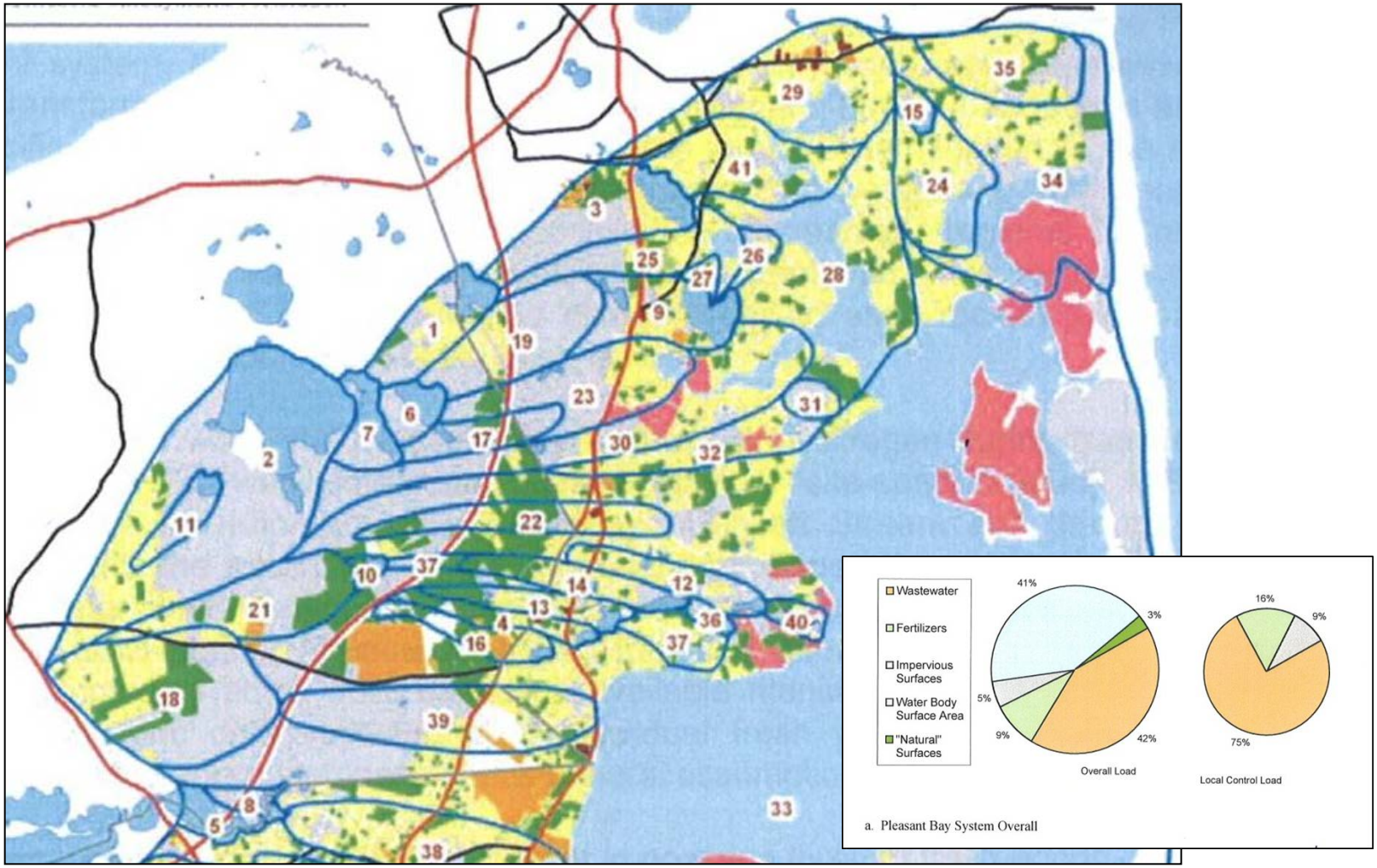
MEP Nitrogen Assumptions and Loadings (continued)

Several sources of Nitrogen



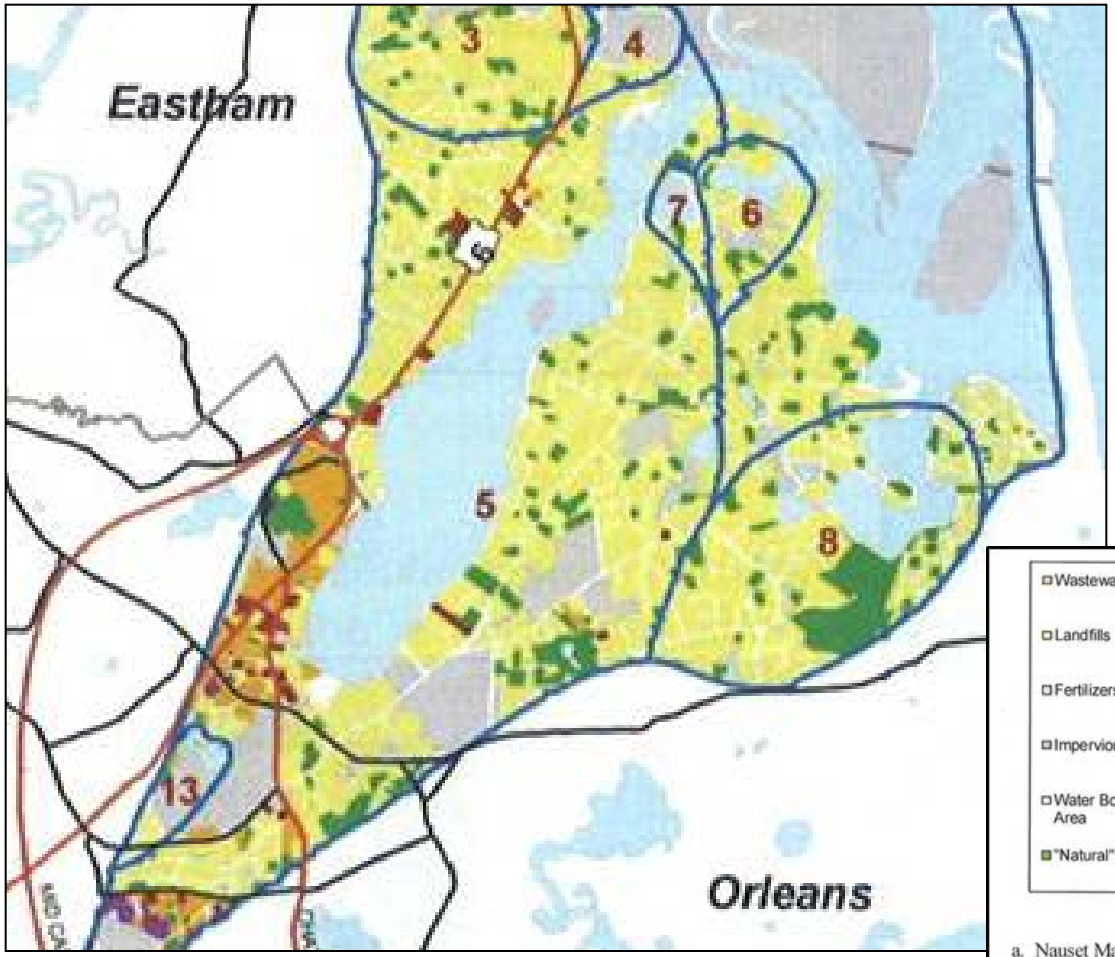
MEP Nitrogen Assumptions and Loadings (continued)

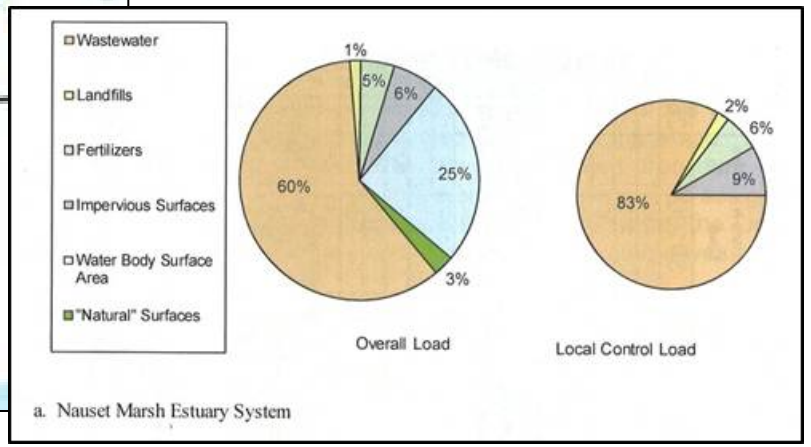
Pleasant Bay watersheds and loads



MEP Nitrogen Assumptions and Loadings (continued)

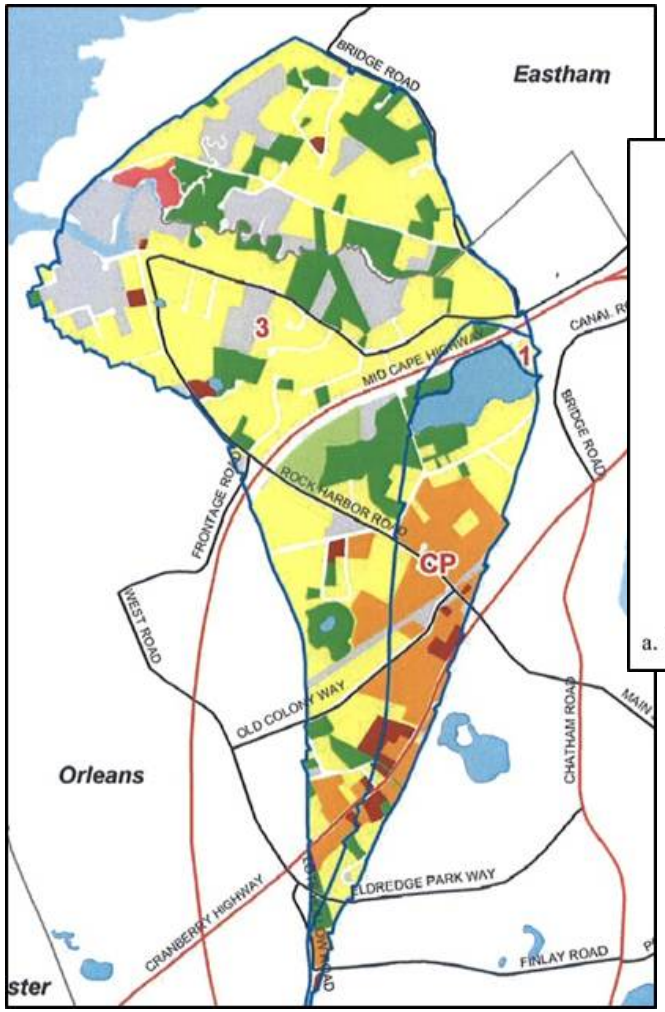
Town Cove/Nauset watersheds and loads

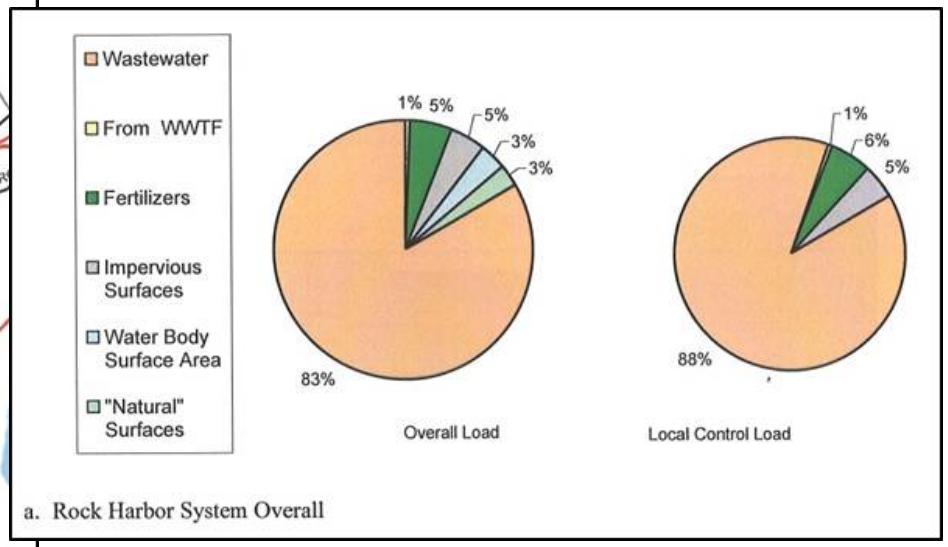




MEP Nitrogen Assumptions and Loadings (continued)

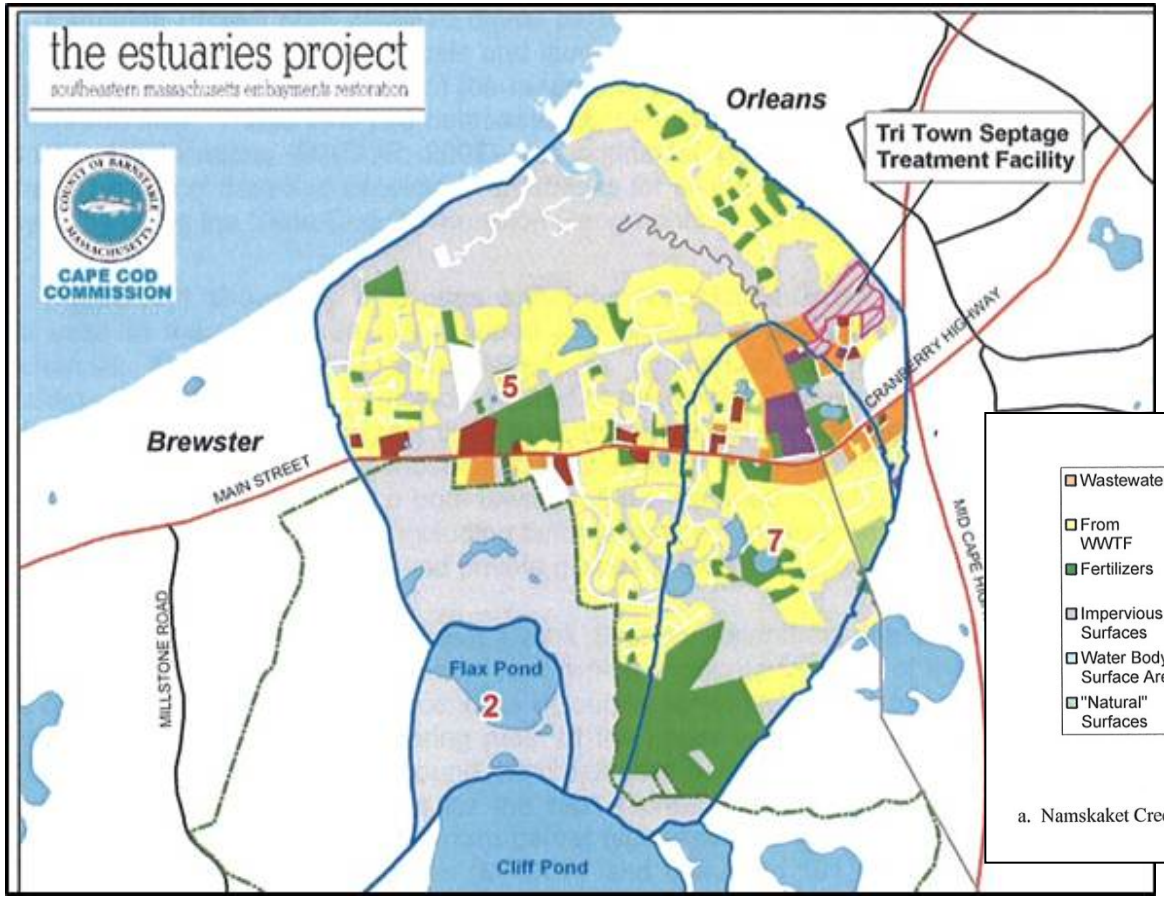
Rock Harbor watersheds and loads

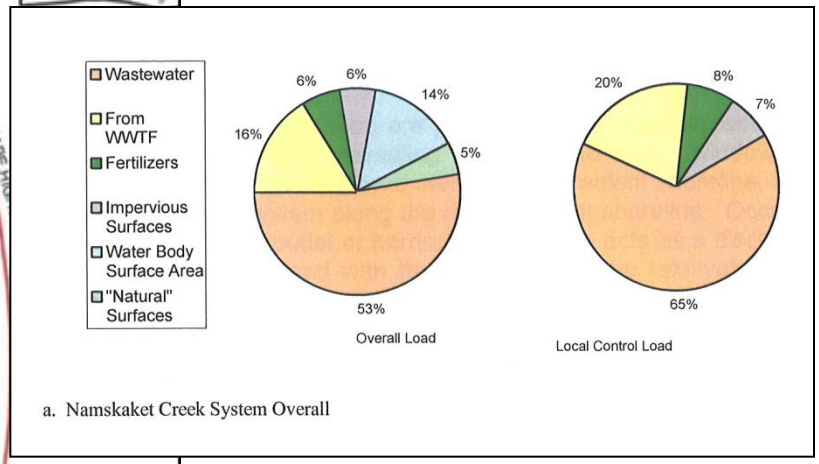




MEP Nitrogen Assumptions and Loadings (continued)

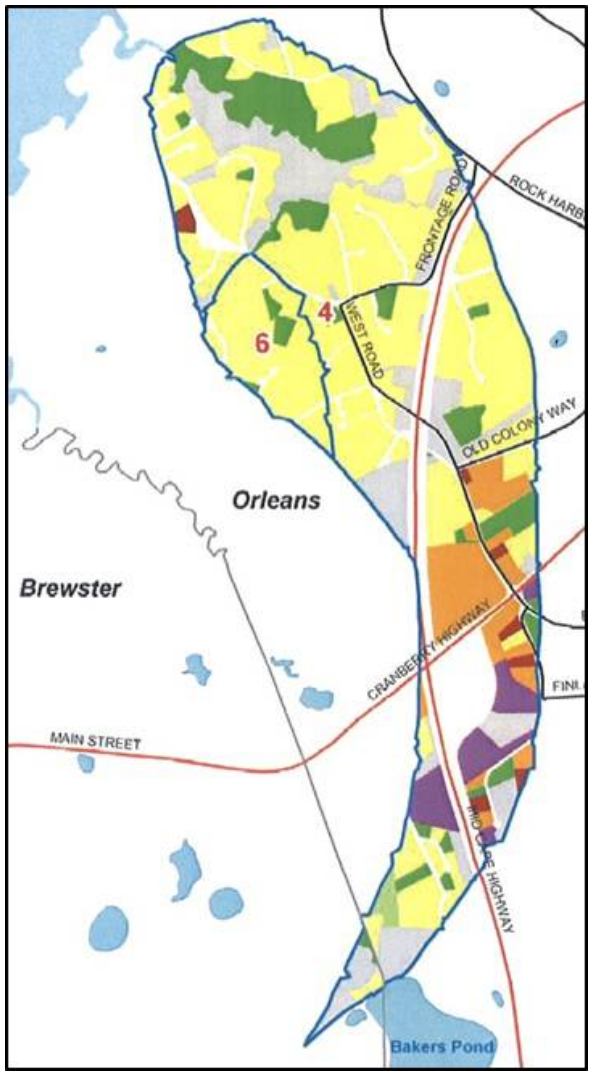
Namskaket Creek watersheds and loads



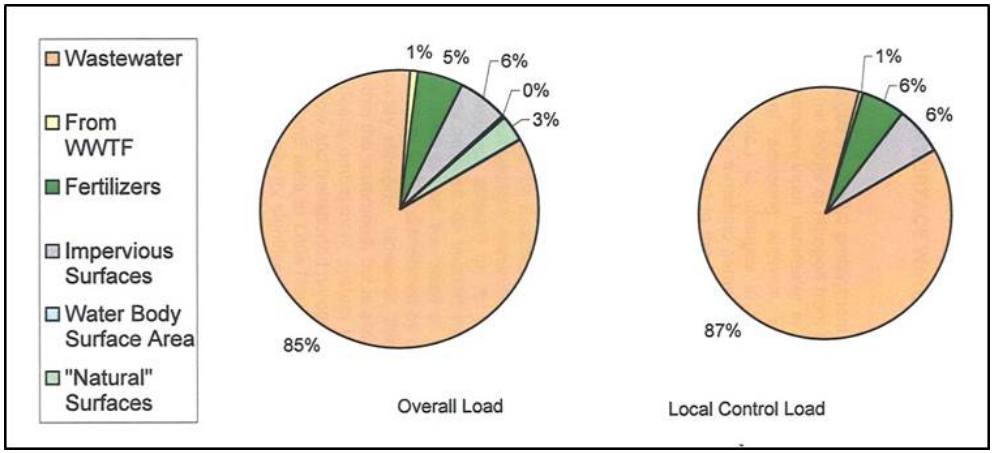


a. Namskaket Creek System Overall

MEP Nitrogen Assumptions and Loadings (continued)



Little Namskaket Creek watersheds and loads



MEP Nitrogen Assumptions and Loadings (continued)

Main findings

- Stormwater nutrient concentrations are very low
- Stormwater flows are intermittent and can be very large
- Some watersheds are more critical for nitrogen and/or phosphorus removal, and should be prioritized
- Stormwater nitrogen loading has been estimated at 5 to 9% of the total loading to the estuaries

Technologies for Stormwater Nitrogen Removal*

UNHSC Measured Median Pollutant Removal Efficiencies

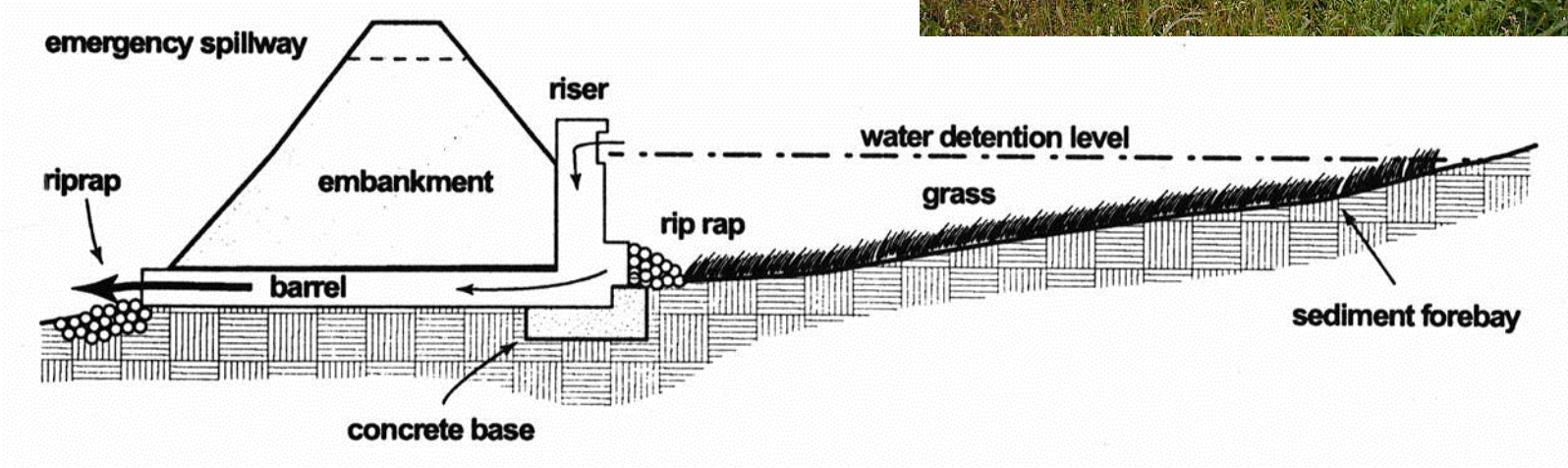
	TSS Total Suspended Solids (mg/l)			TPH-D Total Petroleum Hydrocarbons in the Diesel Range (ug/l)			NO3-N (DIN) Dissolved Inorganic Nitrogen (mg/l)			TZn Total Zinc (mg/l)			TP Total Phosphorus (mg/l)			Average Annual Peak Flow Reduction	Average Annual Lag Time
Treatment Unit Description	Influent	Effluent	% Removal	Influent	Effluent	% Removal	Influent	Effluent	% Removal	Influent	Effluent	% Removal	Influent	Effluent	% Removal	% Reduction	Minutes
Conventional Treatment Technologies																	
Retention Pond	55	30	68%	710	100	82%	0.3	0.2	33%	0.05	0.01	68%	0.09	0.11	NT	86	455
Detention Pond	77	16	79%	490	165	74%	0.3	0.2	25%	0.03	0.02	50%	0.05	0.05	NT	93	639
Stone (rip-rap) Swale	30	15	50%	580	380	33%	0.4	0.7	NT	0.07	0.02	64%	-	-	-	6	7
Vegetated Swale	48	16	56%	710	207	82%	0.3	0.3	NT	0.04	0.02	40%	0.08	0.10	NT	52	38
Berm Swale	51	23	50%	637	61	81%	0.2	0.3	NT	0.03	0.02	50%	0.07	0.09	NT	16	58
Deep Sump Catch Basin	48	34	9%	510	440	14%	0.2	0.3	NT	0.04	0.04	NT	0.08	0.07	NT	NT	NT
Manufactured Treatment Devices																	
ADS Infiltration Unit	49	BDL	99%	766	BDL	99%	0.3	0.9	NT	0.05	BDL	99%	0.12	0.02	81%	87	228
StormTech	87	13	83%	750	45	91%	0.3	0.5	NT	0.03	0.01	67%	0.07	0.03	52%	78	235
Aquifilter	28	11	62%	573	156	66%	0.3	0.3	NT	0.04	0.02	43%	0.07	0.05	24%	NT	NT
Online Hydrodynamic Separators	41	29	29%	774	442	42%	0.4	0.4	NT	0.05	0.04	26%	0.09	0.11	NT	NT	NT
Offline Hydrodynamic Separators (HDS)	120	21	75%	570	180	64%	0.2	0.3	NT	0.03	0.02	21%	0.05	0.05	NT	NT	NT
Low Impact Development (LID)																	
Surface Sand Filter	45	19	51%	788	17	98%	0.3	0.4	NT	0.06	0.01	77%	0.12	0.06	33%	69	187
Bio I - 48" depth (42" filter depth)	37	1	97%	798	BDL	99%	0.4	0.1	44%	0.07	BDL	99%	-	-	-	75	266
Bio II - 30" depth (24" filter depth)	48	6	87%	750	BDL	99%	0.2	0.2	NT	0.04	0.02	73%	0.08	0.05	34%	79	309
Bio III - 30" depth (24" filter depth)	120	8	91%	450	163	64%	0.4	0.3	44%	0.03	0.01	75%	0.03	0.05	NT	84	216
Bio IV - 37" depth (24" filter depth)	80	11	83%	495	165	65%	0.3	0.2	42%	0.03	0.01	67%	0.07	0.06	NT	95	61
Subsurface Gravel Wetlands	61	4	96%	644	BDL	99%	0.3	0.1	75%	0.04	0.01	84%	0.06	0.02	58%	92	391
Porous Asphalt	32	BDL	99%	631	BDL	99%	0.2	0.5	NT	0.04	0.01	75%	0.08	0.04	57%	82	1,275
Pervious Concrete	101	11	85%	310	BDL	99%	0.3	0.5	NT	0.03	0.01	75%	0.06	0.65	NT	93	1,011
Permeable Interlocking Concrete Pavement	51	BDL	99%	610	BDL	99%	0.4	BDL	99%	0.05	BDL	99%	0.13	BDL	99%	99	see pg 16
Tree Filter	31	2	91%	631	BDL	99%	0.2	0.2	1%	0.04	0.01	75%	0.07	0.06	NT	31	204

*BDL indicates a value that is Below Detection Limit of the test method.
NT indicates no treatment.

*Table taken from the University of New Hampshire Stormwater Center 2012 Biennial Report

Nitrogen Removal Technologies – Detention Pond

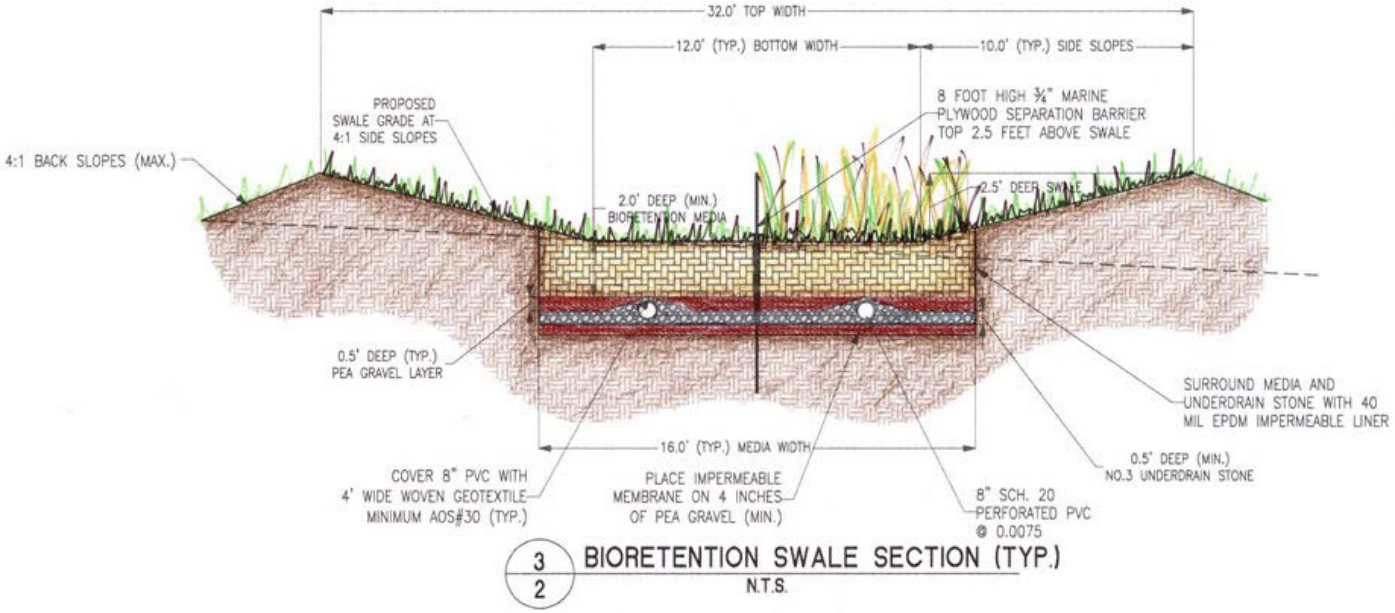
- Nitrogen Removal Rate: 25%*



*Per University of New Hampshire Stormwater Center 2012 Biennial Report findings

Nitrogen Removal Technologies – Bioretention

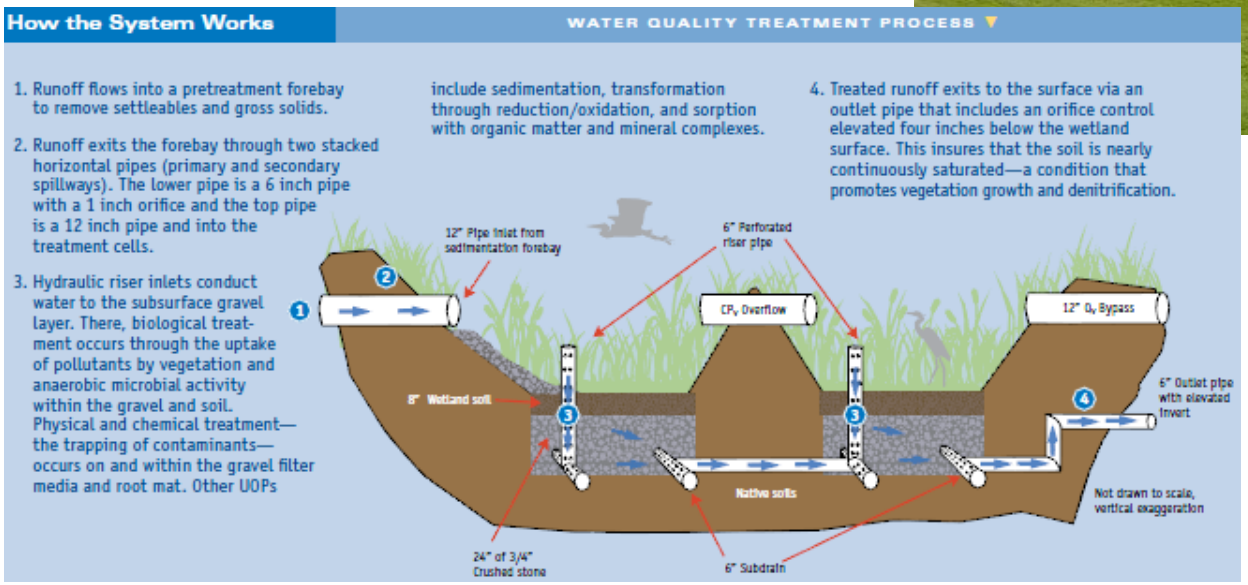
- Nitrogen Removal Rate: 42% to 44%*



*Per University of New Hampshire Stormwater Center 2012 Biennial Report findings. Images taken from Rutgers University and Botany Bay Water Quality Improvement project (AU)

Nitrogen Removal Technologies – Gravel Wetland

- Nitrogen Removal Rate: 75%*



*Per University of New Hampshire Stormwater Center 2012 Biennial Report findings. Images taken from New Hampshire Stormwater Center 2012 Biennial Report.

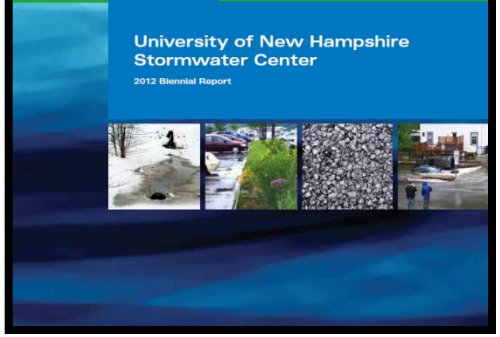
Nitrogen Removal Technologies – TARP / TAPE

- **TAPE** - The Technology Assessment Protocol Ecology Program
  - Washington State Department of Ecology's process for evaluating and approving emerging stormwater treatment best management practices (BMPs)

- **TARP** – The Technology Acceptance Reciprocity Partnership
  - Endorsed by Massachusetts, California, Maryland, New Jersey, Pennsylvania, and Virginia
  - Process for demonstrating and testing stormwater BMPs

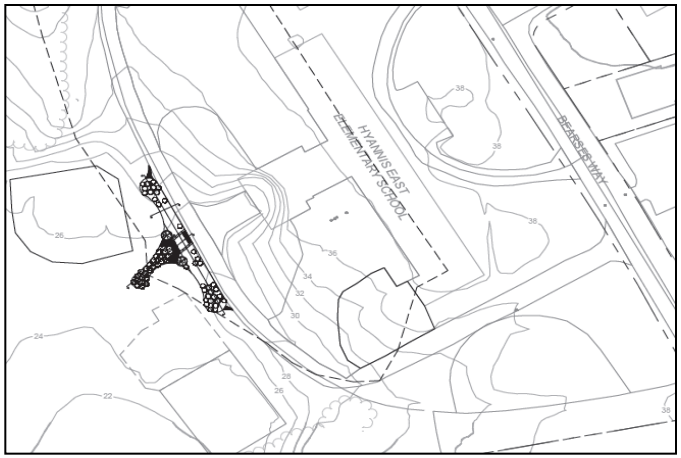
Nitrogen Removal Technologies – University of New Hampshire Stormwater Center

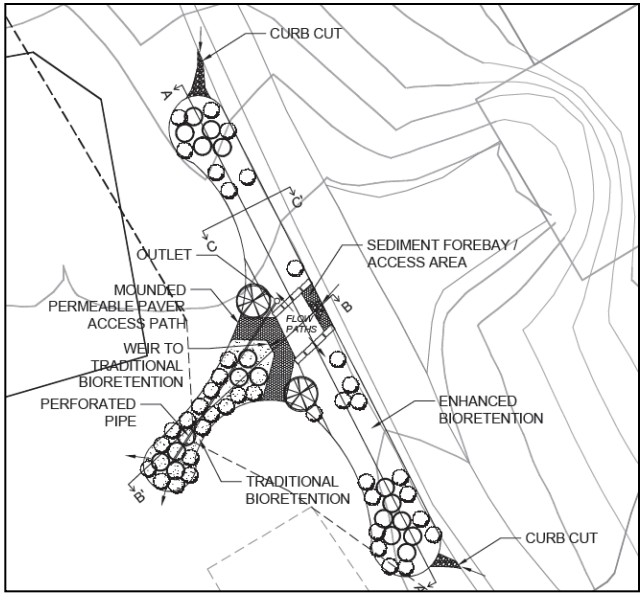
- **Background –**
  - Founded in 2002
  - Field research facility that performs parallel testing of stormwater management technologies
  - Meets all TARP, TAPE, & ETV (*EPA's Environmental Technology Verification Program)*
  - 2012 Biennial Report presents findings on stormwater system:
    - Performance
    - Cost
    - Maintenance
    - Education



Nitrogen Removal Technologies – Case Study for 165 Bearses Way BMP

- U.S. Environmental Protection Agency's (EPA) 2012 Green Infrastructure Community Partners Project
- 20% conceptual plan for an enhanced bioretention facility (combining both gravel wetland and bioretention) to treat stormwater runoff
- Model results show a 65% total nitrogen load removal from the site and a 4.1% reduction in volume

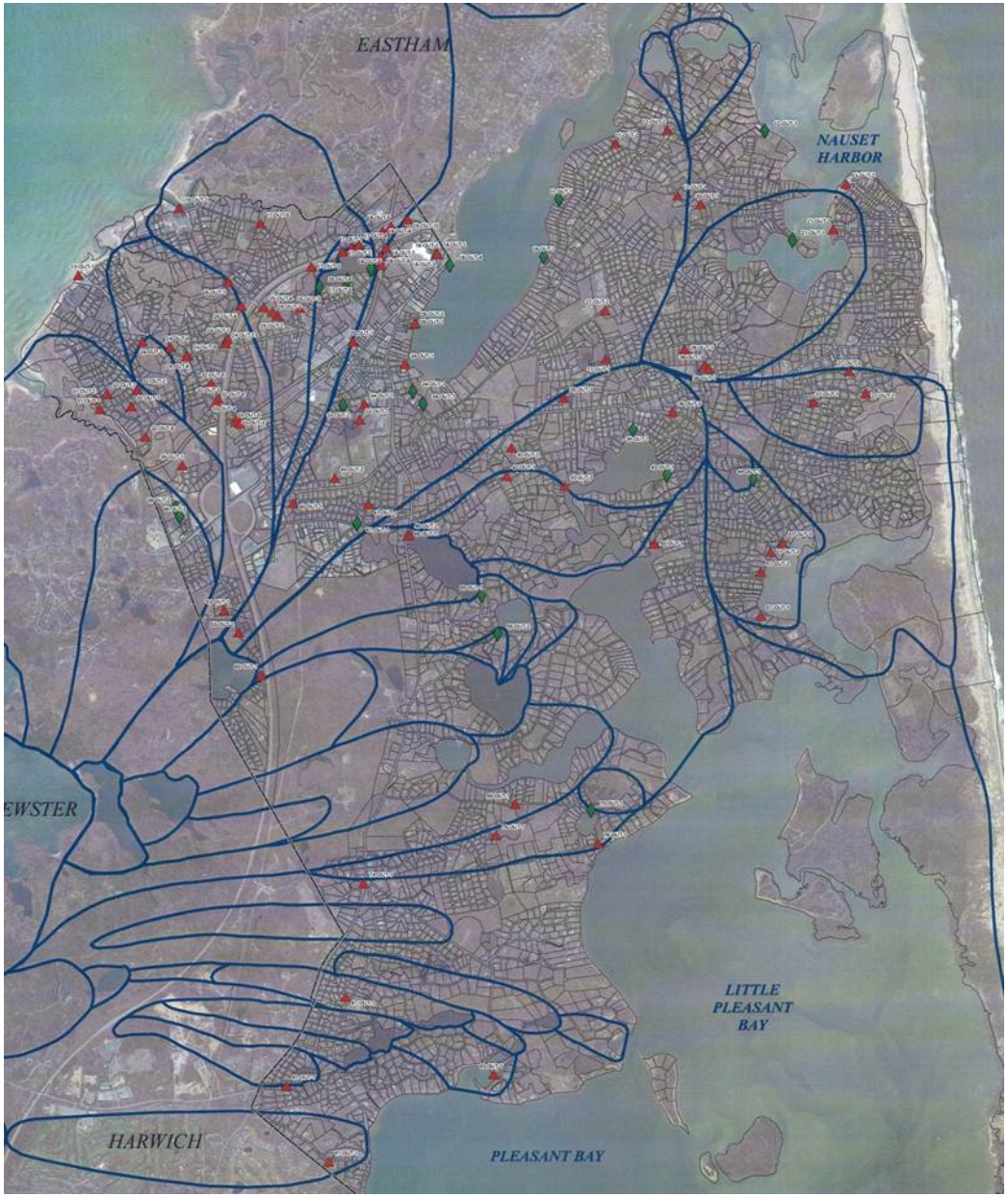




All results and images taken from draft report - *Contract EP-C 11-009 Cape Cod Commission SUSTAIN Model Application to Potential Green Infrastructure Sites*

Nitrogen Removal Technologies – Main Findings

- Significant land areas are typically required
- Costs for the land and treatment facilities can be high
- Facility maintenance is needed
- Facility lifetime is estimated at 20 years
- These technologies are relatively new for areas with porous soils

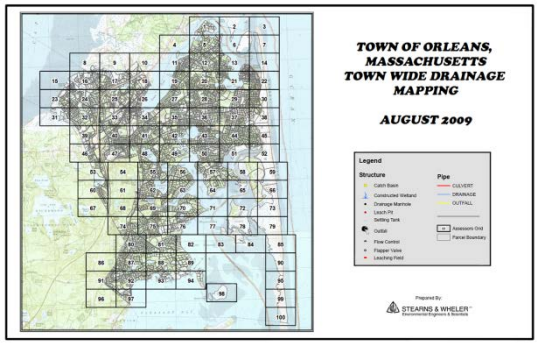


Stormwater Outfalls and Evaluations

Stormwater Outfalls and Evaluations (continued)

- Information sources
  - Town data and locations
  - *Town Wide Drainage Mapping, August 2009*
  - DMF Sanitary Surveys
  - Mass Highway record drawings

- Site visits and data collected
  - Pipe diameter
  - Pipe material
  - Photos
  - Locate / walk drainage area



Stormwater Outfalls and Evaluations (continued)

Calculations

- Potential flows from each outfall:
  - 0.5-inch storm
  - 1-inch storm
  - 10-year storm
  - Annual flow

- Potential pollutant loading
  - In kg/day
  - Assume 1.5 mg/L of nitrogen based on MEP work

Stormwater Outfalls and Evaluations (continued)

Data summary and Interpretation

- Summary worksheet for each outfall with:
  - Drainage area description & observations
  - Site photos
  - Data from site visit (pipe dia, material, etc)
  - Mapping
  - Calculated potential flows
  - Calculated pollutant loadings
  - Prioritization

- Tabular summary

GHD

Discharge ID: 51-OUT-3 Date: 2/7/2013

Address: 57 Briar Spring Road Weather: Partly sunny, 30°

Drainage Area Description:
Residential area with 3/4 acre to 1.5 acre lots

Site Photos:

Additional Observations:

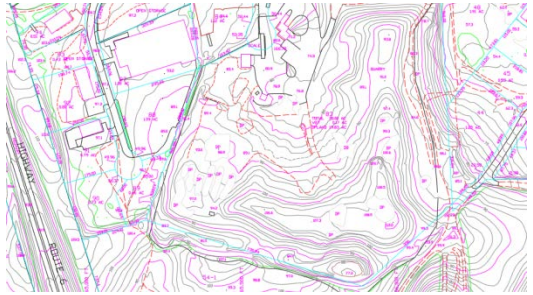
Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (m^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Discharge Area Description	Associated Watersheds
					0.5"	1"				
13	CM	0.88	66%	34%	551	1,102	4	0.36	Discharge into hill side natural, woody with brush draining into Pochet Inlet	

Initial Assessment:
Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:
Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:



Example Worksheets

Discharge ID: 69-OUT-1 **Date:** 2/26/2013

Address: 100 Namequoit Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Majority of runoff from Namequit Road and some from Little Marsh lane.

Site Photos:

Additional Observations:

Abandoned outfall or old culvert observed near 69-OUT-1

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Discharge Area Description	Associated Watersheds
					0.5"	1"				
10.5	CM	2.23	65%	35%	1,400	2,799	7	0.92	Drains down riprap into wetland	

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Example Worksheets

Discharge ID: 55-OUT-1 **Date:** 2/1/2013

Address: 120 Monument Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Includes runoff from Monument Road and Dickenson Conservation Area paved parking lot.

Site Photos:

Additional Observations:

2 Outfalls were found and both drain into the same discharge area. Unable to determine which structures lead to each outfall.

Summary of Existing Conditions:

Pipe Dia (Inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Discharge Area Description	Associated Watersheds
					0.5"	1"				
12	CM	0.72	35%	65%	852	1,703	3	0.56	Discharge into brush covered, semi-nautral drainage basin	

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Example Worksheets

Discharge ID: 51-OUT-3 **Date:** 2/7/2013

Address: 57 Briar Spring Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area with 3/4 acre to 1.5 acre lots

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Discharge Area Description	Associated Watersheds
					0.5"	1"				
13	CM	0.88	66%	34%	551	1,102	4	0.36	Discharge into hill side natural, woody with brush draining into Pochet Inlet	

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Example Worksheets

Discharge ID: 34-OUT-3 **Date:** 1/30/2013

Address: 82 Main Street **Weather:** Overcast, 47°

Drainage Area Description:

Residential area off main road. Lot size ranging from 0.25 acre to 2 acres. Drainage area is mostly road runoff from Main St.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Discharge Area Description	Associated Watersheds
					0.5"	1"				
30	Concrete	1.15	0%	100%	2,089	4,177	6	1.37	Drains into swale in natural, woody area leading to marsh then Town Cove water body	

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

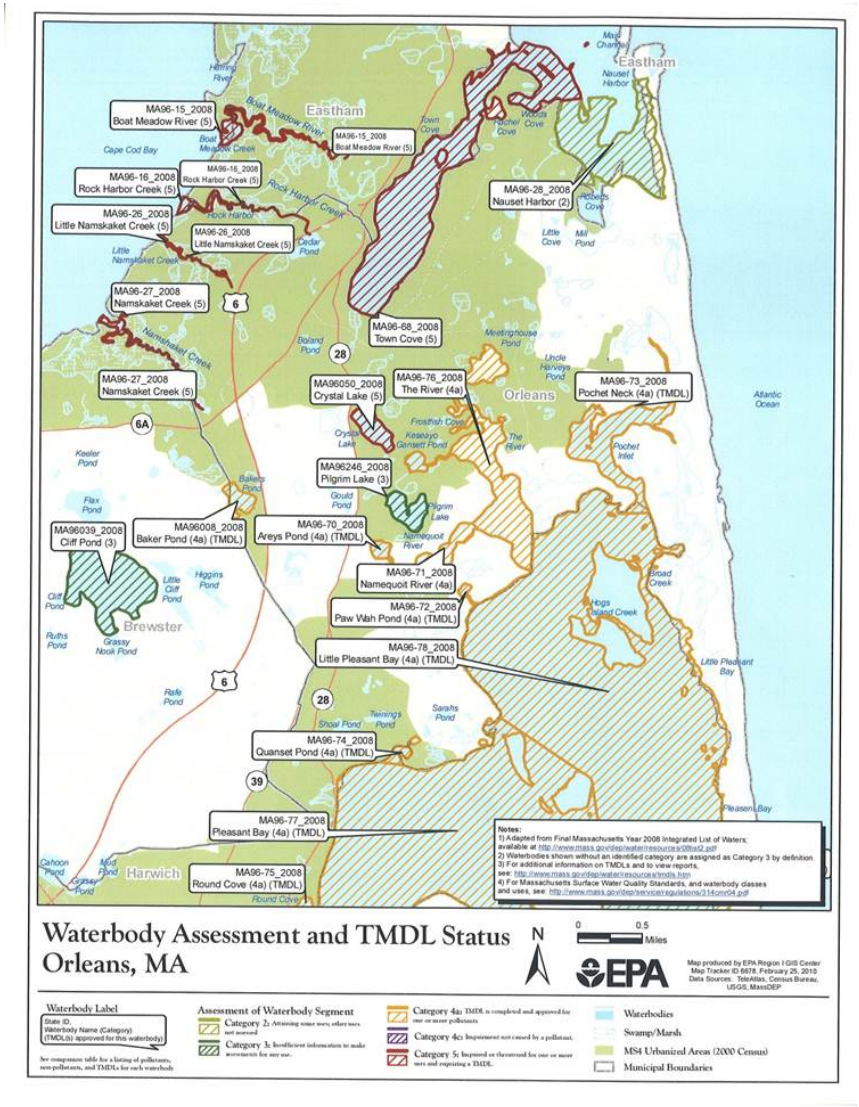
Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

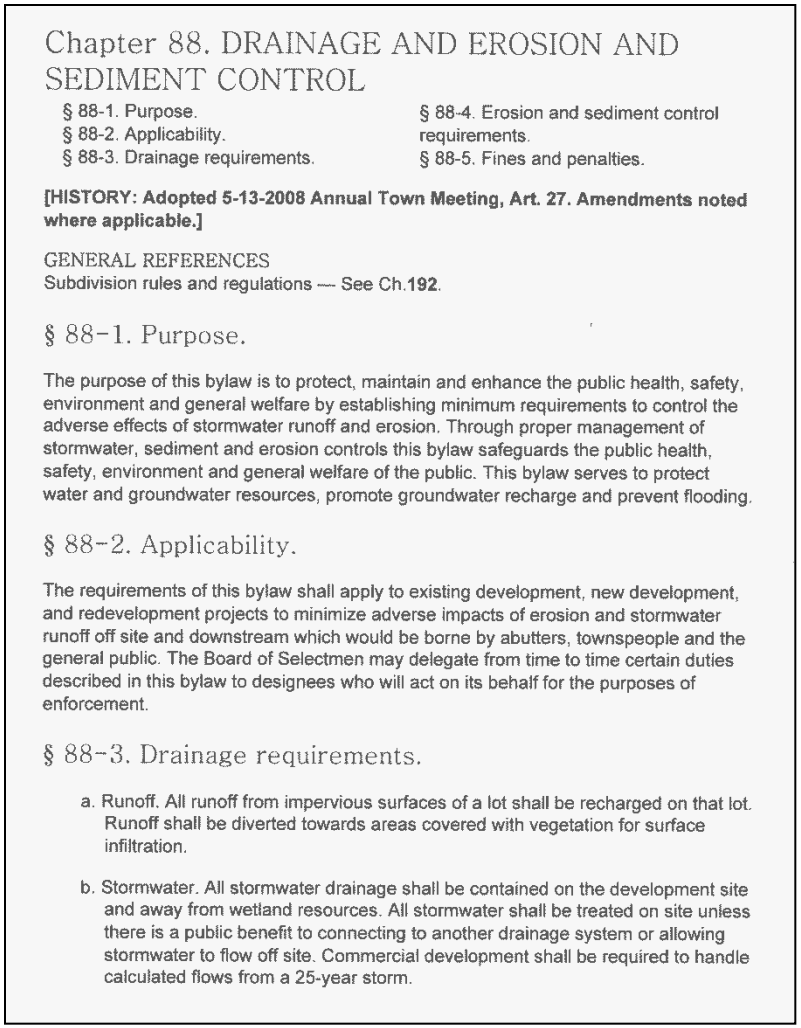
Possible Prioritization Criteria

- Surface water discharge vs. groundwater recharge
- Marine water impacts vs. fresh pond water impacts
- Nitrogen or Phosphorus sensitivity of watershed and receiving water
- TMDL status
- Flow size
- Aesthetics: outfall in high visibility location
- Condition of outfall
- Portion of related project
- Cost
- Outside funding availability



Possible Approach for Revised Town Drainage Code

- Require some form of bioretention as part of Site Plan Review process?
- Require a bioretention technology that has proven N removal performance of…30%, 40%, 50%, etc?
- Town Highway Dept. and Buildings and Grounds Dept. has same requirement?



Chapter 88. DRAINAGE AND EROSION AND SEDIMENT CONTROL

[HISTORY: Adopted 5-13-2008 Annual Town Meeting, Art. 27. Amendments noted where applicable.]

GENERAL REFERENCES
Subdivision rules and regulations — See Ch. **192**.

§ 88-1. Purpose.

The purpose of this bylaw is to protect, maintain and enhance the public health, safety, environment and general welfare by establishing minimum requirements to control the adverse effects of stormwater runoff and erosion. Through proper management of stormwater, sediment and erosion controls this bylaw safeguards the public health, safety, environment and general welfare of the public. This bylaw serves to protect water and groundwater resources, promote groundwater recharge and prevent flooding.

§ 88-2. Applicability.

The requirements of this bylaw shall apply to existing development, new development, and redevelopment projects to minimize adverse impacts of erosion and stormwater runoff off site and downstream which would be borne by abutters, townspeople and the general public. The Board of Selectmen may delegate from time to time certain duties described in this bylaw to designees who will act on its behalf for the purposes of enforcement.

§ 88-3. Drainage requirements.

a. Runoff. All runoff from impervious surfaces of a lot shall be recharged on that lot. Runoff shall be diverted towards areas covered with vegetation for surface infiltration.

b. Stormwater. All stormwater drainage shall be contained on the development site and away from wetland resources. All stormwater shall be treated on site unless there is a public benefit to connecting to another drainage system or allowing stormwater to flow off site. Commercial development shall be required to handle calculated flows from a 25-year storm.

Next Steps

Items to develop

- Prioritization matrix
- Approach and order of magnitude cost of complete assessment
- Fact sheet for public outreach
- General outfall sampling plan

Additional items

-
-
-

Questions and Discussion

Stormwater Sampling Plan
Town of Orleans, MA
September 24, 2013

BACKGROUND

The Town of Orleans (Town) is completing a Preliminary Town-wide Stormwater Assessment of its more than 100 stormwater outfalls to marine estuaries, freshwater ponds, and groundwater discharges. The Town's water quality sampling database (data from 1997 to 2009) was reviewed to identify historic stormwater sampling data. The following table summarizes the available stormwater data:

Table 1 Orleans Historic Stormwater Data

	Outfall Location	No. of Samples	Fecal Coliform (MPN/100 mL)	
			Range	Mean
1	11-OUT-1	5	2 to 310	130
2	15-OUT-1	2	164 to 164	164
3	18-OUT-4	111	0 to 1000	193
4	34-OUT-2	20	0 to 1000	310
5	34-OUT-3	25	4 to 1000	248
6	43-OUT-1	31	0 to 1000	366
7	55-OUT-1	13	0 to 120	18

No nutrient data was available.

Stormwater fecal coliform and nutrient water quality values can be highly variable depending on the land use in the recharge area of the outfall and the time when the sample is collected.

SAMPLING PLAN

The following parameters and typical detection limits are recommended for future stormwater sampling in Orleans:

Table 2 Stormwater Parameters, Detectable Limits, and Holding Times

Parameters	Detection Limits
Fecal Coliform	**1 Colony Forming Unit per 100 mL (cfu/100mL)**
Total Kjeldahl Nitrogen (TKN)	0.3 mg/L
Nitrate Nitrogen	0.1 mg/L
Nitrite Nitrogen	0.1 mg/L
Total Phosphorus	0.01 mg/L
Orthophosphate	0.005 mg/L
Total Suspended Solids	5 mg/L

Holding times are an important consideration for sampling. The Barnstable County Laboratory is the most economical location for these analyses, and should be consulted regarding when they will receive the samples for analysis. Discussions with them on April 18, 2013 indicated the following:

- The Fecal Coliform analysis needs to be processed within six (6) hours of sampling, and a laboratory reading is needed the next day.
- Therefore samples should be delivered to the lab by 3 p.m. Monday through Thursday, and should not be sampled more than five (5) hours before then.

Ideally, the sample collected would be a flow-averaged composite sample for the whole rain event. This is nearly impossible to obtain because the stormwater does not flow at a constant rate and it is difficult for the sampler to be at the outfall when the storm hits.

The Town should try to obtain a grab sample at each outfall during the early part of the storm (first flush period) when the water quality is expected to be the worst.

Samples at each outfall should be collected during several storms.

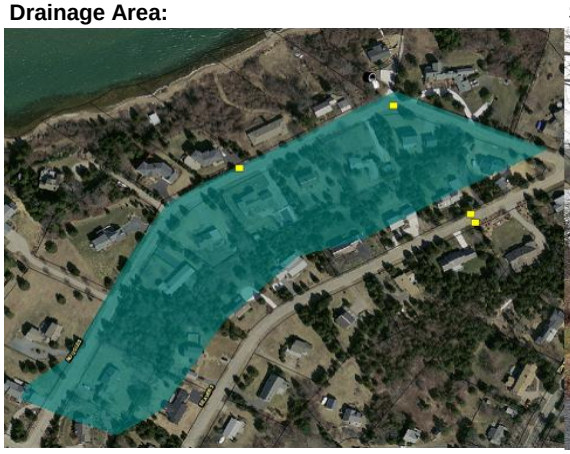
Discharge ID: 11-OUT-2 1/31/2013

Address: 16 Ruggles Road Sunny

Drainage Area Description:

Seasonal residential with 1/2 acre lots; paved roads. Outfall drains to wooded area leading to Town Cove water body.

Drainage Area:



Site Photos:

Additional Observations:

Neighbors complain that the path to the water is obstructed by vegation.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	7	81%	19%	2,293	4,586	28	1.51	8	Low lying vegetation, semi-natural	Nauset Harbor - Town Cove

Initial Assessment:

Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 12-OUT-1 **Date:** 4/12/2013

Address: 210 Brick Hill Road **Weather:** Overcast / Rain, 44°

Drainage Area Description:

Seasonal residential with average 1 acre lots. Mostly roadrunoff from Brick Hill Road and runoff from some western properties.

Drainage Area

Site Photos:

Additional Observations:

Outfall was recently constructed.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE / Concrete	6.71	68%	32%	3,840	7,680	31	2.53	13	Swale leading to pond / wetland. Woody, Natural	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

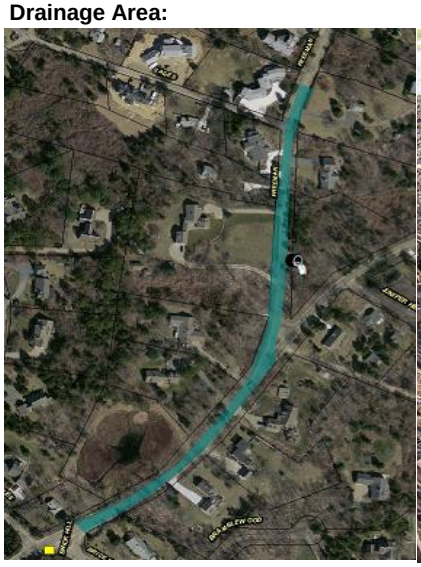
Discharge ID: 12-OUT-2 1/31/2013

Address: 4 Freeman Lane Sunny

Drainage Area Description:

Seasonal to year round residential with 1 acre lots; paved roads. Outfall drains to wetland.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10	CM	1	0%	100%	1,533	3,065	4	1.01	5	Wetland with medium shrubs and trees	Nauset Harbor - Town Cove

Initial Assessment:

Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

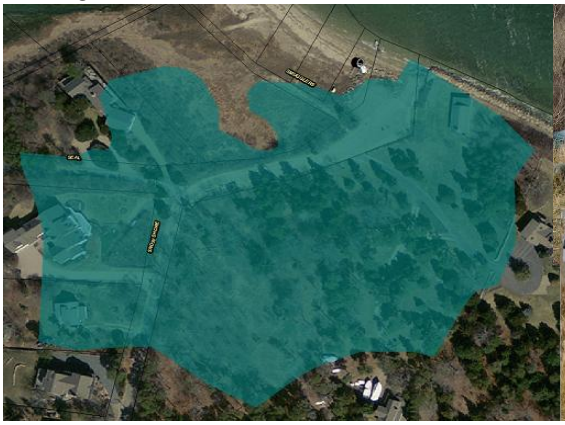
Discharge ID: 13-OUT-1 1/31/2013

Address: Smugglers Path Sunny

Drainage Area Description:

Town landing with a paved public parking lot. Area used primarily as recreational boat ramp.

Drainage Area:



Site Photos:

Additional Observations:

Outfall was not located. Stormdrain structures in parking area were observed to be flooded likely due to high tide. Four Storm-Treat Systems have been installed and it is assumed that the outfall has existing mitigation.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
-	-	5	87%	13%	1,211	2,423	21	0.80	4	Beach, sand leading to Nauset Harbor.	Nauset Harbor - Nauset Marsh

Initial Assessment:

Priority: *(**Low**, Medium, High)*

Maintenance Recommendation:

Priority: *(Low, **Medium**, High, Very High)*

Storm-Treat systems are currently installed. It is recommended that the Town continue to perform routine maintenance on the structures.

Mitigation Recommendations:

None.

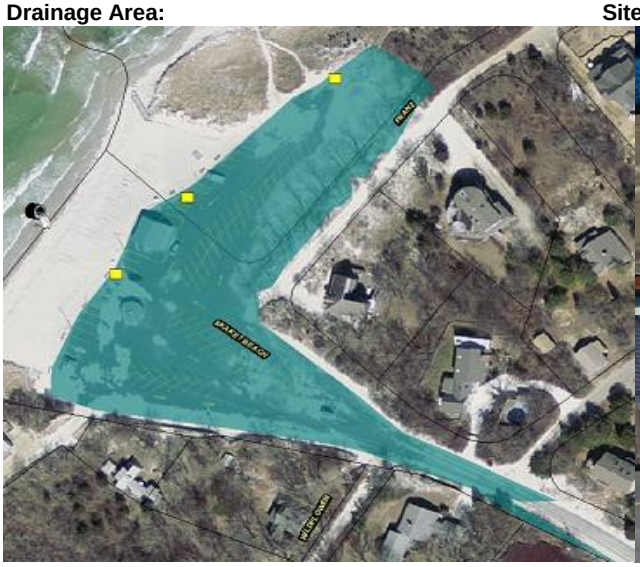
Discharge ID: 15-OUT-1 **Date:** 2/1/2013

Address: Skaket Beach **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Paved road & parking area. Stormwater improvements performed in 2013 including installation of new leaching catch basins, leaching pits, and new septic system and leach field for bath house. Overflow pipe replaces old outfall onto beach.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	2	0%	100%	3,435	6,870	10	2.26	12	Beach, Sand	None - Cape Cod Bay

Initial Assessment:

Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 16-OUT-1

Date: 2/8/2013

Address: 60 Rock Harbor Road

Weather: Overcast / rain and snow mix, 30°

Drainage Area Description:

Year round residential with average of 1/2 acre to 1 acre lots off main road.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	2	60%	40%	1,187	2,374	6	0.78	4	Natural low lying shrubs & brush, woody	Rock Harbor

Initial Assessment:

Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 16-OUT-2

Date: 2/8/2013

Address: Bay View Drive

Weather: Overcast / rain and snow mix, 30°

Drainage Area Description:

Seasonal and year round commercial with a majority of the area composed of paved roads and parking.

Drainage Area:

Site Photos:

Additional Observations:

Actual outfall location was not observed. Assumed outfall located at drain manholes. No catch basins were observed and it was assumed that the parking area was included in the drainage area.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
Unk	Unk	3	19%	81%	4,318	8,635	15	2.84	15	Rock Harbor Creek water body leading into Cape Cod Bay	Rock Harbor

Initial Assessment:

Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-1 **Date:** 2/26/2013

Address: Route 6 **Weather:** Clear, 40°

Drainage Area Description:

Paved 2 lane highway with surface runoff draining to catch basins leading to outfall.

Drainage Area:

Site Photos:

Additional Observations:

Outfall was partially submerged

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0.53	0%	100%	956	1,912	3	0.63	3	Directly into marsh leading down slope into Cedar Pond	Rock Harbor - Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-2 **Date:** 2/26/2013

Address: Route 6 **Weather:** Clear, 40°

Drainage Area Description:

Paved 2 lane highway with surface runoff draining to catch basins leading to outfall.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0.26	0%	100%	479	958	1	0.32	2	Directly into marsh leading down slope into Cedar Pond	Rock Harbor - Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-3 **Date:** 2/26/2013

Address: Route 6 **Weather:** Clear, 40°

Drainage Area Description:

Paved 2 lane highway with surface runoff draining to catch basins leading to outfall.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0.40	0%	100%	732	1,464	2	0.48	2	Into woody marsh near Cedar Pond	Rock Harbor/Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-4

Date: 2/8/2013

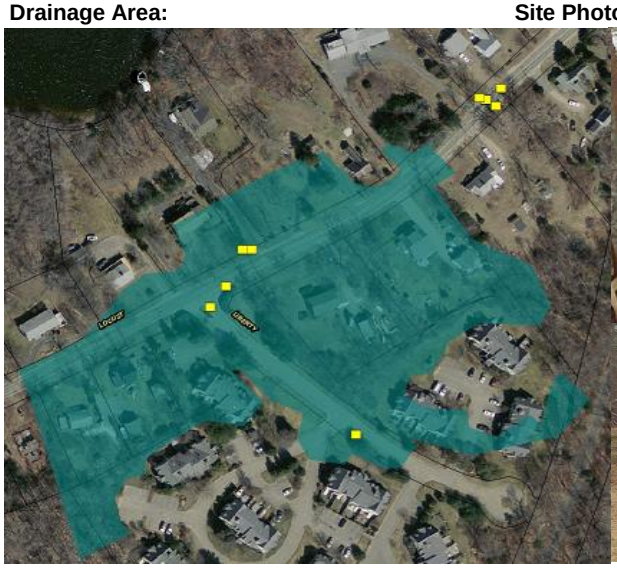
Address: 48 Locust Road

Weather: Overcast / rain and snow mix, 30°

Drainage Area Description:

Seasonal to year round residential with between 1/3 acre to 1 1/2 acre lots off medium volume road.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	CM	6	65%	35%	3,801	7,601	27	2.50	13	Discharge into swale into woody area, leading to Cedar Pond	Rock Harbor - Cedar Pond

Initial Assessment:

Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-5 **Date:** 2/26/2013

Address: 154 Rock Harbor Road **Weather:** Clear, 40°

Drainage Area Description:

Aerial View:

Site Photos:

Additional Observations:

17-OUT-5 was classified as a culvert. There was not significant swale or other drainage structure located.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
-	-	-	-	-	-	-	-	-	-	-	Rock Harbor

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 17-OUT-6

Date: 2/8/2013

Address: Route 6 , near Cedar Pond Road

Weather: Overcast / rain and snow mix, 30°

Drainage Area Description:

Drainage from Route 6 and adjacent land

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	Concrete	1	70%	30%	678	1,355	6	0.45	2	Swale leading to brush / woody area	Rock Harbor

Initial Assessment:

Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-1 **Date:** 2/26/2013

Address: 45 Cranberry Highway **Weather:** Clear, 40°

Drainage Area Description:

Drainage Area:

Site Photos:

Additional Observations:

Abandoned inlet pipe

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/day)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
18	CM	-	-	-	-	-	-	-	-	-	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

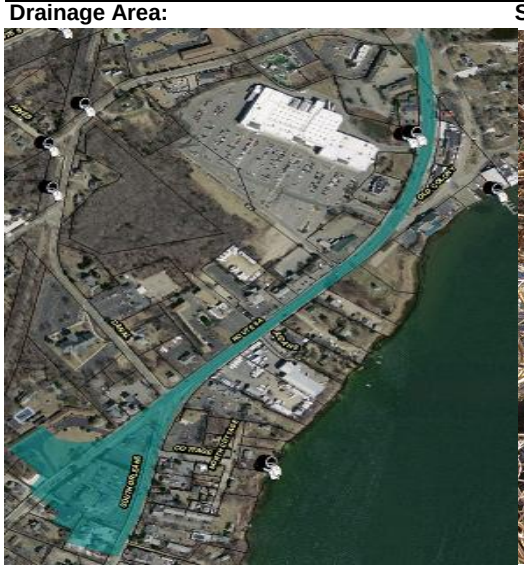
Discharge ID: 18-OUT-2 **Date:** 2/26/2013

Address: 45 Cranberry Highway **Weather:** Clear, 40°

Drainage Area Description:

Runoff from Route 6A and 28 flows into 18-OUT-2 which drains directly into the Lower Pond basin prior to discharge into 18-OUT-4.

Drainage Area:



Site Photos:

Additional Observations:

Discharge water observed to have surface oils and a redish tint.

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
30-36	Concrete	-	-	-	-	-	-	-	-	Directly into Lower Pond basin leading to 18-OUT-4	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-3 **Date:** 2/26/2013

Address: 45 Cranberry Highway **Weather:** Clear, 40°

Drainage Area Description:

Inlet pipe draining Upper and Lower Pond basins into 18-OUT-4 outfall into Town Cove.

Drainage Area:

Site Photos:

Additional Observations:

Unable to locate 18-OUT-3 outfall. Photos of outfall are from Town Cove Stormwater Mitigation Assessment Jeremiah's Gutter, 2005

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/day)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
-	-	-	-	-	-	-	-	-	-	-	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-4 **Date:** 2/26/2013

Address: 40 Ellis Road, Eastham **Weather:** Clear, 40°

Drainage Area Description:

Discharge area to 18-OUT-4 includes 4000 linear feet from Route 6A and 28, 45 acres from Stop & Shop area and adjacent commercial properties, and 4.6 acres from Old Country Road.

Drainage Area:

Site Photos:

Additional Observations:

Unable to take photos of 18-OUT-4. Photos of outfall are from Town Cove Stormwater Mitigation Assessment Jeremiah's Gutter.

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
36	Concrete with flap valve	59.10	36%	64%	69,152	138,303	302	45.52	233	Directly into Town Cove	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Currently an existing treatment system consisting of two ponds separated by a filter dam is treating runoff from the Stop & Shop subwater shed. An infiltration facility on the Windmill Property is providing treatment for 85% of the Route 6A and 28 area.

Runoff from the Old County Road water shed is being treated by a biofilter prior to discharge into the 36" outfall pipe 18-OUT-4.

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-UNK **Date:** 2/26/2013

Address: 40 Ellis Road, Eastham **Weather:** Clear, 40°

Drainage Area Description:

Residential area next to marina. Lot sizes ranging from 1/4 acre to 1 acre.

Drainage Area:

Site Photos:

Additional Observations:

In Eastham.

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	PVC	-	-	-	-	-	-	-	-	Directly into Town Cove	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-5 **Date:** 2/26/2013

Address: Route 6 **Weather:** Clear, 40°

Drainage Area Description:

Route 6 highway. Runoff mostly from impermeable road surface.

Drainage Area:

Site Photos:

Additional Observations:

18-OUT-5 located on North side of Rt. 6.

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
20" & 10"	Concrete	0.29	0%	100%	519	1,039	2	0.34	2	UNK	Not included in MEP

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-6 **Date:** 2/26/2013

Address: Route 6 **Weather:** Clear, 40°

Drainage Area Description:

Route 6 highway. Runoff mostly from impermeable road surface.

Drainage Area:

Site Photos:

Additional Observations:

Unable to locate outfall 18-OUT-6. Assumed drainage based on marked location.

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	0.47	0%	100%	848	1,695	2	0.56	3	UNK	Not included in MEP

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-7 **Date:** 2/8/2013

Address: 65 Canal Road **Weather:** and snow mix, 30°

Drainage Area Description:

Seasonal residential and commercial off medium volume road and near bike path.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	3	63%	37%	2,255	4,510	14	1.48	8	Enclosed low elevation area, natural, woody & low lying brush & shrubs	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-8 **Date:** 2/8/2013

Address: 62 Locust Road **Weather:** Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre to 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Unclear what stormdrains lead to outfall. Recommend Town to investigate.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	1	44%	56%	618	1,236	2	0.41	2	Marsh leading down slope into Cedar Pond	Rock Harbor - Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-9 **Date:** 4/12/2013

Address: 43 Canal Road **Weather:** Overcast / Rain, 40°

Drainage Area Description:

Drainage area includes mostly runoff from Canal Road. Medium traffic road through seasonal residential area.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/day)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	1	0%	100%	1,479	2,958	4	0.97	5	Natural woody leading into Cedar Pond	Rock Harbor / Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-10 **Date:** 2/26/2013

Address: Route 6 near rotary **Weather:** Clear, 40°

Drainage Area Description:

Mostly impermeable road runoff with a small grassy median.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0	28%	72%	602	1,204	2	0.40	2	Natural woody with low lying brush	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 18-OUT-11

Date: 2/8/2013

Address: 7 Jones Road

Weather: Overcast / rain and snow mix, 30°

Drainage Area Description:

Seasonal to year round residential with average of 1/2 acre lots off medium volume road and near bike path.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	1	52%	48%	644	1,288	3	0.42	2	Natural, woody & low lying brush & shrubs	Not included in MEP

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 19-OUT-1 **Date:** 2/26/2013

Address: 16 Gibson Road **Weather:** Clear, 40°

Drainage Area Description:

Seasonal to year round residential with average of 1/2 acre to 3/4 acre lots off low volume residential road.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
15	CM	3	68%	32%	1,845	3,690	14	1.21	6	Directly onto beach leading to Town Cove	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 24-OUT-1 **Date:** 1/30/2013

Address: Skaket Beach Road near Route 6 **Weather:** Overcast, 47°

Drainage Area Description:

Route 6 and adjacent wooded area

Drainage Area:

Site Photos:

Additional Observations:

Assumed majority of flow coming from Route 6 catch basins

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
28	Concrete	2	84%	16%	462	924	4	0.30	2	Drains into stream	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 24-OUT-2 **Date:** 1/30/2013

Address: 50 Skaket Beach Road **Weather:** Overcast, 47°

Drainage Area Description:

Route 6 and adjacent wooded area

Drainage Area: **Site Photos:**

Additional Observations:

24-OUT-2 is a culvert.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
6	VC	-	-	-	-	-	-	-	-	Drains into stream	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 24-OUT-3 **Date:** 2/1/2013

Address: 5 Captain Linnell Road **Weather:** Sunny, 30°

Drainage Area Description:

Seasonal residential with average of 1/3 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Outfall was mostly submerged.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
8	CM	2	52%	48%	1,596	3,191	9	1.05	5	Direct drainage into natural salt marsh / wetland	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 24-OUT-4 **Date:** 1/30/2013

Address: 96 Skaket Beach Road **Weather:** Overcast, 47°

Drainage Area Description:

Seasonal residential with average of 1 to 2 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Could not reach actual outfall discharge due to brush.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	4	78%	22%	1,553	3,107	18	1.02	5	Drains into brush then into salt march/ wetland.	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 24-OUT-5 **Date:** 1/30/2013

Address: 88 Skaket Beach Road **Weather:** Overcast, 47°

Drainage Area Description:

Seasonal residential with average of 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	4	76%	24%	1,947	3,894	20	1.28	7	Drains into woods / brush leading to salt marsh/ wetland.	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 24-OUT-6 **Date:** 1/30/2013

Address: 88 Skaket Beach Road **Weather:** Overcast, 47°

Drainage Area Description:

Seasonal residential with average of 1/2 acre to 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	2	57%	43%	1,457	2,914	9	0.96	5	Drains into woods / brush leading to salt marsh/ wetland.	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

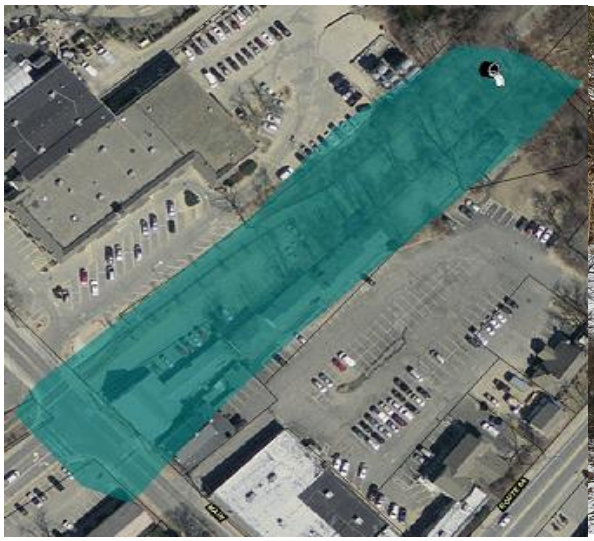
Discharge ID: 25-OUT-1 **Date:** 2/8/2013

Address: On East side of Cape Cod Rail Trail behind 90 Massachusetts 6A **Weather:** and snow mix, 30°

Drainage Area Description:

Year round commercial properties and bike trail. Majority of runoff from paved and gravel parking areas and paved roads.

Drainage Area:



Site Photos:

Additional Observations:

An unmarked outfall was located in the Snow's Home and Garden parking area and labeled as 25-OUT-UNK.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	2	15%	85%	3,088	6,177	10	2.03	10	Semi-natural, wooded with low lying brush	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 25-OUT-2 **Date:** 1/30/2013

Address: 17 Rock Harbor Road **Weather:** Overcast, 47°

Drainage Area Description:

Road runoff from West and East portions of Rock Harbor Road

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	1	15%	85%	798	1,596	3	0.53	3	Drains down steep slope into natural woods, brush	Rock Harbor

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 25-OUT-3 **Date:** 1/30/2013

Address: 25 Rock Harbor Road **Weather:** Overcast, 47°

Drainage Area Description:

Road runoff from West portion of Rock Harbor Road

Drainage Area:

Site Photos:

Additional Observations:

Outfall almost completely submerged

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0	15%	85%	525	1,050	2	0.35	2	Drains down steep slope into natural woods, brush	Rock Harbor

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High,* ***Very High****)*

Mitigation Recommendations:

Discharge ID: 25-OUT-4 **Date:** 2/8/2013

Address: Rock Harbor and Skaket Beach intersection **Weather:** and snow mix, 30°

Drainage Area Description:

Road runoff at the intersection of Rock Harbor Road and Skaket Beach Road

Drainage Area:

Site Photos:

Additional Observations:

Original concrete outfall had failed and was replaced with a coated corrugated steel section.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	Concrete & CM	0	15%	85%	698	1,396	2	0.46	2	Drains down steep slope into natural woods, brush	Nauset Harbor - Nauset Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 25-OUT-5 **Date:** 2/8/2013

Address: Behind 7 Cedar Pond Road **Weather:** and snow mix, 30°

Drainage Area Description:

Seasonal residential and commercial buildings. Lots range from 1/3 acre to 1 acre. Drainage area mostly includes road runoff from newly paved road and some runoff from adjacent residential properties and woody commercial property.

Drainage Area: **Site Photos:**

Additional Observations:

Could not locate outfall discharge. Assumed to be submerged.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
Unk	Unk	2	67%	33%	922	1,844	7	0.61	3	Assumed drains directly into Cedar Pond	Rock Harbor - Cedar Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 25-OUT-6 **Date:** 2/8/2013

Address: Rock Harbor and Skaket Beach intersection **Weather:** and snow mix, 30°

Drainage Area Description:

Road runoff at the intersection of Rock Harbor Road and Skaket Beach Road

Drainage Area:

Site Photos:

Additional Observations:

Observed multiple gaps in the concrete outfall pipe. Outfall pipe was partially submerged under dirt and brush.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	Concrete	0.37	19%	81%	541	1,083	2	0.36	2	Drains down steet slope into natural woods, brush	Rock Harbor

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High*** *, Very High)*

Mitigation Recommendations:

Discharge ID: 25-OUT-7

Address: 10 Locust Road

2/8/2013
Cloudy with light snow fall / cover

Drainage Area Description:

Outfall drains directly onto small boulders into swale / stream and continues to flow downhill. Area is natural wooded with a combination of low lying brush, shrubs, and trees.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
24	Concrete	5	66%	34%	3,324	6,648	25	2.19	11	Swale, Natural Woods	Rock Harbor

Initial Assessment:

Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 26-OUT-1 **Date:** 2/7/2013

Address: 1 Cottage Street **Weather:** Partly Sunny, 30°

Drainage Area Description:

Seasonal residential and year round commercial properties. Majority of runoff from paved Cottage St. and South Oreans Road.

Drainage Area:

Site Photos:

Additional Observations:

Water was observed flowing from perforated holes and it was assumed that the object was 26-OUT-1. Drainage area is assumed to be all impervious and total 1/2 the combined drainage area for outfalls 26-OUT-1,2.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
20	PVC	0.77	0%	100%	1,394	2,788	0	0.92	5	At base of steep hill into marsh flowing directly into Town Cove water body	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 26-OUT-2 **Date:** 2/7/2013

Address: 1 Cottage Street **Weather:** Partly Sunny, 30°

Drainage Area Description:

Seasonal residential and year round commercial properties. Majority of runoff from paved Cottage St. and South Oreans Road.

Drainage Area:

Site Photos:

Additional Observations:

Outfall is in poor shape with multiple hole rusted through. A dead animal was observed next to the outfall. Drainage area is unknown and is assumed to be all impervious and total 1/2 the combined drainage area for outfalls 26-OUT-1,2.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
13	CM	0.77	0%	100%	1,394	2,788	0	0.92	5	At base of steep hill into marsh swale flowing directly into Town Cove water body	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium****, High, Very High)*

Mitigation Recommendations:

Discharge ID: 27-OUT-1 **Date:** 1/31/2013

Address: 7 Pine Ridge Lane **Weather:** Overcast, 50°

Drainage Area Description:

Seasonal residential with mostly 1/3 acre lots and some 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Outfall has multiple holes rusted through.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	CM	5.80	71%	29%	3,087	6,174	26	2.03	10	Natural woody area leading to wetland / marsh	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 27-OUT-2 **Date:** 1/31/2013

Address: 94 Hopkins Lane **Weather:** Overcast, 50°

Drainage Area Description:

Drainage area includes paved main road residential housing complex. Mostly impermeable land, apartments and paved parking.

Drainage Area:

Site Photos:

Additional Observations:

Outfall was partially submerged

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
14	CM	4.45	67%	33%	2,639	5,278	21	1.74	9	Natural woody area leading to wetland / Hopkins Lane Bog	Rock Harbor

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 28-OUT-1 **Date:** 1/31/2013

Address: 85 Great Oak Road **Weather:** Overcast, 50°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots. Flow to the outfall also includes water from culvert at road level and stormwater runoff from road surface.

Drainage Area: **Site Photos:**

There is an 8" CM culvert located under the road at the top of the hill which drains to the outfall catch basin.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	17.35	71%	29%	9,189	18,379	78	6.05	31	Disturbed brush area draining down slope to wetland	Nauset Harbor - Mill Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 28-OUT-UNK **Date:** 2/7/2013

Address: 64 Brick Hill Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots.

Drainage Area: **Site Photos:**

Additional Observations:

Outfall could not be located however the pipe was visible from inside the catch basin.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
Unk	CM	2.11	64%	36%	1,385	2,770	7	0.91	5	Semi-natural woody drainage basin	Nauset Harbor - Mill Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium,*** *High, Very High)*

Mitigation Recommendations:

Discharge ID: 31-OUT-1 **Date:** 2/1/2013

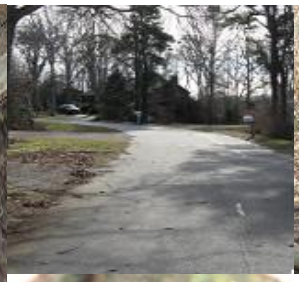
Address: 60 Captain Linnell Road **Weather:** Partly sunny, 33°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots.

Drainage Area:

Site Photos:



Additional Observations:

Outfall was corrugated metal surrounded by concrete. Outfall was partially submerged.

A pvc pipe was entering the catchbasin from the direction of house No. 60.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	CM / Concrete	1.23	56%	44%	986	1,972	6	0.65	3	Directly into wetland then sloping towards tidal marsh and into Namskaket Creek.	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 31-OUT-2 **Date:** 2/1/2013

Address: 56 Captain Linnell Road **Weather:** Partly sunny, 33°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots. Drainage coming from roadway and culvert located to the East of Captain Linnell Road.

Drainage Area:

Site Photos:

Additional Observations:

Outfall fully submerged. Cleaning recommended.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	CM / Concrete	5.36	73%	27%	2,673	5,347	25	1.76	9	Directly into wetland then sloping towards tidal marsh and into Namskaket Creek.	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 32-OUT-1 **Date:** 2/1/2013

Address: 74 Captain Linnell Road **Weather:** Partly sunny, 33°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots. Drainage area includes mostly roadway and properties to NW of road.

Drainage Area:

Site Photos:

Additional Observations:

Outfall fully submerged. Cleaning recommended.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM / Concrete	1.20	64%	36%	793	1,585	6	0.52	3	Directly into natural, woody with low lying brush	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 32-OUT-2 **Date:** 2/1/2013

Address: 87 Captain Linnell Road **Weather:** Partly sunny, 33°

Drainage Area Description:

Seasonal residential area with average 1/2 acre lots. Drainage area includes mostly roadway and properties to NW of road.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
17	CM / Concrete	3.20	68%	32%	1,851	3,703	15	1.22	6	Directly into natural, woody with low lying brush	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium**,** High, Very High)*

Mitigation Recommendations:

Discharge ID: 32-OUT-3 **Date:** 1/30/2013

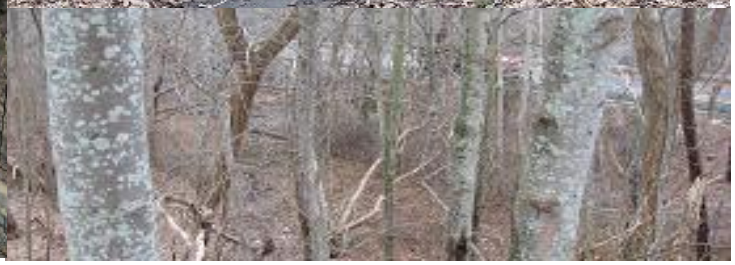
Address: West Road to west of Route 6 overpass **Weather:** Overcast, 47°

Drainage Area Description:

Catch basin located on North side of West Road

Drainage Area:

Site Photos:



Additional Observations:

Possibly includes drainage from Route 6 due to two outfall pipes although not included in calculations.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12 & 17	Concrete	0.30	48%	52%	288	576	1	0.19	1	Directly into natural, woody with low lying brush	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 32-OUT-4 **Date:** 1/30/2013

Address: West Road to west of Route 6 overpass **Weather:** Overcast, 47°

Drainage Area Description:

Catch basin located on North side of West Road

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
17.5	Concrete	0.30	48%	52%	288	576	1	0.19	1	Directly into natural, woody with low lying brush	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium**,** High, Very High)*

Mitigation Recommendations:

Discharge ID: 32-OUT-5 **Date:** 2/26/2013

Address: Behind 92 West Road **Weather:** Sunny, 40°

Drainage Area Description:

Assumed majority of stormwater coming from portions of West Road, Chase Lane, and Salty Ridge Road.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
14	Concrete	0.96	38%	62%	1,079	2,157	5	0.71	4	Directly into natural, woody with low lying brush	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 32-OUT-6 **Date:** 2/1/2013

Address: 32 Skymeadow Drive (Cul-de-Sac) **Weather:** Partly sunny, 33°

Drainage Area Description:

Residential with average 1 acre lot size. Runoff coming from paved road up to 31 Skymeadow Drive and properties to west of Skymeadow Drive.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
7	CM	0.65	56%	44%	524	1,049	3	0.35	2	Directly into natural, woody bordering tidal marsh	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

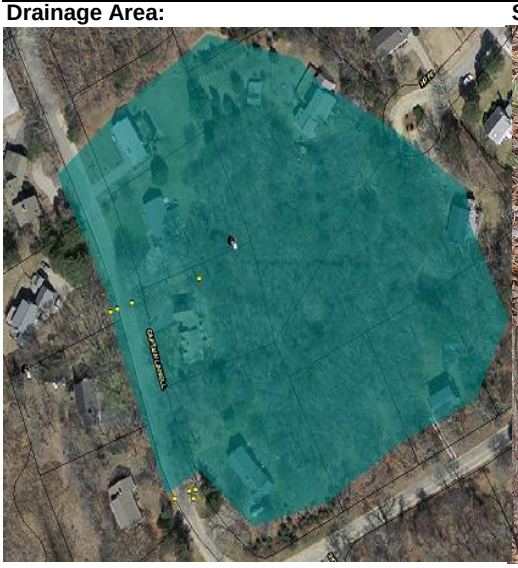
Mitigation Recommendations:

Discharge ID: 32-OUT-7 **Date:** 2/1/2013

Address: 60 Captain Linnell Road **Weather:** Partly sunny, 33°

Drainage Area Description:

Drainage Area:



Site Photos:

Additional Observations:

32-OUT-7 is a culvert draining to 31-OUT-2

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	-	-	-	-	-	-	-	-	Into 31-OUT-2	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 33-OUT-1 **Date:** 1/30/2013

Address: Behind 15B Center Place **Weather:** Overcast, 47°

Drainage Area Description:

Seasonal residential development. Extent of drainage area to outfall is unclear.

Drainage Area:

Site Photos:

Additional Observations:

Water was observed to be flowing however the actual outfall could not be reached.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	3.64	70%	30%	1,969	3,937	15	1.30	7	Direct discharge into swale leading to Bolands Pond	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium,*** *High, Very High)*

Mitigation Recommendations:

Discharge ID: 33-OUT-2 **Date:** 1/30/2013

Address: 19 Brewster Cross Road **Weather:** Overcast, 47°

Drainage Area Description:

Residential and commercial with majority of runoff from Brewster Cross road and Lower Cape Outreach Council parking lot.

Drainage Area: **Site Photos:**

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	1.15	0%	100%	2,085	4,170	6	1.37	7	Swale leading through natural woody into marsh	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium**,** High, Very High)*

Mitigation Recommendations:

Discharge ID: 33-OUT-3 **Date:** 1/30/2013

Address: Intersection of West Road and Old Colony Way **Weather:** Overcast, 47°

Drainage Area Description:

Year round commercial. Stormwater runoff from paved roads.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	0.14	0%	100%	255	511	1	0.17	1	Retention pond with overflow leading to natural woody area	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

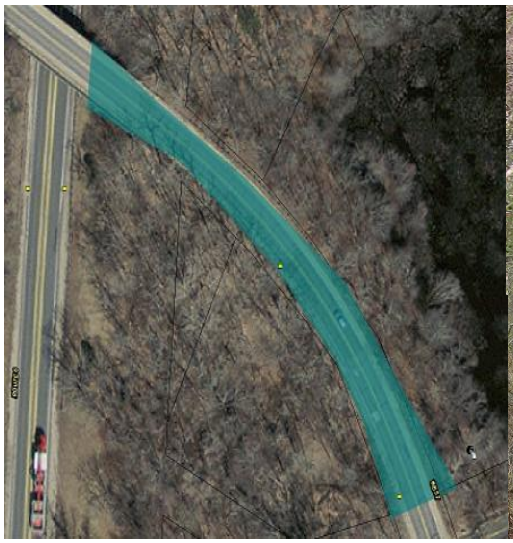
Discharge ID: 33-OUT-4 **Date:** 1/30/2013

Address: Intersection of West Road and Old Colony Way **Weather:** Overcast, 47°

Drainage Area Description:

Year round commercial. Majority of stormwater runoff from West Road up to the Route 6 overpass.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	0.43	0%	100%	782	1,565	2	0.52	3	Natural woody area leading down steep slope into wetland	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium**,** High, Very High)*

Mitigation Recommendations:

Discharge ID: 33-OUT-5 **Date:** 1/30/2013

Address: 89 Old Colony Way **Weather:** Overcast, 47°

Drainage Area Description:

Commercial area with mostly roadway runoff contributing to outfall.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	Concrete	0.83	27%	73%	1,093	2,185	4	0.72	4	Riprap swale leading down slope into woody drainage area	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 34-OUT-1 **Date:** 1/30/2013

Address: 39 S. Orleans Road **Weather:** Overcast, 47°

Drainage Area Description:

Commercial area with some residential. Lot size ranging from 0.25 acre to 1.5 acre. Drainage area includes Cove Road and adjacent properties and Route 28 up to Row Road.

Drainage Area:

Site Photos:

Additional Observations:

The small clay pipe was the only outfall that could be located. Along the beach was searched for a larger outfall; may have been covered by washed up debris.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
8	Clay	3.32	56%	44%	2,643	5,286	16	1.74	9	Grassy right-of-way leading to road-way surface and then eventually to Town Cove	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 34-OUT-2 **Date:** 1/30/2013

Address: 10 Academy Place **Weather:** Overcast, 47°

Drainage Area Description:

Residential with lot size averaging 1/2 acre. Drainage area includes mostly road runoff from Academy Place and small portion of Main Street.

Drainage Area: **Site Photos:**

Additional Observations:

Drainage area is most likely much larger based on the size of the outfall.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
36	CM	0.43	0%	100%	774	1,549	2	0.51	3	Discharge direct into swale leading to marsh then Town Cove water body	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 34-OUT-3 **Date:** 1/30/2013

Address: 82 Main Street **Weather:** Overcast, 47°

Drainage Area Description:

Residential area off main road. Lot size ranging from 0.25 acre to 2 acres. Drainage area is mostly road runoff from Main St.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
30	Concrete	1.15	0%	100%	2,089	4,177	6	1.37	7	Drains into swale in natural, woody area leading to marsh then Town Cove water body	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 34-OUT-4 **Date:** 1/30/2013

Address: 7 Brewster Cross Road **Weather:** Overcast, 47°

Drainage Area Description:

Commercial buildings and residential apartment complex. Drainage area includes parking lot runoff from commerical area.

Drainage Area:

Site Photos:

Additional Observations:

Outfall could not be located and was most likely blocked.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	0.68	0%	100%	1,240	2,480	4	0.82	4	Drains into swale in natural, woody wetland area	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 35-OUT-1 **Date:** 2/7/2013

Address: 18 Karen Way **Weather:** Partly sunny, 30°

Drainage Area Description:

Seasonal residential with average 3/4 acre to 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

35-OUT-1 is a culvert

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/day)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
18	CM	-	-	-	-	-	-	-	-	Culvert runs from wetland	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 35-OUT-2 **Date:** 7/17/2013

Address: Loomis Lane **Weather:** Sunny, 85°

Drainage Area Description:

Residential with average 1/2 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Outfall could not be located and was most likely covered by brush. Drainage area includes portion on Main Street draining into CB off Loomis Lane.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	0.14	24%	76%	187	374	1	0.12	1	Driectly into swale leading to wetland area	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

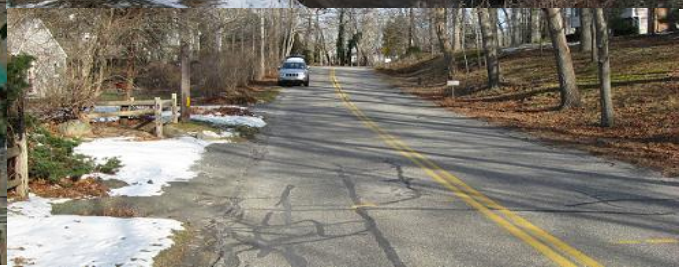
Discharge ID: 36-OUT-1 **Date:** 2/7/2013

Address: 54 Brick Hill Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 1/2 acre lots.

Drainage Area: **Site Photos:**



Additional Observations:

Outfall could not be located and was most likely submerged under frozen water.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	4.34	69%	31%	2,438	4,876	17	1.60	8	Driectly into swale leading to wetland area	Nauset Harbor - Mill Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 36-OUT-2 **Date:** 2/7/2013

Address: 2 Pochet Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 1/2 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Outfall is partially submerged

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
8	Concrete	0.64	58%	42%	481	962	3	0.32	2	Natural, low lying brush draining to wetland	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 36-OUT-3 **Date:** 2/7/2013

Address: 7 Dylan Way **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 3/4 acre lots Road surface runoff from Dylan Road and cul-de-sac.

Drainage Area:

Site Photos:

Unable to locate outfall or any drainage structures.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	1.02	64%	36%	656	1,312	3	0.43	2	Directly into swale leading to wetland area	Nauset Harbor - Mill Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium****, High, Very High)*

Mitigation Recommendations:

Discharge ID: 36-OUT-4 **Date:** 2/7/2013

Address: 37 High Tide Lane **Weather:** Partly sunny, 30°

Drainage Area Description:

Commercial, Nauset Marine. Includes road runoff from High Tide Lane (asphalt) and Marina parking area (gravel) as well as adjoining properties.

Drainage Area:

Site Photos:

Additional Observations:

Outfall was submerged at time of observation.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
22	Concrete	4.79	63%	37%	3,219	6,438	18	2.12	11	Directly into Meeting House Pond	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: ***(Low,*** *Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 37-OUT-1 **Date:** 2/7/2013

Address: 9 Samoset Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 1/2 acre lots.

adjoining properties.

Drainage Area:

Site Photos:

Additional Observations:

Outfall was clear however culvert had obstructions (possibly from residents). Catch basin located at 10 Samoset Road drive way was blocked by debris (unsure if private or public catch basin).

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	0.60	0%	100%	1,089	2,178	3	0.72	4	Grassy swale leading through residential yard	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium****, High, Very High)*

Mitigation Recommendations:

Discharge ID: 37-OUT-2 **Date:** 2/7/2013

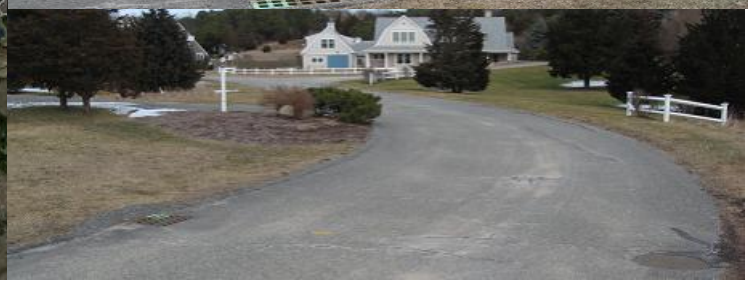
Address: 35 Countryside Drive **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 1 acre lots.

Drainage Area:

Site Photos:



Additional Observations:

Outgoing pipe was visible in the catch basin however the outfall could not be located.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	CM	1.68	68%	32%	986	1,972	5	0.65	3	Assumed woody, natural draining into marsh	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium****, High, Very High)*

Mitigation Recommendations:

Discharge ID: 37-OUT-3 **Date:** 2/7/2013

Address: 35 Countryside Drive **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with average 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Stormwater drains to leaching catch basin behind house No. 60.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
CB	Concrete	1.56	72%	28%	798	1,595	5	0.53	3	Woody, semi natural leaching into ground	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium****, High, Very High)*

Mitigation Recommendations:

Discharge ID: 39-OUT-1 **Date:** 2/1/2013

Address: 46 Bay Ridge Lane **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Road surface runoff from Overland Road to top of hill and some runoff from adjacent land and Nauset Autobody site.

Drainage Area:

Site Photos:

Additional Observations:

Outfall pipe was collapsed and and blocked by fallen trees and rocks. Numerous debris (including plastic flower pots and trash) were observed inside both drainage catch basins leading to the outfall.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	Concrete	2.21	17%	83%	3,332	6,664	11	2.19	11	Woody, natural with brush and medium trees boardering wetland	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 39-OUT-2 **Date:** 7/17/2013

Address: Overland Way - Contractor's Area **Weather:** Sunny, 85°

Drainage Area Description:

Road surface runoff from Way, Bay Ridge Lane, and Oak St.

Drainage Area:

Site Photos:

Additional Observations:

Town stated that Contractor extended outfall to discharge into wetlands and possibly pick up drainage from Contractor's site.

Actual outfall could not be located.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	2.29	56%	44%	1,816	3,632	10	1.20	6	Woody, natural with brush and medium trees boardering wetland	Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 40-OUT-1 **Date:** 2/7/2013

Address: 59 Nickerson Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with 1/2 acre lots. Road stormwater runoff and runoff from property of 64 Nickerson Road (across the street)

Drainage Area: **Site Photos:**

Additional Observations:

Water in catch basin was frozen.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
4	PVC	0.90	62%	38%	630	1,261	4	0.41	2	Woody, semi natural with brush	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 40-OUT-2 **Date:** 2/7/2013

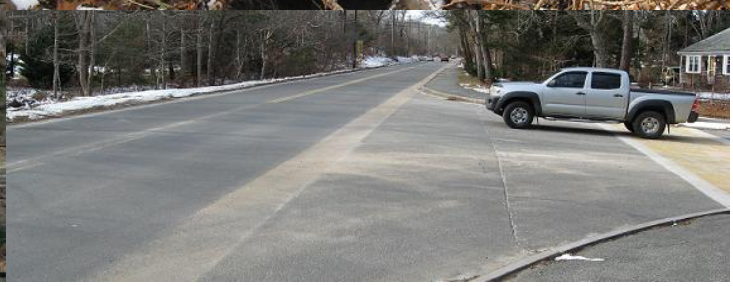
Address: 46 Eldredge Parkway **Weather:** Partly sunny, 30°

Drainage Area Description:

Commercial / Orleans Elementary School. Stormwater runoff from Eldredge Parkway.

Drainage Area:

Site Photos:



Additional Observations:

Manhole cover located in elementary school parking lot. No catch basins were found in the parking lot.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
19" high, 25" wide	Concrete	0.69	0%	100%	1,252	2,504	4	0.82	4	Woody, natural with low lying brush	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

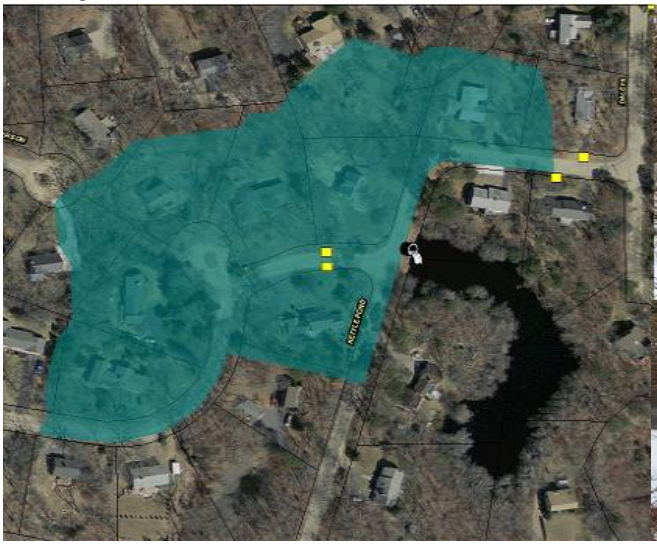
Discharge ID: 41-OUT-1 **Date:** 2/7/2013

Address: 9 Kettle Pond Way **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with 1/2 acre to 1 acre lots. Drainage area includes runoff from Kettle Pond Way, Nickerson Road catch basins, and sloped properties to the west.

Drainage Area: **Site Photos:**



Additional Observations:

Unable to confirm if the catch basins on Nickerson Road are connected to 41-OUT-1

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
13	CM / Concrete	5.84	66%	34%	3,570	7,139	26	2.35	12	Directly into wetland	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 42-OUT-1 **Date:** 2/7/2013

Address: 37 Monument Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential with 1/3 acre to 2 acre lots. Drainage area includes runoff from Pond Street and Monument Road and sloped properties to the west.

Drainage Area: **Site Photos:**

Additional Observations:

Unsure what infrastructure leads to 42-OUT-1. Catch basins on Monument Road appear to be leaching.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
8	CM	2.69	63%	37%	1,796	3,592	12	1.18	6	Drains into woody / brush swale leading to wetland	Pleasant Bay - The River - upper

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 42-OUT-2 **Date:** 2/7/2013

Address: 19 School Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Drainage from paved Town Hall parking lot, School Street, and Orlean Historical Society parking and access roads. Additional runoff from adjacent properties draining onto School Street and portion of River Road.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
13	CM	5.31	53%	47%	4,500	9,000	26	2.96	15	Drains into natural, woody area with brush	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 43-OUT-1 **Date:** 2/7/2013

Address: 69 Barley Neck Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area off Barley Neck Road. Runoff from Barley Neck road and Shelton Lane (Town Landing road) as well as adjacent residential properties to the North.

Drainage Area:

Site Photos:

Additional Observations:

Observed field of drainage manholes. Catch basin at Shelton Lane leading to 43-OUT-1.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
6	PVC	4.50	60%	40%	3,282	6,564	21	2.16	11	Discharge into wetland / swale running alongside road leading into Meeting Hose Pond	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 44-OUT-1 **Date:** 2/7/2013

Address: 11 Uncle Harvey's Way **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area with average 3/4 acre lots.

Drainage Area: **Site Photos:**

Additional Observations:

Resident of House No. 11 Uncle Harvey's Way stated there have been numerous recent algy blooms in Uncle Harvey's Pond.

Multiple drain manholes observed on Uncle Harvey's road around curve near house No. 17.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
13	CM	2.37	69%	31%	1,334	2,668	11	0.88	5	Discharge into steep hill side natural, woody with brush draining into Uncle harvey's Pond	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

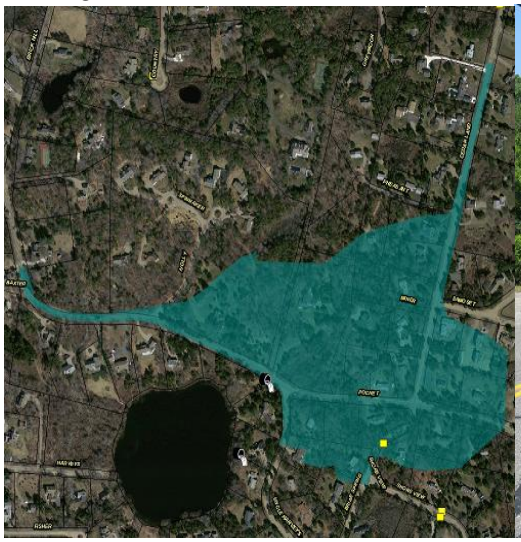
Discharge ID: 44-OUT-2 **Date:** 7/17/2013

Address: Intersection of Uncle Harvey's Way & Pochet Road **Weather:** Sunny, 85°

Drainage Area Description:

Residential area with average 3/4 acre lots and multiple large open space areas.

Drainage Area:



Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10	CM	28.88	71%	29%	15,347	30,695	132	10.10	52	Major roadway runoff draining off Pochet Road into wetland which discharges into culvert leading to Uncle Harvey's Pond	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 46-OUT-1

Date: 2/1/2013

Address: 18 Bay Ridge Lane

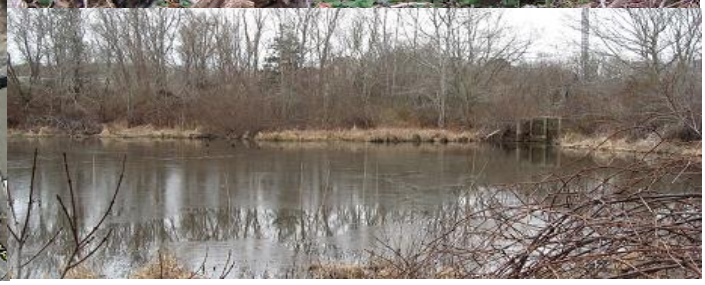
Weather: Windy / Overcast, 30°

Drainage Area Description:

No longer used. Replaced by 46-OUT-2

Drainage Area:

Site Photos:



Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	-	-	-	-	-	-	-	-	-	Namskaket Creek

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 46-OUT-2 **Date:** 2/1/2013

Address: 18 Bay Ridge Lane **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Mostly gravel and some paved parking located at North-East of site. Runoff localized to the site and did not appear to include road runoff from Bay Ridge Lane due to level elevation and leaching CB.

Drainage Area:

Site Photos:

Additional Observations:

Outfall appeared to be recent construction. 3 catch basins were located thoughout site, one of which was leaching. The other two CBs were assumed to be connected to 46-OUT-2.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
15	HDPE	1.97	0%	100%	3,570	7,140	9	2.35	12	Woody, semi natural leading to Skaket Bog	Namskaket Creek

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: ***(Low***, *Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 47-OUT-1 **Date:** 2/1/2013

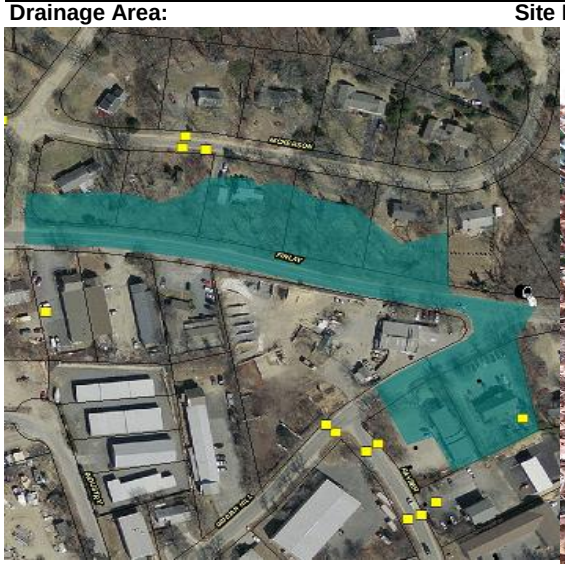
Address: 69 Finlay Road **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Residential and commerical area with average 1/2 acre lots. Runoff from Finlay Road and residential properties to North.

Runoff also from Giddiah Hill Road and commercial properties to East of road leading to catch basins at road intersection.

Drainage Area: **Site Photos:**



Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	3.23	46%	54%	3,194	6,389	15	2.10	11	Discharge into natural, woody with brush leading to wetland	Nauset Harbor - Town Cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 48-OUT-1 **Date:** 2/26/2013

Address: 153 S. Orleans Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Residential with 0.25 acre to 1.25 acre lots. Drainage included mostly runoff from Route 28 and adjacent properties.

Site Photos:

Additional Observations:

Unable to locate both outfall 48-OUT-2. Drainage area is possibly much larger than assumed area.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
24	Concrete	2.84	65%	35%	1,826	3,651	10	1.20	6	Discharge into natural, woody with brush leading downhill to Crystal Lake.	Pleasant Bay - Crystal Lake

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 50-OUT-1 **Date:**

Address: 30 Cedar Cove Road / Barley Neck Road **Weather:**

Drainage Area Description:

Seasonal residential with average of 1 acre lots.

Drainage Area:

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
Unk	Concrete	17	65%	35%	10,745	21,489	51	7.07	36	Culvert draining into tidal marsh / The River	Pleasant Bay - Meeting House Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 51-OUT-1 **Date:** 2/7/2013

Address: 65 Briar Spring Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area with 3/4 acre to 1.5 acre lots

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
N/A	Asphalt Swale	2.56	67%	33%	1,517	3,033	12	1.00	5	Discharge from road to asphalt swale leading through low lying brush then into marsh / channel	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low,* ***Medium*** *, High, Very High)*

Mitigation Recommendations:

Discharge ID: 51-OUT-2 **Date:** 2/7/2013

Address: Gilman Lane Town Landing **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area with 1/2 acre to 1 1/2 acre lots

Site Photos:

Additional Observations:

Only 2" depth remaining for flow. Site was previous NCRS / USDA Water Resources Restoration Project completed in 2011 which included the installation of 2 pretreatment settling tanks, 5 leaching chambers, and 2 leach fields.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
15"	Concrete	4.61	70%	30%	2,522	5,045	21	1.66	9	Marsh / beach leading to water body	Pleasant Bay - Pochet Neck / Barley Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 51-OUT-3 **Date:** 2/7/2013

Address: 57 Briar Spring Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Residential area with 3/4 acre to 1.5 acre lots

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
13	CM	0.88	66%	34%	551	1,102	4	0.36	2	Discharge into hill side natural, woody with brush draining into Pochet Inlet	Pleasant Bay - Pochet Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 53-OUT-1

Date: 2/1/2013

Address: 60 Baker's Pond Road

Weather: Windy / Overcast, 30°

Drainage Area Description:

Site Photos:

Additional Observations:

53-OUT-1 is a culvert

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
15	CM	-	-	-	-	-	-	-	-	-	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 53-OUT-2

Date: 2/1/2013

Address: 94 Baker's Pond Road

Weather: Windy / Overcast, 30°

Drainage Area Description:

Mostly runoff from Baker's Pond Road and some runoff from adjacent conservation land.

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	1.25	79%	21%	480	960	3	0.32	2	Discharge into hill side natural, woody with brush draining into wetland	Nauset Harbor - Town cove

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 53-OUT-3 **Date:** 2/1/2013

Address: 63 Baker's Pond Road **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Residential with average 1 acre to 2 acre lots. Drainage area includes mostly runoff from Baker's Pond Road and some runoff from adjacent properties to the East.

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	1.20	71%	29%	625	1,249	4	0.41	2	Discharge into hill side natural, woody with brush draining into wetland	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(Low, Medium,* ***High****, Very High)*

Mitigation Recommendations:

Discharge ID: 53-OUT-4

Date: 2/1/2013

Address: 66 Baker's Pond Road

Weather: Windy / Overcast, 30°

Drainage Area Description:

Residential unpaved road.

Site Photos:

Additional Observations:

Outfall appears to be private and used to prevent washout of private road.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10	CM	0.46	33%	67%	558	1,117	1	0.37	2	Discharge into hill side natural, woody with brush draining into wetland	Little Namskaket Marsh

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 55-OUT-1 **Date:** 2/1/2013

Address: 120 Monument Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Includes runoff from Monument Road and Dickenson Conservation Area paved parking lot.

Site Photos:

Additional Observations:

Two Outfalls were found and both drain into the same discharge area. Unable to determine which structures lead to each outfall.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	CM	0.72	35%	65%	852	1,703	3	0.56	3	Discharge into brush covered, semi-nautral drainage basin	Pleasant Bay - Crystal Lake

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Cleaning Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

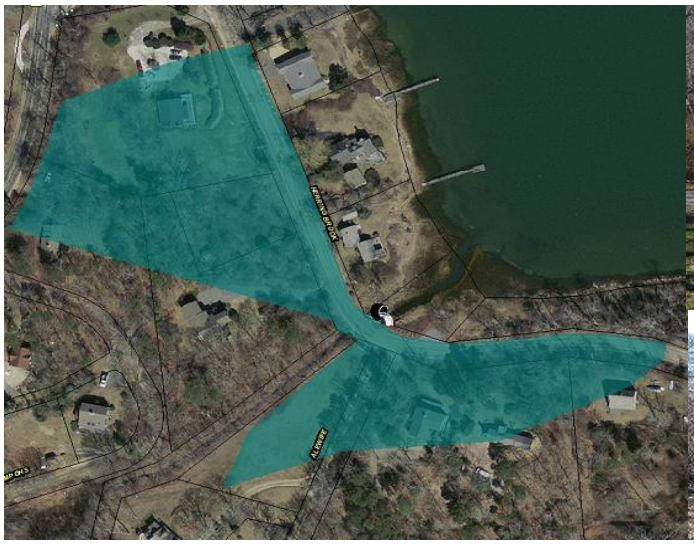
Discharge ID: 55-OUT-2 **Date:** 2/1/2013

Address: 36 Herring Brook Way **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Mostly semi natural woody with brush cover.

Drainage Area: **Site Photos:**



Additional Observations:

Based on visual observation of StormTreat system it is recommended that maintenance operations be performed. A 6" dia green pvc pipe was observed to be coming up from the drainage catch basin.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	3.92	67%	33%	2,379	4,759	13	1.57	8	Runoff leads to StormTreat system	Pleasant Bay - Kescayo Gasset Stream

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(Low, Medium, High, **Very High**)*

Mitigation Recommendations:

Discharge ID: 57-OUT-1 **Date:** 2/7/2013

Address: 204 Barley Neck Road **Weather:** Partly sunny, 30°

Drainage Area Description:

Seasonal residential with average 1 acre to 2 acre lots. Mostly natural woody with moderate brush cover.

Site Photos:

Additional Observations:

Unable to locate 57-OUT-1. All catch basins were observed to be leaching and not pipes leading to outfall could be seen.

Cul-de-sac was recently paved and its assumed that the outfall was removed.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	3.72	76%	24%	1,596	3,192	15	1.05	5	Runoff leads to leaching catch basins at bottom of cul-de-sac	Pleasant Bay - Pochet Neck / Barley Neck

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 60-OUT-1 **Date:** 2/1/2013

Address: 110 Bakers Pond Road **Weather:** Windy / Overcast, 30°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Mostly natural woody with moderate brush cover. Runoff mostly from road surfaces including Bakers Pond Road and Route 6.

Site Photos:

Additional Observations:

Large concrete outfall brings runoff from Route 6. Smaller CM outfall brings runoff from Baker's Pond Road and adjoining properties.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
18, 8	Concrete, CM	1.87	54%	46%	1,563	3,125	7	1.03	5	Runoff from Rt. 6 and Baker Pond Road drains to asphalt swale leading to beach near Baker's Pond	Pleasant Bay - Baker Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 69-OUT-1 **Date:** 2/26/2013

Address: 100 Namequoit Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Majority of runoff from Namequoit Road and some from Little Marsh lane.

Site Photos:

Additional Observations:

Abandoned outfall or old culvert observed near 69-OUT-1

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10.5	CM	2.23	65%	35%	1,400	2,799	7	0.92	5	Drains down riprap into wetland	Pleasant Bay - Namequoit River

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

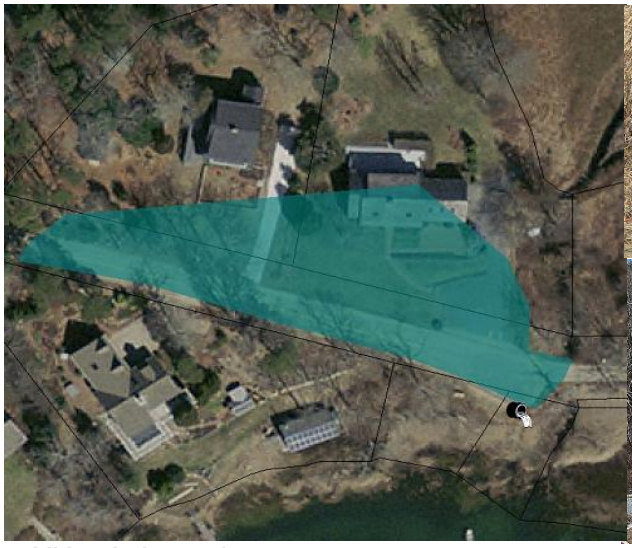
Discharge ID: 70-OUT-1 **Date:** 2/26/2013

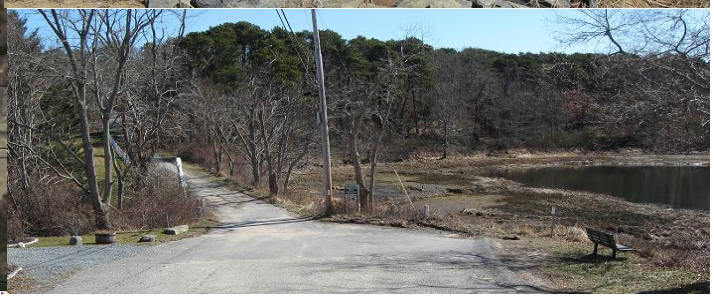
Address: 158 Namequoit Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Majority of runoff from Namequoit Road and adjacent properties

Site Photos:





Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
8	HDPE	0.47	51%	49%	422	844	1	0.28	1	Discharge down riprap into marsh leading to Paw Wah Pond	Pleasant Bay - Paw Wah Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 74-OUT-1 **Date:** 2/26/2013

Address: Intersection of Harwich Road and Rt. 28. **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Residential and commercial properties. Drainage area includes mostly road runoff from intersection of Rt. 28, Quanset Road, and Harwich Road.

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
14	HDPE	0.91	0%	100%	1,653	3,306	5	1.09	6	Woody, natural with medium brush cover	Pleasant Bay

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 75-OUT-1 **Date:** 2/26/2013

Address: 24 Ridgewood Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Majority of runoff from Namequoit Road and adjacent properties

Site Photos:

Additional Observations:

Resident has noticed algal blooms in the past and also stated that the Town had made mention closing 75-OUT-1.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
11	CM	4.13	69%	31%	2,357	4,715	13	1.55	8	Directly into wetland	Pleasant Bay - Paw Wah Pond Bog

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

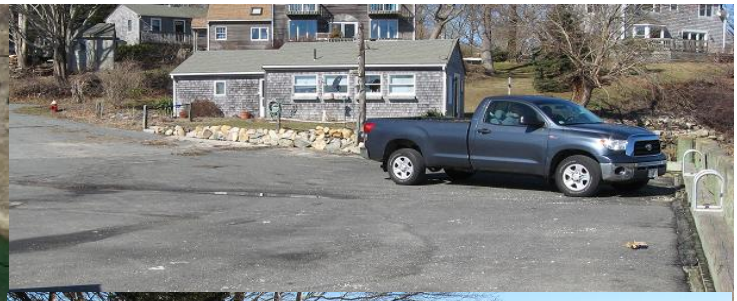
Discharge ID: 76-OUT-1 **Date:** 2/26/2013

Address: 142 Portanimicut Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Runoff from Portanimicut Road and adjacent properties to the North.

Site Photos:



Additional Observations:

Outfall could not be located and was assumed to be submerged at high tide.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
UNK	UNK	0.61	49%	51%	569	1,138	2	0.37	2	Directly into Eli's Creek	Pleasant Bay - Paw Wah Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 80-OUT-1

Date: 7/16/2013

Address: 47 Forest Way

Weather: Sunny / Clear, 80°

Drainage Area Description:

Seasonal residential with average 2 acre lots.

Site Photos:

Additional Observations:

Resident stated that there used to be frequent algal blooms (10+ years ago) however there have not been any recently.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
10	DI	6.13	70%	30%	3,390	6,780	17	2.23	11	Directly Uncle Israel's Pond	Pleasant Bay - Sarah's Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 87-OUT-1 **Date:** 2/26/2013

Address: 21 Woodridge Road **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre lots. Runoff from Woodridge road.

Site Photos:

Additional Observations:

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
12	HDPE	1.62	60%	40%	1,177	2,354	6	0.77	4	Woody, natural with high amount of brush cover draining down steep slope	Pleasant Bay - Twining's Pond

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 91-OUT-1 **Date:** 2/26/2013

Address: 50 Winslow Drive **Weather:** Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre to 1 acre lots. Runoff from Winslow Drive and properties to the West.

Site Photos:

Additional Observations:

OHD cone was found near a swale - unsure whether this was marking the location of an outfall.

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
N/A	Asphalt	1.17	60%	40%	839	1,678	4	0.55	3	Asphalt swale draining into woody, natural with some brush cover draining down steep slope	Pleasant Bay

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Discharge ID: 91-OUT-UNK

Date: 2/26/2013

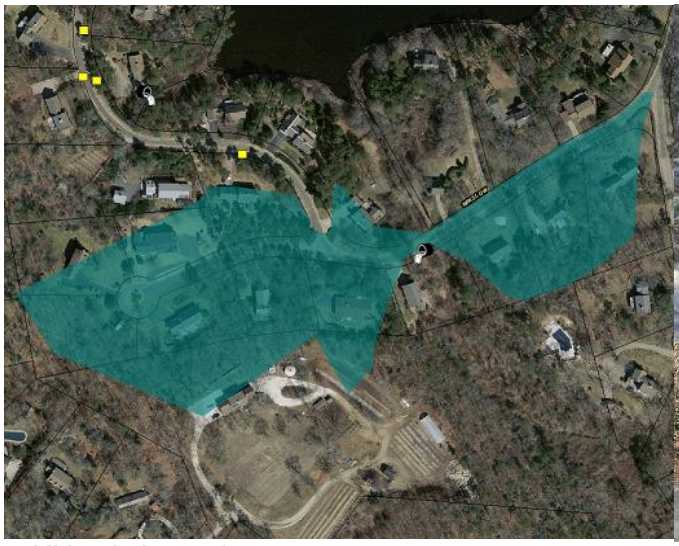
Address: 31 Winslow Drive

Weather: Sunny / Clear, 40°

Drainage Area Description:

Seasonal residential with average 1/2 acre to 1.5 acre lots. Runoff from Winslow Drive and adjacent properties.

Site Photos:



Additional Observations:

Asphalt swale leading to dried up culvert / stream

Summary of Existing Conditions:

Pipe Dia (inch)	Pipe Material	Drainage Area (Acres)	Surface Area Pervious (%)	Surface Area Impervious (%)	Runoff Volume (ft^3)		10 yr Storm (cfs)	Annual Flow (million gallons per year)	Nitrogen Loading (kg/yr)	Discharge Area Description	Associated Watersheds
					0.5"	1"					
N/A	Asphalt	7.46	71%	29%	3,903	7,805	23	2.57	13	Asphalt swale draining into woody, natural swale / stream	Pleasant Bay

Initial Assessment:

Mitigation Priority: *(Low, Medium, High)*

Maintenance Recommendation:

Priority: *(**Low**, Medium, High, Very High)*

Mitigation Recommendations:

Project No: 8615148
Client: Town of Orleans, MA
Project Name: Orleans Town-Wide Preliminary Stormwater Assessment
Document Title: Rules for Outfall Prioritization Matrix
Date: 9/24/2013

No.	Categories	Calculation of Points
1	Watershed Nitrogen Sensitivity	Very High = MEP threshold % change value between -75% and -100%
		High = MEP threshold % change value between -50% and -75%
		Medium = MEP threshold % change value between -25% and -50%
		Low = MEP threshold % change value between 0% and -25%
		Vey Low = MEP threshold % change value > 0%
2	Phosphorous Sensitivity	High = Greater than 100 µg/l
		Medium = 10 > 100 µg/l
		Low = < 10 µg/l
3	Impervious Surface Area	High = 75-100% impervious
		Medium = 30-75% impervious
		Low = 0-30% impervious
4	Average Fecal Coliform Count (Based on Town's Existing Data)	High = 300 > 400
		Medium = 100 > 300
		Low = 0 > 100
5	Public Benefit / Visibility	High = Located in areas of public access or use
		Medium = Located within visible or slightly obstructed view of public.
		Low = Not located within areas of public access/use; very low visibility.
6	Discharge Area Impact	High = Discharges directly into water
		Medium = Discharge within visible distance of water (< 25ft)
		Low = Discharge not within visible distance of water

Project No.: 8615148
Client: Town of Orleans, MA
Project Name: Orleans Town-Wide Preliminary Stormwater Assessment
Document Title: Outfall Prioritization Matrix
Date: 9/24/2013

Outfall Prioritization based on Public Benefit / Visibility

			Descriptive or Quantified Criteria										Criteria for Comparative Rating						
Outfall ID	**Outfall Street Location**	**Comments**	**DMF Shellfish Resource #**	**Located In Nitrogen Sensitive Watershed**	**MEP Threshold % Change**	**Preliminary Treatment System Installed?**	**Avg. Fecal Coliform Count (MPN/100ml)**	**Annual Flow (million gallons / yr)**	**Drainage Area (acres)**	**Impervious Drainage Area (%)**	**Nitrogen Loading Kg/Yr[13]**	**Nitrogen Loading Kg/Yr/Acre[15]**	**303d Listing / TMDL**	**MEP Watershed Nitrogen Sensitivity**	**Phosphorus Sensitivity (Ponds Only)**	**Impervious Surface Area %**	**Fecal Coliform Count**	**Public Benefit / Visibility**	**Discharge Area Impact**
Outfalls with High Public Benefit / Visibility																			
43-OUT-1	69 Barley Neck Road			Yes	-83	No	366	2.16	4.50	40%	11	2.46	Nitrogen	Very High	No Data	Med	High	High	High
50-OUT-1	30 Cedar Cove Road / Barley Neck Road			Yes	-83	No	366	7.07	17.03	35%	36	2.13	Nitrogen	Very High	No Data	Med	High	Med	High
70-OUT-1	158 Namequoit Road			Yes	-61	No	NT	0.28	0.47	49%	1	3.02	Nitrogen	High	No Data	Med	No Data	High	Med
11-OUT-1	5 Asas Landing			Yes	-67	No	130	1.95	7.20	23%	10	1.39	Fecal Coliform	High	No Data	Low	Med	High	Med
44-OUT-2	Intersection of Uncle Harvey's Way & Pochet Road	(2)		No	0	No	NT	10.10	28.88	29%	52	1.79	Nitrogen	Low	No Data	Low	No Data	High	High
48-OUT-1	153 S. Orleans Road			No	0	No	NT	1.20	2.84	35%	6	2.17	Dissolved Oxygen	Low	Med	Low	No Data	High	Med
55-OUT-1	120 Monument Road			No	0	No	17	0.56	0.72	65%	3	3.97	Dissolved Oxygen	Low	Med	Med	No Data	High	Low
60-OUT-1	110 Bakers Pond Road			No	0	No	NT	1.03	1.87	46%	5	2.81	Mercury in Fish Tissue	Low	Low	Med	No Data	High	High
13-OUT-1	Smugglers Path			No	0	Yes	NT	0.80	4.95	13%	4	0.83	None	Low	No Data	Low	No Data	High	Low
15-OUT-1	Skaket Beach		CCB-17	No	0	No	164	2.26	1.89	100%	12	6.12	None	Low	No Data	High	Med	High	Med
55-OUT-2	36 Herring Brook Way			No	0	Yes	NT	1.57	3.92	33%	8	2.05	Nitrogen	Low	No Data	Low	No Data	High	Low
Outfalls with Medium Public Benefit / Visibility																			
42-OUT-2	19 School Road			Yes	-83	No	NT	2.96	5.31	47%	15	2.86	Nitrogen	Very High	No Data	Med	No Data	Med	Low
18-OUT-9	43 Canal Road			Yes	-67	No	NT	0.97	0.81	100%	5	6.12	Fecal Coliform	High	High	High	No Data	Med	Med
76-OUT-1	142 Portanimicut Road	(9)		Yes	-61	No	NT	0.37	0.61	51%	2	3.13	Nitrogen	High	No Data	Med	No Data	Med	High
16-OUT-2	Bay View Drive	(2)	CCB-9	Yes	-67	No	NT	2.84	2.95	81%	15	4.94	Fecal Coliform	High	No Data	Med	No Data	Med	High
17-OUT-5	154 Rock Harbor Road	(8)		No	0								Fecal Coliform	High	No Data	N/A	No Data	Med	Low
18-OUT-7	65 Canal Road			Yes	-67	No	NT	1.48	3.36	37%	8	2.26	Fecal Coliform	High	No Data	Med	No Data	Med	Low
19-OUT-1	16 Gibson Road			Yes	-67	No	NT	1.21	3.20	32%	6	1.94	Fecal Coliform	High	No Data	Med	No Data	Med	Med
25-OUT-1	On East side of Cape Cod Rail Trail behind 90 Massachusetts 6A			Yes	-67	No	NT	2.03	2.01	85%	10	5.20	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-1	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-2	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
33-OUT-1	Behind 15B Center Place	(9)		Yes	-67	No	NT	1.30	3.64	30%	7	1.83	Fecal Coliform	High	No Data	Med	No Data	Med	High
34-OUT-1	39 S. Orleans Road			Yes	-67	No	NT	1.74	3.32	44%	9	2.68	Fecal Coliform	High	No Data	Med	No Data	Med	Low
34-OUT-2	10 Academy Place			Yes	-67	No	210	0.51	0.43	100%	3	6.12	Fecal Coliform	High	No Data	High	Med	Med	High
34-OUT-4	7 Brewster Cross Road	(9)		Yes	-67	No	NT	0.82	0.68	100%	4	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
41-OUT-1	9 Kettle Pond Way			Yes	-67	No	NT	2.35	5.84	34%	12	2.06	Fecal Coliform	High	No Data	Low	No Data	Med	Med
69-OUT-1	100 Namequoit Road			Yes	-37	No	NT	0.92	2.23	35%	5	2.11	Nitrogen	Med	No Data	Low	No Data	Med	Med
51-OUT-1	65 Briar Spring Road			No	0	No	NT	1.00	2.56	33%	5	2.00	Nitrogen	Low	No Data	Low	No Data	Med	Low
51-OUT-2	Gilman Lane Town Landing			No	0	Yes	NT	1.66	4.61	30%	9	1.84	Nitrogen	Low	No Data	Low	No Data	Med	Low
57-OUT-1	204 Barley Neck Road	(7)		No	0	No	NT	1.05	3.72	24%	5	1.45	Nitrogen	Low	No Data	Low	No Data	Med	Low
80-OUT-1	47 Forest Way			No	0	No	NT	2.23	6.13	30%	11	1.86	Nitrogen	Low	No Data	Low	No Data	Med	Med
33-OUT-3	Intersection of West Road and Old Colony Way			No	67	No	NT	0.17	0.14	100%	1	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Med	Low
Outfalls with Low Public Benefit / Visibility																			
36-OUT-2	2 Pochet Road			Yes	-83	No	NT	0.32	0.64	42%	2	2.54	Nitrogen	Very High	No Data	Med	No Data	Low	Low
36-OUT-4	37 High Tide Lane			Yes	-83	No	360	2.12	4.79	37%	11	2.27	Nitrogen	Very High	No Data	Med	High	Low	High

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
35-OUT-1	18 Karen Way	(8)		Yes	-83								Nitrogen	Very High	No Data	N/A	No Data	Low	Low
35-OUT-2	Loomis Lane			Yes	-83	No	NT	0.12	0.14	76%	1	4.62	Nitrogen	Very High	No Data	High	No Data	Low	Low
17-OUT-3	Route 6			Yes	-67	No	NT	0.48	0.40	100%	2	6.12	Fecal Coliform	High	High	High	No Data	Low	Low
75-OUT-1	24 Ridgewood Road			Yes	-61	No	NT	1.55	4.13	31%	8	1.93	Nitrogen	High	No Data	Low	No Data	Low	Low
11-OUT-2	16 Ruggles Road			Yes	-67	No	64	1.51	6.54	19%	8	1.18	Fecal Coliform	High	No Data	Low	No Data	Low	Low
12-OUT-1	210 Brick Hill Road			Yes	-67	No	NT	2.53	6.71	32%	13	1.93	Fecal Coliform	High	No Data	Med	No Data	Low	Low
12-OUT-2	4 Freeman Lane			Yes	-67	No	NT	1.01	0.84	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
16-OUT-1	60 Rock Harbor Road			Yes	-67	No	NT	0.78	1.62	40%	4	2.47	Fecal Coliform	High	No Data	Med	No Data	Low	Low
17-OUT-6	Route 6 , near Cedar Pond Road			Yes	-67	No	NT	0.45	1.23	30%	2	1.87	Fecal Coliform	High	No Data	Med	No Data	Low	Low
18-OUT-2	45 Cranberry Highway	(12)		Yes	-67	No	NT						Fecal Coliform	High	No Data	N/A	No Data	Low	High
18-OUT-3	45 Cranberry Highway	(8) (9) (12)		Yes	-67	No							Fecal Coliform	High	No Data	N/A	No Data	Low	High
18-OUT-4	40 Ellis Road, Eastham			Yes	-67	Yes	192	45.52	59.10	64%	233	3.95	Fecal Coliform	High	No Data	Med	Med	Low	High
18-OUT-UNK	40 Ellis Road, Eastham	(11)		No									Fecal Coliform	High	No Data	N/A	No Data	Low	High
25-OUT-2	17 Rock Harbor Road			Yes	-67	No	NT	0.53	0.52	85%	3	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-3	25 Rock Harbor Road			Yes	-67	No	NT	0.35	0.34	85%	2	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-4	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.46	0.45	85%	2	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-6	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.36	0.37	81%	2	4.97	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-7	10 Locust Road			Yes	-67	No	NT	2.19	5.45	34%	11	2.06	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-1	7 Pine Ridge Lane			Yes	-67	No	NT	2.03	5.80	29%	10	1.80	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-2	94 Hopkins Lane			Yes	-67	No	NT	1.74	4.45	33%	9	2.00	Fecal Coliform	High	No Data	Med	No Data	Low	Low
33-OUT-2	19 Brewster Cross Road			Yes	-67	No	NT	1.37	1.15	100%	7	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
34-OUT-3	82 Main Street			Yes	-67	No	247	1.37	1.15	100%	7	6.12	Fecal Coliform	High	No Data	High	Med	Low	Med
37-OUT-1	9 Samoset Road			Yes	-51	No	NT	0.72	0.60	100%	4	6.12	Nitrogen	High	No Data	High	No Data	Low	Low
37-OUT-2	35 Countryside Drive			Yes	-51	No	NT	0.65	1.68	32%	3	1.98	Nitrogen	High	No Data	Low	No Data	Low	Low
37-OUT-3	35 Countryside Drive			Yes	-51	No	NT	0.53	1.56	28%	3	1.72	Nitrogen	High	No Data	Low	No Data	Low	Low
40-OUT-1	59 Nickerson Road			Yes	-67	No	NT	0.41	0.90	38%	2	2.35	Fecal Coliform	High	No Data	Med	No Data	Low	Low
40-OUT-2	46 Eldredge Parkway			Yes	-67	No	NT	0.82	0.69	100%	4	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
47-OUT-1	69 Finlay Road			Yes	-67	No	NT	2.10	3.23	54%	11	3.33	Fecal Coliform	High	No Data	Med	No Data	Low	Low
53-OUT-2	94 Baker's Pond Road			Yes	-67	No	NT	0.32	1.25	21%	2	1.29	Fecal Coliform	High	No Data	Low	No Data	Low	Low
42-OUT-1	37 Monument Road			Yes	-37	No	NT	1.18	2.69	37%	6	2.25	Nitrogen	Med	No Data	Low	No Data	Low	Low
74-OUT-1	Intersection of Harwich Road and Rt. 28.			Yes	-28	No	NT	1.09	0.91	100%	6	6.12	Nitrogen	Med	No Data	High	No Data	Low	Low
91-OUT-1	50 Winslow Drive	(9)		Yes	-28	No	NT	0.55	1.17	40%	3	2.43	Nitrogen	Med	No Data	Med	No Data	Low	Low
17-OUT-1	Route 6			No	0	No	NT	0.63	0.53	100%	3	6.12	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-2	Route 6			No	0	No	NT	0.32	0.26	100%	2	6.12	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-4	48 Locust Road			No	0	No	NT	2.50	5.92	35%	13	2.17	Fecal Coliform	Low	High	Low	No Data	Low	Low
18-OUT-8	62 Locust Road			No	0	No	NT	0.41	0.61	56%	2	3.44	Fecal Coliform	Low	High	Med	No Data	Low	Med
25-OUT-5	Behind 7 Cedar Pond Road	(2)		No	0	No	NT	0.61	1.52	33%	3	2.04	Fecal Coliform	Low	High	Med	No Data	Low	Low
28-OUT-1	85 Great Oak Road			No	0	No	NT	6.05	17.35	29%	31	1.79	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
28-OUT-UNK	64 Brick Hill Road	(9)		No	0	No	NT	0.91	2.11	36%	5	2.21	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
36-OUT-3	7 Dylan Way	(9)		No	0	No	NT	0.43	1.02	36%	2	2.17	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
36-OUT-1	54 Brick Hill Road	(9)		No	0	No	NT	1.60	4.34	31%	8	1.90	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
87-OUT-1	21 Woodridge Road			No	0	No	NT	0.77	1.62	40%	4	2.45	Nitrogen	Low	Med	Med	No Data	Low	Low
18-OUT-10	Route 6 near rotary			No	0	No	NT	0.40	0.46	72%	2	4.43	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
44-OUT-1	11 Uncle Harvey's Way			No	0	No	NT	0.88	2.37	31%	5	1.90	Nitrogen	Low	No Data	Low	No Data	Low	Low
51-OUT-3	57 Briar Spring Road			No	0	No	NT	0.36	0.88	34%	2	2.10	Nitrogen	Low	No Data	Low	No Data	Low	Low
91-OUT-UNK	31 Winslow Drive	(5)		Yes	-28	No	NT	2.57	7.46	29%	13	1.77	Nitrogen	Low	No Data	Low	No Data	Low	Low
39-OUT-2	Overland Way - Contractor's Area			No	239	No	NT	1.20	2.29	44%	6	2.68	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
18-OUT-11	7 Jones Road	(4)		No	0[4]	No	NT	0.42	0.74	48%	2	2.92	None	Very Low	No Data	Med	No Data	Low	Low
18-OUT-5	Route 6	(9)		No	0[4]	No	NT	0.34	0.29	100%	2	6.12	None	Very Low	No Data	High	No Data	Low	Low
18-OUT-6	Route 6	(9)		No	0[4]	No	NT	0.56	0.47	100%	3	6.12	None	Very Low	No Data	High	No Data	Low	Low
24-OUT-1	Skaket Beach Road near Route 6			No	67	No	NT	0.30	1.59	16%	2	0.98	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Med

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr(13)	Nitrogen Loading Kg/Yr/Acre(15)	303d Listing / TMDL	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
24-OUT-2	50 Skaket Beach Road	(8)											Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
24-OUT-3	5 Captian Linnell Road			No	67	No	NT	1.05	1.83	48%	5	2.94	Fecal Coliform	Very Low	No Data	Med	No Data	Low	High
24-OUT-4	96 Skaket Beach Road	(6)		No	67	No	NT	1.02	3.98	22%	5	1.32	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-5	88 Skaket Beach Road			No	67	No	NT	1.28	4.38	24%	7	1.50	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-6	88 Skaket Beach Road			No	67	No	NT	0.96	1.89	43%	5	2.60	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-1	60 Captain Linnell Road		CCB-17	No	239	No	NT	0.65	1.23	44%	3	2.71	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-2	56 Captain Linnell Road		CCB-17	No	239	No	NT	1.76	5.36	27%	9	1.68	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-1	74 Captain Linnell Road			No	239	No	NT	0.52	1.20	36%	3	2.23	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-2	87 Captain Linnell Road			No	239	No	NT	1.22	3.20	32%	6	1.95	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-3	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3.20	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-4	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3.20	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-5	Behind 92 West Road			No	67	No	NT	0.71	0.96	62%	4	3.80	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-6	32 Skymeadow Drive (Cul-de-Sac)			No	239	No	NT	0.35	0.65	44%	2	2.71	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-7	60 Captain Linnell Road	(8)		No	239		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
33-OUT-4	Intersection of West Road and Old Colony Way			No	67	No	NT	0.52	0.43	100%	3	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
33-OUT-5	89 Old Colony Way			No	67	No	NT	0.72	0.83	73%	4	4.46	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
39-OUT-1	46 Bay Ridge Lane			No	239	No	NT	2.19	2.21	83%	11	5.08	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
46-OUT-1	18 Bay Ridge Lane	(10)		No	324								Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
46-OUT-2	18 Bay Ridge Lane			No	324	No	NT	2.35	1.97	100%	12	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Low	Med
53-OUT-1	60 Baker's Pond Road	(8)		No	67		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
53-OUT-3	63 Baker's Pond Road			No	67	No	NT	0.41	1.20	29%	2	1.76	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
53-OUT-4	66 Baker's Pond Road	(3)		No	67	No	NT	0.37	0.46	67%	2	4.07	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low

Notes:

(1) To be completed once Outfall Prioritization Matrix has been finalized
(2) Outfall was not located
(3) Private outfall
(4) Threshold percent change values were not included in MEP reports
(5) Outfall is an asphalt swale
(6) Unable to access Outfall. Some data is incomplete.
(7) Unable to locate Outfall. Assumed Outfall no longer exists.
(8) Outfall classified as a culvert.
(9) Unable to locate outfall. Assumed outfall exists.
(10) Outfall abandoned
(11) Located outside of Town boundaries
(12) Outfall drains into 18-OUT-4
(13) Loading rate for impervious surfaces only
(14) TMDL needed, existing, or assumed will have a TMDL in near future
(15) Nitrogen loading based over entire drainage area (pervious & impervious)
NT = Not Tested

Project No.: 8615148
Client: Town of Orleans, MA
Project Name: Orleans Town-Wide Preliminary Stormwater Assessment
Document Title: Outfall Prioritization Matrix
Date: 9/24/2013

Outfall Prioritization based on Phosphorous Sensitivity

			Descriptive or Quantified Criteria										Criteria for Comparative Rating						
Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL[14]	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
Outfalls with High Phosphorous Sensitivity																			
18-OUT-9	43 Canal Road			Yes	-67	No	NT	0.97	0.81	100%	5	6.12	Fecal Coliform	High	High	High	No Data	Med	Med
17-OUT-3	Route 6			Yes	-67	No	NT	0.48	0.40	100%	2	6.12	Fecal Coliform	High	High	High	No Data	Low	Low
17-OUT-1	Route 6			No	0	No	NT	0.63	0.53	100%	3	6.12	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-2	Route 6			No	0	No	NT	0.32	0.26	100%	2	6.12	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-4	48 Locust Road			No	0	No	NT	2.50	5.92	35%	13	2.17	Fecal Coliform	Low	High	Low	No Data	Low	Low
18-OUT-8	62 Locust Road			No	0	No	NT	0.41	0.61	56%	2	3.44	Fecal Coliform	Low	High	Med	No Data	Low	Med
25-OUT-5	Behind 7 Cedar Pond Road	(2)		No	0	No	NT	0.61	1.52	33%	3	2.04	Fecal Coliform	Low	High	Med	No Data	Low	Low
Outfalls with Medium Phosphorous Sensitivity																			
48-OUT-1	153 S. Orleans Road			No	0	No	NT	1.20	2.84	35%	6	2.17	Dissolved Oxygen	Low	Med	Low	No Data	High	Med
55-OUT-1	120 Monument Road			No	0	No	17	0.56	0.72	65%	3	3.97	Dissolved Oxygen	Low	Med	Med	No Data	High	Low
87-OUT-1	21 Woodridge Road			No	0	No	NT	0.77	1.62	40%	4	2.45	Nitrogen	Low	Med	Med	No Data	Low	Low
Outfalls with Low Phosphorous Sensitivity / No Data																			
60-OUT-1	110 Bakers Pond Road			No	0	No	NT	1.03	1.87	46%	5	2.81	Mercury in Fish Tissue	Low	Low	Med	No Data	High	High
35-OUT-2	Loomis Lane			Yes	-83	No	NT	0.12	0.14	76%	1	4.62	Nitrogen	Very High	No Data	High	No Data	Low	Low
39-OUT-2	Overland Way - Contractor's Area			No	239	No	NT	1.20	2.29	44%	6	2.68	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
44-OUT-2	Intersection of Uncle Harvey's Way & Pochet Road	(2)		No	0	No	NT	10.10	28.88	29%	52	1.79	Nitrogen	Low	No Data	Low	No Data	High	High
80-OUT-1	47 Forest Way			No	0	No	NT	2.23	6.13	30%	11	1.86	Nitrogen	Low	No Data	Low	No Data	Med	Med
76-OUT-1	142 Portanimicut Road	(9)		Yes	-61	No	NT	0.37	0.61	51%	2	3.13	Nitrogen	High	No Data	Med	No Data	Med	High
28-OUT-1	85 Great Oak Road			No	0	No	NT	6.05	17.35	29%	31	1.79	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
28-OUT-UNK	64 Brick Hill Road	(9)		No	0	No	NT	0.91	2.11	36%	5	2.21	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
70-OUT-1	158 Namequoit Road			Yes	-61	No	NT	0.28	0.47	49%	1	3.02	Nitrogen	High	No Data	Med	No Data	High	Med
11-OUT-1	5 Asas Landing			Yes	-67	No	130	1.95	7.20	23%	10	1.39	Fecal Coliform	High	No Data	Low	Med	High	Med
13-OUT-1	Smugglers Path			No	0	Yes	NT	0.80	4.95	13%	4	0.83	None	Low	No Data	Low	No Data	High	Low
15-OUT-1	Skaket Beach		CCB-17	No	0	No	164	2.26	1.89	100%	12	6.12	None	Low	No Data	High	Med	High	Med
55-OUT-2	36 Herring Brook Way			No	0	Yes	NT	1.57	3.92	33%	8	2.05	Nitrogen	Low	No Data	Low	No Data	High	Low

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL[14]	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
42-OUT-2	19 School Road			Yes	-83	No	NT	2.96	5.31	47%	15	2.86	Nitrogen	Very High	No Data	Med	No Data	Med	Low
43-OUT-1	69 Barley Neck Road			Yes	-83	No	366	2.16	4.50	40%	11	2.46	Nitrogen	Very High	No Data	Med	High	High	High
50-OUT-1	30 Cedar Cove Road / Barley Neck Road			Yes	-83	No	366	7.07	17.03	35%	36	2.13	Nitrogen	Very High	No Data	Med	High	Med	High
16-OUT-2	Bay View Drive	(2)	CCB-9	Yes	-67	No	NT	2.84	2.95	81%	15	4.94	Fecal Coliform	High	No Data	Med	No Data	Med	High
17-OUT-5	154 Rock Harbor Road	(8)		No	0								Fecal Coliform	High	No Data	N/A	No Data	Med	Low
18-OUT-7	65 Canal Road			Yes	-67	No	NT	1.48	3.36	37%	8	2.26	Fecal Coliform	High	No Data	Med	No Data	Med	Low
19-OUT-1	16 Gibson Road			Yes	-67	No	NT	1.21	3.20	32%	6	1.94	Fecal Coliform	High	No Data	Med	No Data	Med	Med
25-OUT-1	On East side of Cape Cod Rail Trail behind 90 Massachusetts 6A			Yes	-67	No	NT	2.03	2.01	85%	10	5.20	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-1	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-2	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
33-OUT-1	Behind 15B Center Place	(9)		Yes	-67	No	NT	1.30	3.64	30%	7	1.83	Fecal Coliform	High	No Data	Med	No Data	Med	HIgh
34-OUT-1	39 S. Orleans Road			Yes	-67	No	NT	1.74	3.32	44%	9	2.68	Fecal Coliform	High	No Data	Med	No Data	Med	Low
34-OUT-2	10 Academy Place			Yes	-67	No	210	0.51	0.43	100%	3	6.12	Fecal Coliform	High	No Data	High	Med	Med	High
34-OUT-4	7 Brewster Cross Road	(9)		Yes	-67	No	NT	0.82	0.68	100%	4	6.12	Fecal Coliform	High	No Data	High	No Data	Med	Low
41-OUT-1	9 Kettle Pond Way			Yes	-67	No	NT	2.35	5.84	34%	12	2.06	Fecal Coliform	High	No Data	Low	No Data	Med	Med
69-OUT-1	100 Namequoit Road			Yes	-37	No	NT	0.92	2.23	35%	5	2.11	Nitrogen	Med	No Data	Low	No Data	Med	Med
51-OUT-1	65 Briar Spring Road			No	0	No	NT	1.00	2.56	33%	5	2.00	Nitrogen	Low	No Data	Low	No Data	Med	Low
51-OUT-2	Gilman Lane Town Landing			No	0	Yes	NT	1.66	4.61	30%	9	1.84	Nitrogen	Low	No Data	Low	No Data	Med	Low
57-OUT-1	204 Barley Neck Road	(7)		No	0	No	NT	1.05	3.72	24%	5	1.45	Nitrogen	Low	No Data	Low	No Data	Med	Low
33-OUT-3	Intersection of West Road and Old Colony Way			No	67	No	NT	0.17	0.14	100%	1	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Med	Low
36-OUT-2	2 Pochet Road			Yes	-83	No	NT	0.32	0.64	42%	2	2.54	Nitrogen	Very High	No Data	Med	No Data	Low	Low
36-OUT-4	37 High Tide Lane			Yes	-83	No	360	2.12	4.79	37%	11	2.27	Nitrogen	Very High	No Data	Med	High	Low	High
35-OUT-1	18 Karen Way	(8)		Yes	-83								Nitrogen	Very High	No Data	N/A	No Data	Low	Low
75-OUT-1	24 Ridgewood Road			Yes	-61	No	NT	1.55	4.13	31%	8	1.93	Nitrogen	High	No Data	Low	No Data	Low	Low
11-OUT-2	16 Ruggles Road			Yes	-67	No	64	1.51	6.54	19%	8	1.18	Fecal Coliform	High	No Data	Low	No Data	Low	Low
12-OUT-1	210 Brick Hill Road			Yes	-67	No	NT	2.53	6.71	32%	13	1.93	Fecal Coliform	High	No Data	Med	No Data	Low	Low
12-OUT-2	4 Freeman Lane			Yes	-67	No	NT	1.01	0.84	100%	5	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
16-OUT-1	60 Rock Harbor Road			Yes	-67	No	NT	0.78	1.62	40%	4	2.47	Fecal Coliform	High	No Data	Med	No Data	Low	Low
17-OUT-6	Route 6 , near Cedar Pond Road			Yes	-67	No	NT	0.45	1.23	30%	2	1.87	Fecal Coliform	High	No Data	Med	No Data	Low	Low
18-OUT-2	45 Cranberry Highway	(12)		Yes	-67	No	NT						Fecal Coliform	High	No Data	N/A	No Data	Low	High
18-OUT-3	45 Cranberry Highway	(8) (9) (12)		Yes	-67	No							Fecal Coliform	High	No Data	N/A	No Data	Low	High

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL[14]	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
18-OUT-4	40 Ellis Road, Eastham			Yes	-67	Yes	192	45.52	59.10	64%	233	3.95	Fecal Coliform	High	No Data	Med	Med	Low	High
18-OUT-UNK	40 Ellis Road, Eastham	(11)		No									Fecal Coliform	High	No Data	N/A	No Data	Low	High
25-OUT-2	17 Rock Harbor Road			Yes	-67	No	NT	0.53	0.52	85%	3	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-3	25 Rock Harbor Road			Yes	-67	No	NT	0.35	0.34	85%	2	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-4	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.46	0.45	85%	2	5.20	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-6	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.36	0.37	81%	2	4.97	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-7	10 Locust Road			Yes	-67	No	NT	2.19	5.45	34%	11	2.06	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-1	7 Pine Ridge Lane			Yes	-67	No	NT	2.03	5.80	29%	10	1.80	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-2	94 Hopkins Lane			Yes	-67	No	NT	1.74	4.45	33%	9	2.00	Fecal Coliform	High	No Data	Med	No Data	Low	Low
33-OUT-2	19 Brewster Cross Road			Yes	-67	No	NT	1.37	1.15	100%	7	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
34-OUT-3	82 Main Street			Yes	-67	No	247	1.37	1.15	100%	7	6.12	Fecal Coliform	High	No Data	High	Med	Low	Med
37-OUT-1	9 Samoset Road			Yes	-51	No	NT	0.72	0.60	100%	4	6.12	Nitrogen	High	No Data	High	No Data	Low	Low
37-OUT-2	35 Countryside Drive			Yes	-51	No	NT	0.65	1.68	32%	3	1.98	Nitrogen	High	No Data	Low	No Data	Low	Low
37-OUT-3	35 Countryside Drive			Yes	-51	No	NT	0.53	1.56	28%	3	1.72	Nitrogen	High	No Data	Low	No Data	Low	Low
40-OUT-1	59 Nickerson Road			Yes	-67	No	NT	0.41	0.90	38%	2	2.35	Fecal Coliform	High	No Data	Med	No Data	Low	Low
40-OUT-2	46 Eldredge Parkway			Yes	-67	No	NT	0.82	0.69	100%	4	6.12	Fecal Coliform	High	No Data	High	No Data	Low	Low
47-OUT-1	69 Finlay Road			Yes	-67	No	NT	2.10	3.23	54%	11	3.33	Fecal Coliform	High	No Data	Med	No Data	Low	Low
53-OUT-2	94 Baker's Pond Road			Yes	-67	No	NT	0.32	1.25	21%	2	1.29	Fecal Coliform	High	No Data	Low	No Data	Low	Low
42-OUT-1	37 Monument Road			Yes	-37	No	NT	1.18	2.69	37%	6	2.25	Nitrogen	Med	No Data	Low	No Data	Low	Low
74-OUT-1	Intersection of Harwich Road and Rt. 28.			Yes	-28	No	NT	1.09	0.91	100%	6	6.12	Nitrogen	Med	No Data	High	No Data	Low	Low
91-OUT-1	50 Winslow Drive	(9)		Yes	-28	No	NT	0.55	1.17	40%	3	2.43	Nitrogen	Med	No Data	Med	No Data	Low	Low
36-OUT-3	7 Dylan Way	(9)		No	0	No	NT	0.43	1.02	36%	2	2.17	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
36-OUT-1	54 Brick Hill Road	(9)		No	0	No	NT	1.60	4.34	31%	8	1.90	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
18-OUT-10	Route 6 near rotary			No	0	No	NT	0.40	0.46	72%	2	4.43	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
44-OUT-1	11 Uncle Harvey's Way			No	0	No	NT	0.88	2.37	31%	5	1.90	Nitrogen	Low	No Data	Low	No Data	Med	Med
51-OUT-3	57 Briar Spring Road			No	0	No	NT	0.36	0.88	34%	2	2.10	Nitrogen	Low	No Data	Low	No Data	Low	Low
91-OUT-UNK	31 Winslow Drive	(5)		Yes	-28	No	NT	2.57	7.46	29%	13	1.77	Nitrogen	Low	No Data	Low	No Data	Low	Low
18-OUT-11	7 Jones Road	(4)		No	0[4]	No	NT	0.42	0.74	48%	2	2.92	None	Very Low	No Data	Med	No Data	Low	Low
18-OUT-5	Route 6	(9)		No	0[4]	No	NT	0.34	0.29	100%	2	6.12	None	Very Low	No Data	High	No Data	Low	Low
18-OUT-6	Route 6	(9)		No	0[4]	No	NT	0.56	0.47	100%	3	6.12	None	Very Low	No Data	High	No Data	Low	Low
24-OUT-1	Skaket Beach Road near Route 6			No	67	No	NT	0.30	1.59	16%	2	0.98	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Med
24-OUT-2	50 Skaket Beach Road	(8)											Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
24-OUT-3	5 Captian Linnell Road			No	67	No	NT	1.05	1.83	48%	5	2.94	Fecal Coliform	Very Low	No Data	Med	No Data	Low	High

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL[14]	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
24-OUT-4	96 Skaket Beach Road	(6)		No	67	No	NT	1.02	3.98	22%	5	1.32	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-5	88 Skaket Beach Road			No	67	No	NT	1.28	4.38	24%	7	1.50	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-6	88 Skaket Beach Road			No	67	No	NT	0.96	1.89	43%	5	2.60	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-1	60 Captain Linnell Road		CCB-17	No	239	No	NT	0.65	1.23	44%	3	2.71	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-2	56 Captain Linnell Road		CCB-17	No	239	No	NT	1.76	5.36	27%	9	1.68	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-1	74 Captain Linnell Road			No	239	No	NT	0.52	1.20	36%	3	2.23	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-2	87 Captain Linnell Road			No	239	No	NT	1.22	3.20	32%	6	1.95	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-3	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3.20	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-4	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3.20	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-5	Behind 92 West Road			No	67	No	NT	0.71	0.96	62%	4	3.80	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-6	32 Skymeadow Drive (Cul-de-Sac)			No	239	No	NT	0.35	0.65	44%	2	2.71	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-7	60 Captain Linnell Road	(8)		No	239		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
33-OUT-4	Intersection of West Road and Old Colony Way			No	67	No	NT	0.52	0.43	100%	3	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
33-OUT-5	89 Old Colony Way			No	67	No	NT	0.72	0.83	73%	4	4.46	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
39-OUT-1	46 Bay Ridge Lane			No	239	No	NT	2.19	2.21	83%	11	5.08	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
46-OUT-1	18 Bay Ridge Lane	(10)		No	324								Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
46-OUT-2	18 Bay Ridge Lane			No	324	No	NT	2.35	1.97	100%	12	6.12	Fecal Coliform	Very Low	No Data	High	No Data	Low	Med
53-OUT-1	60 Baker's Pond Road	(8)		No	67		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
53-OUT-3	63 Baker's Pond Road			No	67	No	NT	0.41	1.20	29%	2	1.76	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
53-OUT-4	66 Baker's Pond Road	(3)		No	67	No	NT	0.37	0.46	67%	2	4.07	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low

Notes:

(1) To be completed once Outfall Prioritization Matrix has been finalized
(2) Outfall was not located
(3) Private outfall
(4) Threshold percent change values were not included in MEP reports
(5) Outfall is an asphalt swale
(6) Unable to access Outfall. Some data is incomplete.
(7) Unable to locate Outfall. Assumed Outfall no longer exists.
(8) Outfall classified as a culvert.
(9) Unable to locate outfall. Assumed outfall exists.
(10) Outfall abandoned
(11) Located outside of Town boundaries
(12) Outfall drains into 18-OUT-4
(13) Loading rate for impervious surfaces only
(14) TMDL needed, existing, or assumed will have a TMDL in near future
(15) Nitrogen loading based over entire drainage area (pervious & impervious)
NT = Not Tested

Project No.: 8615148
Client: Town of Orleans, MA
Project Name: Orleans Town-Wide Preliminary Stormwater Assessment
Document Title: Outfall Prioritization Matrix
Date: 9/24/2013

Outfall Prioritization based on Watershed Nitrogen Sensitivity

			Descriptive or Quantified Criteria											Criteria for Comparative Rating						
Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
Outfalls located within Watershed with Very High Sensitivity to Nitrogen																			
35-OUT-2	Loomis Lane			Yes	-83	No	NT	0.12	0.14	76%	1	5	Nitrogen	Very High	No Data	High	No Data	Low	Low
42-OUT-2	19 School Road			Yes	-83	No	NT	2.96	5.31	47%	15	3	Nitrogen	Very High	No Data	Med	No Data	Med	Low
43-OUT-1	69 Barley Neck Road			Yes	-83	No	366	2.16	4.50	40%	11	2	Nitrogen	Very High	No Data	Med	High	High	High
50-OUT-1	30 Cedar Cove Road / Barley Neck Road			Yes	-83	No	366	7.07	17.03	35%	36	2	Nitrogen	Very High	No Data	Med	High	Med	High
36-OUT-2	2 Pochet Road			Yes	-83	No	NT	0.32	0.64	42%	2	3	Nitrogen	Very High	No Data	Med	No Data	Low	Low
36-OUT-4	37 High Tide Lane			Yes	-83	No	360	2.12	4.79	37%	11	2	Nitrogen	Very High	No Data	Med	High	Low	High
35-OUT-1	18 Karen Way	(8)		Yes	-83								Nitrogen	Very High	No Data	N/A	No Data	Low	Low
Outfalls located within Watershed with High Sensitivity to Nitrogen																			
18-OUT-9	43 Canal Road			Yes	-67	No	NT	0.97	0.81	100%	5	6	Fecal Coliform	High	High	High	No Data	Med	Med
17-OUT-3	Route 6			Yes	-67	No	NT	0.48	0.40	100%	2	6	Fecal Coliform	High	High	High	No Data	Low	Low
76-OUT-1	142 Portanimicut Road	(9)		Yes	-61	No	NT	0.37	0.61	51%	2	3	Nitrogen	High	No Data	Med	No Data	Med	High
70-OUT-1	158 Namequoit Road			Yes	-61	No	NT	0.28	0.47	49%	1	3	Nitrogen	High	No Data	Med	No Data	High	Med
11-OUT-1	5 Asas Landing			Yes	-67	No	130	1.95	7.20	23%	10	1	Nitrogen	High	No Data	Low	Med	High	Med
16-OUT-2	Bay View Drive	(2)	CCB-9	Yes	-67	No	NT	2.84	2.95	81%	15	5	Fecal Coliform	High	No Data	Med	No Data	Med	High
17-OUT-5	154 Rock Harbor Road	(8)		No	0								Fecal Coliform	High	No Data	N/A	No Data	Med	Low
18-OUT-7	65 Canal Road			Yes	-67	No	NT	1.48	3.36	37%	8	2	Fecal Coliform	High	No Data	Med	No Data	Med	Low
19-OUT-1	16 Gibson Road			Yes	-67	No	NT	1.21	3.20	32%	6	2	Fecal Coliform	High	No Data	Med	No Data	Med	Med
25-OUT-1	On East side of Cape Cod Rail Trail behind 90 Massachusetts			Yes	-67	No	NT	2.03	2.01	85%	10	5	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-1	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6	Fecal Coliform	High	No Data	High	No Data	Med	Low
26-OUT-2	1 Cottage Street			Yes	-67	No	NT	0.92	0.77	100%	5	6	Fecal Coliform	High	No Data	High	No Data	Med	Low
33-OUT-1	Behind 15B Center Place	(9)		Yes	-67	No	NT	1.30	3.64	30%	7	2	Fecal Coliform	High	No Data	Med	No Data	Med	HIgh
34-OUT-1	39 S. Orleans Road			Yes	-67	No	NT	1.74	3.32	44%	9	3	Fecal Coliform	High	No Data	Med	No Data	Med	Low
34-OUT-2	10 Academy Place			Yes	-67	No	210	0.51	0.43	100%	3	6	Fecal Coliform	High	No Data	High	Med	Med	High
34-OUT-4	7 Brewster Cross Road	(9)		Yes	-67	No	NT	0.82	0.68	100%	4	6	Fecal Coliform	High	No Data	High	No Data	Med	Low
41-OUT-1	9 Kettle Pond Way			Yes	-67	No	NT	2.35	5.84	34%	12	2	Fecal Coliform	High	No Data	Low	No Data	Med	Med
75-OUT-1	24 Ridgewood Road			Yes	-61	No	NT	1.55	4.13	31%	8	2	Nitrogen	High	No Data	Low	No Data	Low	Low
11-OUT-2	16 Ruggles Road			Yes	-67	No	64	1.51	6.54	19%	8	1	Fecal Coliform	High	No Data	Low	No Data	Low	Low
12-OUT-1	210 Brick Hill Road			Yes	-67	No	NT	2.53	6.71	32%	13	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
12-OUT-2	4 Freeman Lane			Yes	-67	No	NT	1.01	0.84	100%	5	6	Fecal Coliform	High	No Data	High	No Data	Low	Low
16-OUT-1	60 Rock Harbor Road			Yes	-67	No	NT	0.78	1.62	40%	4	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
17-OUT-6	Route 6 , near Cedar Pond Road			Yes	-67	No	NT	0.45	1.23	30%	2	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
18-OUT-2	45 Cranberry Highway	(12)		Yes	-67	No	NT						Fecal Coliform	High	No Data	N/A	No Data	Low	High
18-OUT-3	45 Cranberry Highway	(8) (9) (12)		Yes	-67	No							Fecal Coliform	High	No Data	N/A	No Data	Low	High
18-OUT-4	40 Ellis Road, Eastham			Yes	-67	Yes	192	45.52	59.10	64%	233	4	Fecal Coliform	High	No Data	Med	Med	Low	High
18-OUT-UNK	40 Ellis Road, Eastham	(11)		No									Fecal Coliform	High	No Data	N/A	No Data	Low	High
25-OUT-2	17 Rock Harbor Road			Yes	-67	No	NT	0.53	0.52	85%	3	5	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-3	25 Rock Harbor Road			Yes	-67	No	NT	0.35	0.34	85%	2	5	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-4	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.46	0.45	85%	2	5	Fecal Coliform	High	No Data	High	No Data	Low	Low

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
25-OUT-6	Rock Harbor and Skaket Beach intersection			Yes	-67	No	NT	0.36	0.37	81%	2	5	Fecal Coliform	High	No Data	High	No Data	Low	Low
25-OUT-7	10 Locust Road			Yes	-67	No	NT	2.19	5.45	34%	11	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-1	7 Pine Ridge Lane			Yes	-67	No	NT	2.03	5.80	29%	10	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
27-OUT-2	94 Hopkins Lane			Yes	-67	No	NT	1.74	4.45	33%	9	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
33-OUT-2	19 Brewster Cross Road			Yes	-67	No	NT	1.37	1.15	100%	7	6	Fecal Coliform	High	No Data	High	No Data	Low	Low
34-OUT-3	82 Main Street			Yes	-67	No	247	1.37	1.15	100%	7	6	Fecal Coliform	High	No Data	High	Med	Low	Med
37-OUT-1	9 Samoset Road			Yes	-51	No	NT	0.72	0.60	100%	4	6	Nitrogen	High	No Data	High	No Data	Low	Low
37-OUT-2	35 Countryside Drive			Yes	-51	No	NT	0.65	1.68	32%	3	2	Nitrogen	High	No Data	Low	No Data	Low	Low
37-OUT-3	35 Countryside Drive			Yes	-51	No	NT	0.53	1.56	28%	3	2	Nitrogen	High	No Data	Low	No Data	Low	Low
40-OUT-1	59 Nickerson Road			Yes	-67	No	NT	0.41	0.90	38%	2	2	Fecal Coliform	High	No Data	Med	No Data	Low	Low
40-OUT-2	46 Eldredge Parkway			Yes	-67	No	NT	0.82	0.69	100%	4	6	Fecal Coliform	High	No Data	High	No Data	Low	Low
47-OUT-1	69 Finlay Road			Yes	-67	No	NT	2.10	3.23	54%	11	3	Fecal Coliform	High	No Data	Med	No Data	Low	Low
53-OUT-2	94 Baker's Pond Road			Yes	-67	No	NT	0.32	1.25	21%	2	1	Fecal Coliform	High	No Data	Low	No Data	Low	Low

Outfalls located within Watershed with Medium Sensitivity to Nitrogen

69-OUT-1	100 Namequoit Road			Yes	-37	No	NT	0.92	2.23	35%	5	2	Nitrogen	Med	No Data	Low	No Data	Med	Med
42-OUT-1	37 Monument Road			Yes	-37	No	NT	1.18	2.69	37%	6	2	Nitrogen	Med	No Data	Low	No Data	Low	Low
74-OUT-1	Intersection of Harwich Road and Rt. 28.			Yes	-28	No	NT	1.09	0.91	100%	6	6	Nitrogen	Med	No Data	High	No Data	Low	Low
91-OUT-1	50 Winslow Drive	(9)		Yes	-28	No	NT	0.55	1.17	40%	3	2	Nitrogen	Med	No Data	Med	No Data	Low	Low

Outfalls located within Watershed with Low Sensitivity to Nitrogen

17-OUT-1	Route 6			No	0	No	NT	0.63	0.53	100%	3	6	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-2	Route 6			No	0	No	NT	0.32	0.26	100%	2	6	Fecal Coliform	Low	High	High	No Data	Low	Med
17-OUT-4	48 Locust Road			No	0	No	NT	2.50	5.92	35%	13	2	Fecal Coliform	Low	High	Low	No Data	Low	Low
18-OUT-8	62 Locust Road			No	0	No	NT	0.41	0.61	56%	2	3	Fecal Coliform	Low	High	Med	No Data	Low	Med
25-OUT-5	Behind 7 Cedar Pond Road	(2)		No	0	No	NT	0.61	1.52	33%	3	2	Fecal Coliform	Low	High	Med	No Data	Low	Low
48-OUT-1	153 S. Orleans Road			No	0	No	NT	1.20	2.84	35%	6	2	Dissolved Oxygen	Low	Med	Low	No Data	High	Med
55-OUT-1	120 Monument Road			No	0	No	17	0.56	0.72	65%	3	4	Dissolved Oxygen	Low	Med	Med	No Data	High	Low
87-OUT-1	21 Woodridge Road			No	0	No	NT	0.77	1.62	40%	4	2	Nitrogen	Low	Med	Med	No Data	Low	Low
60-OUT-1	110 Bakers Pond Road			No	0	No	NT	1.03	1.87	46%	5	3	Mercury in Fish Tissue	Low	Low	Med	No Data	High	High
28-OUT-1	85 Great Oak Road			No	0	No	NT	6.05	17.35	29%	31	2	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
28-OUT-UNK	64 Brick Hill Road	(9)		No	0	No	NT	0.91	2.11	36%	5	2	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
13-OUT-1	Smugglers Path			No	0	Yes	NT	0.80	4.95	13%	4	1	None	Low	No Data	Low	No Data	High	Low
15-OUT-1	Skaket Beach		CCB-17	No	0	No	164	2.26	1.89	100%	12	6	None	Low	No Data	High	Med	High	Med
55-OUT-2	36 Herring Brook Way			No	0	Yes	NT	1.57	3.92	33%	8	2	Nitrogen	Low	No Data	Low	No Data	High	Low
51-OUT-1	65 Briar Spring Road			No	0	No	NT	1.00	2.56	33%	5	2	Nitrogen	Low	No Data	Low	No Data	Med	Low
51-OUT-2	Gilman Lane Town Landing			No	0	Yes	NT	1.66	4.61	30%	9	2	Nitrogen	Low	No Data	Low	No Data	Med	Low
57-OUT-1	204 Barley Neck Road	(7)		No	0	No	NT	1.05	3.72	24%	5	1	Nitrogen	Low	No Data	Low	No Data	Med	Low
36-OUT-3	7 Dylan Way	(9)		No	0	No	NT	0.43	1.02	36%	2	2	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
36-OUT-1	54 Brick Hill Road	(9)		No	0	No	NT	1.60	4.34	31%	8	2	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
18-OUT-10	Route 6 near rotary			No	0	No	NT	0.40	0.46	72%	2	4	Fecal Coliform	Low	No Data	Med	No Data	Low	Low
44-OUT-1	11 Uncle Harvey's Way			No	0	No	NT	0.88	2.37	31%	5	2	Nitrogen	Low	No Data	Low	No Data	Low	Low
51-OUT-3	57 Briar Spring Road			No	0	No	NT	0.36	0.88	34%	2	2	Nitrogen	Low	No Data	Low	No Data	Low	Low
91-OUT-UNK	31 Winslow Drive	(5)		Yes	-28	No	NT	2.57	7.46	29%	13	2	Nitrogen	Low	No Data	Low	No Data	Low	Low
44-OUT-2	Intersection of Uncle Harvey's Way & Pochet Road	(2)		No	0	No	NT	10.10	28.88	29%	52	2	Nitrogen	Low	No Data	Low	No Data	High	High
80-OUT-1	47 Forest Way			No	0	No	NT	2.23	6.13	30%	11	2	Nitrogen	Low	No Data	Low	No Data	Med	Med

Outfall ID	Outfall Street Location	Comments	DMF Shellfish Resource #	Located In Nitrogen Sensitive Watershed	MEP Threshold % Change	Preliminary Treatment System Installed?	Avg. Fecal Coliform Count (MPN/100ml)	Annual Flow (million gallons / yr)	Drainage Area (acres)	Impervious Drainage Area (%)	Nitrogen Loading Kg/Yr[13]	Nitrogen Loading Kg/Yr/Acre[15]	303d Listing / TMDL	MEP Watershed Nitrogen Sensitivity	Phosphorus Sensitivity (Ponds Only)	Impervious Surface Area %	Fecal Coliform Count	Public Benefit / Visibility	Discharge Area Impact
Outfalls located within Watershed with Very Low Sensitivity to Nitrogen																			
39-OUT-2	Overland Way - Contractor's Area			No	239	No	NT	1.20	2.29	44%	6	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
33-OUT-3	Intersection of West Road and Old Colony Way			No	67	No	NT	0.17	0.14	100%	1	6	Fecal Coliform	Very Low	No Data	High	No Data	Med	Low
18-OUT-11	7 Jones Road	(4)		No	0[4]	No	NT	0.42	0.74	48%	2	3	None	Very Low	No Data	Med	No Data	Low	Low
18-OUT-5	Route 6	(9)		No	0[4]	No	NT	0.34	0.29	100%	2	6	None	Very Low	No Data	High	No Data	Low	Low
18-OUT-6	Route 6	(9)		No	0[4]	No	NT	0.56	0.47	100%	3	6	None	Very Low	No Data	High	No Data	Low	Low
24-OUT-1	Skaket Beach Road near Route 6			No	67	No	NT	0.30	1.59	16%	2	1	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Med
24-OUT-2	50 Skaket Beach Road	(8)											Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
24-OUT-3	5 Captian Linnell Road			No	67	No	NT	1.05	1.83	48%	5	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	High
24-OUT-4	96 Skaket Beach Road	(6)		No	67	No	NT	1.02	3.98	22%	5	1	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-5	88 Skaket Beach Road			No	67	No	NT	1.28	4.38	24%	7	1	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
24-OUT-6	88 Skaket Beach Road			No	67	No	NT	0.96	1.89	43%	5	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-1	60 Captain Linnell Road		CCB-17	No	239	No	NT	0.65	1.23	44%	3	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
31-OUT-2	56 Captain Linnell Road		CCB-17	No	239	No	NT	1.76	5.36	27%	9	2	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-1	74 Captain Linnell Road			No	239	No	NT	0.52	1.20	36%	3	2	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-2	87 Captain Linnell Road			No	239	No	NT	1.22	3.20	32%	6	2	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-3	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-4	West Road to west of Route 6 overpass			No	67	No	NT	0.19	0.30	52%	1	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-5	Behind 92 West Road			No	67	No	NT	0.71	0.96	62%	4	4	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-6	32 Skymeadow Drive (Cul-de-Sac)			No	239	No	NT	0.35	0.65	44%	2	3	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
32-OUT-7	60 Captain Linnell Road	(8)		No	239		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
33-OUT-4	Intersection of West Road and Old Colony Way			No	67	No	NT	0.52	0.43	100%	3	6	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
33-OUT-5	89 Old Colony Way			No	67	No	NT	0.72	0.83	73%	4	4	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low
39-OUT-1	46 Bay Ridge Lane			No	239	No	NT	2.19	2.21	83%	11	5	Fecal Coliform	Very Low	No Data	High	No Data	Low	Low
46-OUT-1	18 Bay Ridge Lane	(10)		No	324								Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
46-OUT-2	18 Bay Ridge Lane			No	324	No	NT	2.35	1.97	100%	12	6	Fecal Coliform	Very Low	No Data	High	No Data	Low	Med
53-OUT-1	60 Baker's Pond Road	(8)		No	67		NT						Fecal Coliform	Very Low	No Data	N/A	No Data	Low	Low
53-OUT-3	63 Baker's Pond Road			No	67	No	NT	0.41	1.20	29%	2	2	Fecal Coliform	Very Low	No Data	Low	No Data	Low	Low
53-OUT-4	66 Baker's Pond Road	(3)		No	67	No	NT	0.37	0.46	67%	2	4	Fecal Coliform	Very Low	No Data	Med	No Data	Low	Low

Notes:

(1) To be completed once Outfall Prioritization Matrix has been finalized
(2) Outfall was not located
(3) Private outfall
(4) Threshold percent change values were not included in MEP reports
(5) Outfall is an asphalt swale
(6) Unable to access Outfall. Some data is incomplete.
(7) Unable to locate Outfall. Assumed Outfall no longer exists.
(8) Outfall classified as a culvert.
(9) Unable to locate outfall. Assumed outfall exists.
(10) Outfall abandoned
(11) Located outside of Town boundaries
(12) Outfall drains into 18-OUT-4
(13) Loading rate for impervious surfaces only
(14) TMDL needed, existing, or assumed will have a TMDL in near future
(15) Nitrogen loading based over entire drainage area (pervious & impervious)
NT = Not Tested

EASTHAM

BREWSTER

HARWICH

NAUSET HARBOR

LITTLE PLEASANT BAY

PLEASANT BAY

Nauset Estuary is not yet listed for a Nitrogen TMDL, but is expected to receive one in the future.

LEGEND

- Dissolved Oxygen
- Fecal Coliform
- Mercury in Fish Tissue
- Nitrogen
- Outfall
- Assessors Grid

Paper Size ARCH D

0 0.125 0.25 0.5 Miles

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet

N

TOWN OF ORLEANS, MASSACHUSETTS

Outfall Location Map on Areas Affected by 303D Listings

Job Number 86-15148
Revision A
Date 24 Sep 2013

Figure 1

G:\86\15148\GIS\Maps\MXD_Deliverables\Outfall Map MEP 2013 March.mxd

1545 Iyannough Road, Hyannis Massachusetts 02601 USA **T** 1 508 362 5680 **F** 1 508 362 5684 **E** hyamail@ghd.com **W** www.ghd.com

Data source: Data Custodian, Data Set Name/Title, Version/Date. Created by:atrouchaleau

Appendix C

Preliminary Classification of the Stormwater Systems per 2013 Orleans Town-Wide Preliminary Stormwater Assessment

Town of Orleans, Massachusetts
Water Quality and Wastewater Planning
Preliminary Classification of the Stormwater Systems per 2013 Orleans Town-Wide Preliminary Stormwater Assessment

No.	Year	Location	Purpose	Impervious Area		Est. Construction Cost	Description
				sf	ac		
1	1991	Meeting House Pond Landing	Water Quality				Settling Tank / Leaching Field
2	1993	Tonset Road	Water Quality				Catch Basins and Leach Pits to Saltworks Circle Outfall
3	1993	Window on the Cove	Water Quality				Settling Tank and Leach Pits (3)
4	1993	Main and Tonset	Water Quality				Settling Tank and Leach Pits (2)
5	1993	Barley Neck/Beach/Main Street	Water Quality				Settling Tank and Leach Pit (1)
6	1998	Brewster Cross Road	Water Quality				Several Catch Basins and Leach Pits
7	1999	Rock Harbor Ramp	Water Quality				Trench Drain / Leach Pits (2)
8	1999	Asa's Landing	Water Quality				Catch Basins and Leach Pits
9	1999	Ruggles Road	Water Quality				Leach Pits
10	1999	Snow Shore Road Outfall	Water Quality				Catch Basins and SW Remediation Chambers
11	1999	Mill Pond Road	Water Quality				Catch Basins and Leach Pits
12	1999	Lonnie's Pond	Water Quality				Catch Basins and SW Remediation Chambers
13	1999	Namequoit Road	Water Quality				Catch Basins and Leach Pits
14	2005	Charles Moore Arena	Drainage / Flooding			$25,000.00	Leach Pits
15	**2006**	**Windmill At the Cove**	**Water Quality**	**69113**	**1.59**	**$79,750.00**	**Catch Basins and Leach Pits (9)**
16	**2006**	**Town Cove Constructed Wetland**	**Water Quality**	**282785**	**6.49**	**$34,200.00**	**Biofilter**
17	**2007**	**Town Cove Outfall Repair**	**Water Quality**				**Installation of Tide Gate on 36" Pipe at Town Cove**
18	**2008**	**Skaket Road Cuvlert**	**Water Quality**			**$165,565.00**	**Instalaltion of New Culvert and Cultec Chambers**
19	**2009**	**Rock Harbor Road**	**Water Quality**	**28004**	**0.64**	**$140,457.00**	**Sediment Tank and Leaching Chambers**
20	**2009**	**Gibson Road Outfall**	**Water Quality**		**0.00**		**Sediment Tank and Leaching Chambers**
21	**2009**	**Monument Road Drainage (3 locations parking lot and 2 upstream on Monument Road)**	**Water Quality**	**83169**	**1.91**	**$104,095.00**	**Sediment Tank and Leaching Chambers**
22	2010	Uncle Harvey's Way	Water Quality				Two Leach Pits and Catch Basins
23	**2011**	**Skaket Beach Parking Lot**	**Water Quality**				**Sediment Tank and Leaching Chambers**
24	**2011**	**Locust Road (3 sites for three discharges)**	**Water Quality**				**Catch Basins and Leach Pits**

Town of Orleans, Massachusetts
Water Quality and Wastewater Planning
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No.	Year	Location	Purpose	Impervious Area		Est. Construction Cost	Description
				sf	ac		
25	2012	Priscilla Road	Water Quality			$465,000.00	Part of NRCS Water Restoration Project, all sites includied settling tank, deep sump CB's and leaching chambers
26	2012	Gilman Landing	Water Quality				
27	2012	Barley Neck Landing	Water Quality				
28	2012	River Road Landing	Water Quality				
29	2012	Quanset Road	Water Quality				
30	2012	Quanset Landing	Water Quality				
31		Highway Department	Water Quality				Settling Tank and Leaching Pits
32		Meadow Way	Drainage / Flooding				Leach Pits
33	2013	Overland Way	Water Quality	153158	3.52		Catch Basins and Leach Pits
34	2013	Brick Hill Road Outfall	Water Quality and Drainage	60416	1.39		Deep Sump Catch Basins
35		Route 39	Drainage / Flooding				Catch Basins and Leaching Pits
36	2014	Tonset and Freeman	Water Quality				Constructed Wetland
37	2014	Brick Road and Tonset Road	Drainage / Flooding				Catch Basins and Leach Pits
38	2014	Brick Hill Road near Hopkins	Drainage / Flooding				Catch Basins and Leach Pits
39	2010	Pond Street	Drainage / Flooding				Catch Basins
40	2010	Finlay Road	Drainage / Flooding				Catch Basins