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**Town of Nags Head
Decentralized Wastewater
Management Plan**

Stone Project # 04 1477-W

Prepared For:

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TABLE OF CONTENTS

1.	INTRODUCTION AND RATIONALE.....	1
2.	PLAN ELEMENTS.....	3
2.1.	Septic System Inspection and Tank Pumping Program.....	3
2.1.1.	Inspectors.....	3
2.1.2.	Inspection Procedures.....	4
2.1.3.	Septic Tank Pumpouts.....	5
2.1.4.	Repairs/Replacements.....	5
2.1.5.	Loan/Grants to Homeowners.....	6
2.1.6.	Data Collection and Reporting.....	6
2.1.7.	Education and Outreach for Inspection Program.....	7
2.2.	Permit Tracking and Reporting.....	8
2.3.	Water Use Tracking and Reporting.....	10
2.4.	Water Quality Monitoring Program.....	11
2.4.1.	Realign Sampling Locations.....	11
2.4.2.	Monitoring for Enterococcus Concentrations.....	12
2.4.3.	Background Surface Water Monitoring.....	12
2.4.4.	Water Use Information During Sampling Events.....	12
2.4.5.	Quality Assurance Project Plan (QAPP).....	13
2.5.	Intensive Individual System Monitoring Study.....	13
2.6.	County Permit Data Collection.....	13
2.7.	Integrated Stormwater/Onsite System Analysis.....	13
2.7.1.	Surface Drainage Analysis.....	14
2.7.2.	Dry Weather and Storm Event-Based Sampling.....	14
2.7.3.	Additional Constituent Sampling.....	14
2.8.	Overall Education and Outreach.....	14
2.9.	Zoning Regulation Changes.....	14
2.9.1.	Design Incentives.....	15
2.10.	Ongoing Analyses and Program Review.....	15
3.	IMPLEMENTATION PLAN, SCHEDULE AND BUDGET.....	16
3.1.	Budget.....	16
3.1.1.	Septic System Inspection and Tank Pumping Program.....	16
3.1.2.	Permit Tracking and Reporting.....	17
3.1.3.	Water Use Tracking and Reporting.....	17

3.1.4.	<i>Water Quality Monitoring Program</i>	17
3.1.5.	<i>Intensive Individual System Monitoring Study</i>	17
3.1.6.	<i>County Paper Permit Data Collection</i>	17
3.1.7.	<i>Integrated Stormwater/Onsite System Analysis</i>	17
3.1.8.	<i>Overall Education and Outreach</i>	17
3.1.9.	<i>Zoning Regulation Changes</i>	17
3.1.10.	<i>Ongoing Analyses and Program Review</i>	18
3.2.	<i>Potential Program Funding Sources</i>	18
3.2.1.	<i>Potential Local Funding Sources</i>	18
3.2.2.	<i>Loan and Grant Program for Upgrades and Repairs</i>	18

LIST OF TABLES

Table 1: Matrix of Technical Report Conclusions & Recommendations and DWMP Options

Table 2: Summary of Maintenance and Management Requirements for Type I-VI Systems

LIST OF FIGURES

Figure 1: Permit Process Flowchart

The Town of Nags Head is committed to protecting the environment and public health. Effective care of onsite systems is essential to keeping this commitment. The Town will enhance its oversight of these systems in a fair, reasonable and cost-effective manner to ensure they are well managed and that system owners have the information and tools necessary to protect their private investment and the public good. The Decentralized Wastewater Management Plan will be dynamic and evolving over time so that decentralized systems remain a sustainable component of Nags Head's infrastructure.

—Mission Statement

1. INTRODUCTION AND RATIONALE

Wastewater from the vast majority of buildings in the Town of Nags Head is treated with onsite wastewater treatment systems (OWTS, or onsite systems). Over 85% of all developed properties (4,339 total) use onsite systems; of those, 95% of the properties are residential. The property owners have responsibility for operating and maintaining onsite systems. The goals of this Decentralized Wastewater Management Plan are to assess and monitor potential water quality impacts due to onsite systems, and encourage and support operation and maintenance initiatives by the property owners.

The Town is actively supporting the management of onsite wastewater treatment systems through a voluntary Septic Health Initiative. The Septic Health Initiative covers all onsite systems smaller than 3,000 gallons per day (gpd) whose maintenance is not regulated by the County Health Department. This initiative began in 2000 and includes four key areas:

- voluntary inspections, septic tank pumping and loans for repairs or replacements,
- groundwater and surface water quality monitoring,
- public education and outreach, and
- development of a Decentralized Wastewater Management Plan (DWMP).

The Town has contracted with Stone Environmental, Inc. (Stone) of Montpelier, Vermont, with assistance from Dr. David Lindbo of North Carolina State University, to review the current program, analyze the results of the water quality monitoring and inspection program in relation to the potential impacts from onsite systems, and make recommendations for the Decentralized Wastewater Management Plan (DWMP) that directly relate to the findings of the scientific analysis. A Preliminary Report was issued and presented in January 2005, followed by development of an extensive list of management options related to the report findings. A local advisory committee along with town staff and Stone team members met in February and March to review and choose the management options best suited to the Town. An updated version of the scientific analyses was completed in July 2005. Stone wishes to acknowledge the efforts of Town staff in obtaining data, in the approach for conducting the scientific investigation, and in the development of the Management Plan.

This Decentralized Wastewater Management Plan describes the changes to the current initiative chosen for implementation by the Town. The effort is a voluntary participation, incentive-based program focused on supporting property owners in maintaining their systems through an expansion of the current efforts. The DWMP includes additional education and outreach efforts, assistance in maintenance efforts through the voluntary inspection and pumping, and repair/upgrade loan/grant program, continuing the water quality monitoring program, and expanding the data tracking and reporting. Table 1 is a matrix of the major conclusions and recommendations from the Technical Report, and the DWMP options chosen for implementation.

Three key findings in the Technical Report include:

- Older substandard systems such as sand bottom tanks are impacting the environment, while not necessarily causing a surface failure
- Areas where there exists a shallow seasonal high groundwater are impacting the environment
- Properties with high water use may be impacting the ability of the onsite systems to sufficiently treat wastewater effluent.

The following sections describe the plan elements, implementation schedule and budget estimate.

2. PLAN ELEMENTS

This section contains the basic functions and changes to the current Septic Health Initiative program. The subsections include information on the septic system inspection and tank pumping program (including funding for upgrades and repairs); permit tracking and reporting; water use tracking and reporting, water quality monitoring program; overall education and outreach; zoning regulation changes; and ongoing analyses and program review.

2.1. Septic System Inspection and Tank Pumping Program

The program is for all property and business owners that are not using a state regulated system (sewer connection or systems >3,000 gallons per day). The inspection includes a visual inspection of the drainfield area, opening and checking the condition and need for pumping in the septic tank, and low interest loans for repairs and replacements.

An onsite system inspection program was initiated as part of the Septic Health Initiative by the Nags Head Planning Department in the summer of 2000. This inspection program has both heightened awareness of proper onsite system maintenance among town residents and helped to initiate improvements to poorly performing systems. Nearly a third of all onsite systems have been inspected. Of the 1,082 systems (on 1,009 properties) that have been inspected, 31% (204) were classified as “failing.” Each system was judged to have failed for one or more of the following reasons. The number of systems failing due to each of the possible criteria is also summarized below (note some systems failed in more than one category):

- Sand Bottom Tank: 59 systems
- Leaky Tank: 95 systems
- Saturated Soils: 40 systems
- Effluent Ponding: 30 systems
- Septic Field Failing: 167 systems
- General System Failure: 132 systems

Of the 182 failing systems on 177 properties, 58 systems (31%) are known to have received repairs or upgrades after a failed inspection was reported. The status of the remaining 124 systems is unknown. The current program focused on one-time inspections, whereas the shift is to provide ongoing inspection services to all onsite systems.

2.1.1. Inspectors

Currently septic tank pumping contractors perform the inspection. They are trained by Town staff on how to perform the inspection, how to fill out the inspection form, and disseminate outreach materials. The inspectors may have an incentive to pump the tank whether it needs it or not. They also are not necessarily knowledgeable

about the workings of the other components of a drainfield and the role of soils in wastewater treatment.

The proposed change includes contracting out the service to trained septic system inspectors not involved directly with designing or maintaining systems in Nags Head. This way the pumper truck is only contacted when there is a verified need to pump, and the inspectors would be more knowledgeable about the entire system.

If the inspection program encompasses all onsite systems included in the Septic Health Initiative, substantial resources will be needed for inspectors. Conducting initial inspections of all uninspected systems over five years would result in approximately 440 inspections per year. When all onsite systems are receiving routine maintenance inspections at an average frequency of every three years, it amounts to 1,100 inspections per year.

2.1.2. Inspection Procedures

Currently each year the town requests bids from septic tank pumping contractors to perform the inspection and pump out the tanks at a set rate. A one-page form is filled out by the inspector, and is entered into a database table by the Town Septic Health Coordinator (Coordinator). The Coordinator provides assistance to property owners, inspection oversight, and administers the loan applications. The current onsite system inspection procedure is uniform for all systems, whether they have been inspected before or not. It also focuses mainly on the septic tank and omits a number of pieces of information included in other inspection procedures that have been used in other jurisdictions or in national programs.

The following changes are proposed:

- using different levels of inspections for first-time and followup inspections and
- strengthening the inspection procedure to gather more, useful information.

Proposed changes include developing a more comprehensive inspection process with two procedures and forms. The “first-time inspection” includes basic information on the system components, their location, sizes and permit status, and may take longer during the site visit. The followup or “routine inspection” will be a relatively quick visit to the site to check the tanks, identify any changes to the site plan, and record basic information similar to the current inspection. There will also be additional information that is collected and tracked, including permit information (see section 2.2 below). Expand the use of a database to record and track data. The USEPA is developing a simple database for wastewater management that is scheduled to be available fall of 2005. The database should have the ability to link the property data to a GIS database, and include the water

quality monitoring results and permit information. Consider a web-based database to manage all of the data. This option would allow the septic system inspectors to enter their data remotely. Consider obtaining approval from the property owner for multi-year inspections besides a one-time inspection, maybe on a 3-year cycle.

2.1.3. *Septic Tank Pumpouts*

Currently a septic tank pumper truck may be on site for the inspection. In many instances, according to Town staff, the tank needs pumping during the initial inspection. This condition may lead to unnecessary pumpouts to occur, particularly in followup inspections. The Town obtains a commitment from a septic tank pumping contractor for set prices for the inspection and pumpout services. Pumpout prices depend on the size of the tank and volume pumped.

Proposed changes include separating the inspection from the pumpout. During the inspection, determine whether there is a need for pumping, and arrange for the truck separately. For ongoing maintenance inspections, the tank solid vs. liquid volumes can be tracked if less than the recommended pumping volume. Tracking the pumpout data for ongoing inspections will help determine when to recommend pumping on specific properties. Generate reports and send reminder cards to owners when pumpouts are needed. It is recommended to continue to request bids for pumpout prices based on volume on an annual basis.

2.1.4. *Repairs/Replacements*

Currently the inspection may identify repairs or replacements needed, the owner is contacted. Several substandard systems including sand-bottom septic tanks have been discovered through the inspection. If the owners go ahead with the repair or replacement, the owner obtains the approval from the County Health Department, and the Town receives a copy of the permit from the Health Department. The Town is not currently tracking permits for repairs.

Best fix instances occur where failed or substandard systems are upgraded, the existing onsite conditions cannot meet current minimum design requirements, and waivers need to be granted. Best fixes may require conventional systems to be replaced by pump and fill systems, LPP, or I/A pretreatment systems to bring the system into closer compliance with the rules. Education is needed for homeowners on the importance of upgrading older and substandard systems for public health and environmental reasons, even if the system is not failing to the surface. Increased awareness of system operation and maintenance needs becomes more important with system complexity, such as ones using pumps and pretreatment units.

Proposed changes include an expansion of the current program to target and encourage upgrades of older and substandard systems (like sand bottom tanks), particularly in areas with shallow depths to the seasonal high groundwater. Also, the Town can track inspected systems needing repair/upgrade for receipt of a Health Department permit and for those not submitting applications, conduct follow-up telephone calls or letters to owners to encourage action.

2.1.5. Loan/Grants to Homeowners

Currently a loan up to \$3,000 over three years is offered by the Town to pay for repairs and replacement systems. The loan amount may not be sufficient to cover properties needing pumps, fill material and/or pretreatment technologies. There also may be additional loan or grant funds available through state programs.

Proposed changes include higher loan limits (\$5,000) for difficult sites where fill and alternative systems may be needed. Also include grants (where available) through state/federal programs. For upgrades to substandard systems like sand-bottom tanks, provide system buyouts or grants through the use of Town funds. Leverage Town funds to obtain state and/or federal grants for increased capacity of financing incentives. Use financing incentives to encourage upgrades to older systems, particularly those in areas with shallow seasonal groundwater tables.

2.1.6. Data Collection and Reporting

Currently the inspector fills out the inspection form by hand, submits it to the Town, and the Town Septic Health Coordinator enters the data into a database table for reporting and tracking purposes.

Proposed changes include expanding the use of a database to enter, store, and retrieve data. Have the inspector enter the data directly into the database if possible. Enter and track additional information including:

- The number of people occupying building,
- Whether or not a home business is on premises (e.g., child care),
- Whether the homeowner reports that there has ever been a backup into the house,
- Repairs known by the homeowner to have been made to system, whether there is ponding of water in the drainfield aggregate, and
- Whether effluent appears to be evenly distributed in the drainfield.

Develop and follow quality control (QC) and quality assurance (QA) procedures to standardize methods and to check data entry consistency. Develop reports for summary reports on numbers of inspections, etc., and to track individual property information. For example, track when a system is repaired to ensure repair

identified in inspection is completed. If not, additional measures to contact the owner and encourage them to have the repair done can be completed.

2.1.7. Education and Outreach for Inspection Program

Currently inspectors receive a small amount of training by Town staff on conducting inspections and filling out the form. The inspectors and Coordinator currently distribute educational materials such as door hangers and plumbing fixture stickers. The Town's website includes information on the inspection program along with several outreach documents and links.

The proposed expansion of the current program includes a different type of trained inspector and targeted education and outreach efforts as described below.

2.1.7.1. Septic System Inspector Education and Training

Require training for inspectors, including basic education and special training on designing, installing and inspecting onsite systems (i.e. NC Certified subsurface system operators, attendance at North Carolina State University (NCSU) onsite wastewater training courses, NAWT inspector training certification or equivalent). The Town wants trained professionals that can carefully evaluate and communicate current conditions in a professional and easily understood manner.

The Town can develop its own list of approved inspectors, by advertising requests for qualifications from professionals interested in providing inspection services. There can be a simple application form and process of reviewing and approving inspectors for a period of two years or more. For 6 hours of continuing education requirements, the courses listed at NCSU, or CEUs from wastewater conferences can be required on renewal applications. Inspectors must agree not to conduct business in the onsite system field in Nags Head to eliminate any conflicts of interest. In addition to the training and experience requirements, the inspectors must attend a workshop by Town staff on inspection procedures, education and outreach initiatives, and general performance expectations. The cost of the inspection can either be set by the Town, or left between the individual inspectors and property owners. A process for revoking certifications should be developed for quality assurance purposes. The Coordinator conducts oversight of the inspectors and inspection program.

2.1.7.2. Homeowner Outreach Overall Program

Target homeowners who have not participated in the inspection program to date. Conduct neighborhood events to encourage inspections by area, prioritizing areas of older systems and shallow groundwater tables. Conduct telephone calls to owners of un-inspected systems and encourage them to have their system inspected.

Yard signs demonstrating pride in having had the onsite system inspected could be distributed to property owners. Distribute outreach materials such as the North Carolina “Coast “A” Sys” program materials, such as “Improving Septic System Maintenance in Coastal Communities.”

2.1.7.3. Ongoing Inspections

In order to sustainably maintain onsite systems over time, ongoing maintenance inspections should be encouraged. Campaign to promote regular (yearly or every two years) inspections to maintain their systems. Consider obtaining inspection agreements from homeowners for multi-year (i.e. 3-5 years) periods rather than one year at a time.

2.1.7.4. Target Properties with Older Systems

As of April 2005, 233 of 887 (26%) systems built before 1979 had been inspected. Inspecting the remaining systems from before 1979 is a priority, since doing so will identify the location of the remaining sand-bottomed septic tanks, a pre-condition for a comprehensive replacement plan. In order to increase the number of pre-1979 systems inspected, the Town will contact the owners of the un-inspected older systems and attempt to persuade them to have their systems inspected. A follow-up call can be made to those who indicate willingness to have their systems inspected but have not yet done so after a number of months. A program for buyout of the sand-bottomed tanks will be instituted to encourage replacement of the tanks. Mailings and handouts will be used to support this effort.

2.2. Permit Tracking and Reporting

Currently Town building permit approvals are dependent and intermixed with the Health Department approvals. Following is a description of the current state, county and local permit program (Figure 1 attached).

Management of decentralized wastewater treatment systems in Nags Head is within the regulatory framework provided by the rules of the state of North Carolina under the North Carolina Title 15A – Department of Environment, Health, and Natural Resources, Chapter 18 – Environmental Health, Subchapter 18A – Sanitation, Section .1900 – Sewage Treatment and Disposal Systems (Rules). These rules contain the soils and site requirements, design and construction requirements, and administrative procedures, plus some management requirements for onsite wastewater treatment systems (OWTS, or onsite systems).

The North Carolina Department of Environment and Natural Resources (NCDENR) administers the program in Nags Head related to all systems with design flows greater than 3,000 gallons per day (gpd).

The Dare County Health Department (Health Department) administers the decentralized system program in the Nags Head area for systems under 3,000 gpd. This office conducts a preliminary review of an application, conducts a soil and site evaluation, issues a denial letter when the site is denied from use, or a site approval letter stating the conditions under which the site is approved, and specifies the system type. The design is then submitted to the Health Department, and an Improvement Permit (Site Approval) is issued.

Concurrently or just following, the Health Department issues an Authorization for Construction based on the system design. After the Health Department inspects the installed system, they issue an Operation Permit. The operation permit may identify the maximum number of occupants allowed in a building and may contain conditions for system inspections and monitoring.

The Town of Nags Head plays a role through its Zoning Regulations, which require building permits once the Health Department issues an Authorization for Construction. Once the system is constructed and an Operation Permit is issued, the town issues a Certificate of Occupancy. The zoning regulations also include information related to the density of parcels, limit the number of bedrooms in a single-family residence to 8, set a maximum size on the wastewater treatment system of 1,080 gallons per day (equivalent to an occupancy of 18), and include setbacks from structures to property lines and vegetative buffers.

The state rules set operation requirements for septic tanks and performance requirements for drainfields of onsite systems. Septic tanks are to be checked periodically and pumped when the solids level is more than one third of the liquid depth in any compartment. The drainfield is to be operated and maintained such that there is no discharge of effluent to the surface, surface waters, or groundwater; no back-up of sewage or effluent into the building or within the treatment systems; and no liquid within three inches of the surface two days in a row (observed at least one day after rainfall).

The state rules require differing levels of management for different types of onsite systems (Table 2). Types I-III are managed by the system owner, and do not require reviews by the local Health Department except for systems with pumps or dosing siphons (every 5 years). Type I systems include chemical toilets, grease traps and other toilet systems; Type II include conventional septic systems including shallow placement systems; and Type III include systems between 480 gpd and 3,000 gpd flows, pumping systems and other non-conventional trench systems. Type IV systems include systems with low pressure pipe (LPP) or multiple pumps. Type V systems include sand filter pretreatments, greater than 3,000 gpd systems, aerobic treatment units (ATU), and other mechanical, biological or chemical pretreatment plant. Type VI systems include systems larger than 3,000 gpd with pretreatment components. For Type IV-VI systems, periodic review by the local Health

Department and periodic inspection, maintenance, and reporting by a management entity are required.

For other, simpler systems, no inspection or review is required after the system is installed. For these systems, operation and maintenance is the sole responsibility of the system owner, and there are no safeguards to ensure the responsibility is upheld. The permit record for each onsite system allows the Health Department to keep track of both where onsite systems are located and of some information about the site and system construction.

Proposed changes include entering permit information into a database and tracking system upgrades and permit conditions. Information can be collected on design flows, component types and sizes, occupancy limits and system location (GIS). For Type V alternative systems, they are to be inspected once or twice yearly, reported yearly, along with effluent samples meeting performance standards. If standards are not met, the Health Department can issue letters to the homeowner, and/or a Notice of Permit Violation with procedures to bring the property back into compliance. The current Town Zoning Regulations require the owner to send a copy of the inspection reports to the town. A process can be developed for notifying the homeowners that the report has not been received, or that there is a problem identified in the report that needs follow-up.

2.3. Water Use Tracking and Reporting

The Town Water Department delivers municipal water supply services to all developed properties in town. Currently the Town Water Department maintains records on actual water use and bills owners by the gallon. Municipal water use in Nags Head is now billed on a tiered rate, based on consumption. The first 3,000 gallons per two-month billing period are the most expensive: they are billed at a fixed rate which is determined by the size of the pipe at the water meter, ranging from \$23.00 for a ¾” pipe to \$1,001 for a 5” pipe (\$7.67 - \$333.67 per 1,000 gallons). For all users, the cost per thousand gallons (or fraction thereof) becomes \$4.00 for 3,001-20,000 gallons and increases gradually to a maximum \$5.50 per thousand gallons for over \$300,000 gallons. This information is not currently tied to the Septic Health Initiative.

Water use exceeding sustainable flows to the drainfield is found at many residences in Nags Head during at least part of the year. Reducing water use in residences could have a significant effect on protecting and improving water quality and on the long-term health and cost of the onsite wastewater treatment systems.

Proposed efforts begin with a water conservation campaign to help reduce water use, encourage low flow plumbing fixtures, and make residents, commercial owners and renters aware of water use issues. Use incentives such as rebates to owners replacing old fixtures that use more water.

There is a message area on water bills that can be used for an outreach effort to conserve water. The Town currently uses the message space for messages like “Don't litter,” and for announcing upcoming events. The Town could include a message space for information about water usage. The space could contain messages like, “Conserving water helps the environment and protects your investment. The Septic Health Initiative office can help you reduce water use. Call 449-6047.”

Continue to track water use data versus wastewater design flows in a database. Also see Section 2.4.1.4 on adding water use readings to the water quality program, and 2.4.2 on an intensive monitoring study including daily water meter readings over a one or two month period.

If water use continues to be an issue, consider revising water use rates to dramatically increase when design flows are exceeded. Develop a system of relating water use information to the permit design flows so that the homeowners can be notified if the water use appears to exceed the design flows. The rate structure tailored to each customer's design flow would work more effectively if each customer received a notification of how their water usage rated with respect to design flow.

2.4. Water Quality Monitoring Program

Currently the Town is collecting water samples from 30 groundwater monitoring wells and 15 surface water points. They have recently added taking water level measurements in the wells. Contracted samplers using a Standard Operating Procedure (SOP) are taking the samples. Laboratory results are sent to the Town and entered into a spreadsheet by the Coordinator.

Major recommendations include realigning water quality sampling locations based on the results of the Technical Report, adding sampling for additional indicator bacteria, the addition of a “no impact” surface water sampling location, collecting water meter data during sampling events, and implementing quality control and assurance procedures.

2.4.1. Realign Sampling Locations

Realign water quality sampling locations based on the results of the Preliminary Report and the Final Technical Report. Several groundwater monitoring locations that are currently being sampled for the purpose of determining OWTS impacts on groundwater are located either upgradient or cross-gradient from the systems' drainfields and thus are not actually capturing impacts. Some of these monitoring wells are also damaged and in need of either repair or abandonment.

2.4.2. Monitoring for Enterococcus Concentrations

Add testing for Enterococcus to the list of water quality characteristics monitored by the sampling program. In 2003, North Carolina adopted BEACH Act (Beaches Environmental Assessment and Coastal Health Act of 2000) standards and began a beach monitoring program using Enterococcus as the indicator organism.

Previously, beach advisories were posted based on exceedances of a fecal coliform-based standard. The North Carolina DENR now monitors ocean (Tier 1) beaches in Nags Head weekly from April through October for Enterococcus, salinity, and water temperature. In order for the Town's sampling program results to be directly comparable with the results from DENR's new beach monitoring program results, both programs must monitor the same indicator bacterium. Sampling for Enterococcus would also enable comparisons between the Town's surface water monitoring results and data collected by the water department at Fresh Pond. Shellfishing area closures are still determined by exceedance of a fecal coliform-based standard, so we do not yet recommend discontinuing the monitoring of fecal coliform bacteria levels.

2.4.3. Background Surface Water Monitoring

Add a "background" surface water sampling point in Roanoke Sound and (secondarily) in the Atlantic Ocean to the points already monitored in the sampling program. Each of the surface water monitoring points already being sampled is near some form of drainage "outlet" situation (either near clusters of onsite systems, near the outlet from a package wastewater treatment plant, or near a stormwater outfall). The addition of background monitoring points for surface water quality in the ocean and the Sound would enable comparisons with historical water quality information (for the Sound), understanding of whether water quality in the wider water bodies is changing over time, and understanding over the long term of whether the Town's management activities are positively impacting water quality. The Sound side point might be the historical sampling point along the Causeway. The Ocean point(s) could be spaced along the beach, as far from outfalls as possible.

2.4.4. Water Use Information During Sampling Events

Collect extra water meter readings during regular water quality sampling events where applicable. Collecting specific water use data from the building's water meter along with water levels and water quality characteristics during each sampling event would allow a vastly clearer understanding of the relationship(s) between excessive water use and system performance/impacts on local groundwater quality. This recommendation only applies to monitoring wells located downgradient of leachfields serving buildings where water meters can be easily read. The water

meters can be read by person, or set up with electronic telemetry for automatic readings.

2.4.5. Quality Assurance Project Plan (QAPP)

A QAPP for the Water Quality Sampling Program would describe field and laboratory sampling activities, along with detailed Standard Operating Procedures (SOPs) for tasks such as field water level measurements, collection of samples, and Chain of Custody procedures. All staff covered under the QAPP would need to have documented training in implementing the sampling procedures.

2.5. Intensive Individual System Monitoring Study

Perform an intensive monitoring study on one conventional and one I/A (peat filter) system over a one or two month period in the summer. The study would include obtaining detailed permit, design, soils and construction information, collecting daily water use readings and daily water level measurements. Also, collect weekly water quality samples of septic tank effluent, peat filter treated effluent, and a nearby downgradient monitoring well. This study would greatly improve the understanding of peak flow impacts on system performance and water quality, particularly where systems may be exceeding design flows.

2.6. County Permit Data Collection

Most of the available electronic datasets pertinent to water quality and onsite were collected and used for the analysis presented. However, some data sources available in only hard copy format (such as Dare County permits before 1999) were not available. This resulted in some systems' characteristics being estimated from other data sources. The two most important examples of this are system design flow being estimated from structure bedrooms and bathrooms, and system age being estimated from structure age. While this method provided reasonable estimates for most residential properties, the estimates are likely not as accurate for non-residential properties. We encourage the Town to continue conversations with Dare County Health Department staff regarding the conversion of older permit information to a database or other electronic format.

2.7. Integrated Stormwater/Onsite System Analysis

The scientific analysis completed in this Technical Report indicated a need for additional review and consideration of the impacts of stormwater on water quality, particularly in the surface water ditches. Developing an integrated approach to looking at the impacts of both stormwater and decentralized wastewater is important in assuring that the Town has developed a defensible management strategy. Much of the data collected and analyzed in this report can also be useful in stormwater management decisions. Several of the recommendations (such as adding background ocean sampling points) in the water quality sampling subsection would also be useful for stormwater management purposes. Following

are some recommendations for additional information related to stormwater and wastewater impacts.

2.7.1. Surface Drainage Analysis

A comprehensive dataset of the surface drainage network was not available at the time of this study. A dataset detailing the surface drainage system in Nags Head would enable a better understanding of the impacts onsite systems have on surface waters. Development of this dataset may represent a significant effort, depending on the availability of existing data from departments such as Public Works.

2.7.2. Dry Weather and Storm Event-Based Sampling

Dry weather water inputs and sampling can help identify illicit discharges into ditches, such as straight pipes. Storm event sampling can be completed just following a storm event. Both of these methods have merit in identifying wastewater and stormwater contributions to pollutant loading.

2.7.3. Additional Constituent Sampling

One means of analyzing nutrient loading includes developing a nitrogen mass balance. This analysis uses total nitrogen and organic nitrogen in addition to the nitrogen species currently sampled. Collecting these two additional constituents in the surface water samples would provide additional information needed to conduct the mass balance equation.

2.8. Overall Education and Outreach

The previous education and outreach efforts included a survey questionnaire, workshops including one at the elementary school with a student poster contest, handouts such as doorhangers, plumbing fixture stickers, and web-page links and materials.

Proposed changes include targeting older neighborhoods, particularly with high seasonal groundwater, for upgrading substandard systems. Town staff can work with the real estate industry to spread the word to renters regarding septic system use, reducing water use, confirming occupancy limits, and inspecting and maintaining systems. Expanding the website materials, links and information to support new efforts is important to creating a successful program.

2.9. Zoning Regulation Changes

Currently the Town zoning regulations include many site and building standards for new construction or renovations including a maximum 8 bedroom capacity for single family residences. The regulations also currently require the owner of an alternative system submit the annual inspection and monitoring reports to the Town.

The Town should consider requiring a higher percentage of open space on a lot. The regulations should also specify no subsurface construction within a certain distance to surface waters. This can help with time of travel to the surface waters and replacement system options without being directly tied to system design. The Town should also improve tracking permit conditions and informally contacting the owners to encourage compliance with their permits.

2.9.1. Design Incentives

The Town should encourage larger drainfield calculations (either design flow or long term acceptance rate) by allowing other setback reductions in zoning regulations (such as reducing sideyard setback if they design a 25% larger drainfield).

2.10. Ongoing Analyses and Program Review

The DWMP and scientific analysis should be reviewed from time to time, in order to evaluate the effectiveness of the program, and to make changes for improvements. An annual report summarizes the program activities should be prepared along with any recommended changes for the next year. Every five years, the Town should contract with an environmental science firm to analyze the data and make recommendations for program changes.

3. IMPLEMENTATION PLAN, SCHEDULE AND BUDGET

The plan for implementation includes a review and approval by the Town Board of Supervisors of specific components of this DWMP, and staff development of an operating budget for the program. Following is an estimated implementation schedule, and estimated staff hours and budget needed for the components described in this DWMP.

The proposed schedule for implementing the proposed changes to the current Septic Health Initiative is outlined below.

- Septic System Inspection and Tank Pumping Program Fall 2005
 - New inspectors contracted/trained
 - Loan/grant process established
 - Education and outreach for inspections
- Permit Tracking and Reporting Summer 2005
- Water Use Tracking and Reporting Summer 2005
- Water Quality Monitoring Program Summer 2005
- Overall Education and Outreach Summer/Fall 2005
- Zoning Regulation Changes Fall 2005
- Ongoing Analyses and Program Review Yearly/2-3 years

3.1. Budget

The budget for the Septic Health Initiative has ranged from approximately \$125,000 in fiscal year 2000/2001, to \$476,500 in FY2003/2004. The adopted budget for FY 2004/2005 is just under \$300,000, with approximately \$125,000 set aside for water quality monitoring.

Following is a breakdown of anticipated costs for changes to the current program, some being one-time costs either for setting up the program this year, some being one-time costs for a special study, and others ongoing. The next year budget includes a larger education and outreach effort to promote the changes to the program. There is no increase in Town staff anticipated at this time, although assistance with data entry may be necessary on a temporary basis, particularly if there is a significant increase in the number of inspections performed by others. An estimate of staff hours is also included with the budget estimates. Also, depending upon the internal efforts by Town staff rather than contracting out services, these budget amounts can be significantly decreased.

3.1.1. *Septic System Inspection and Tank Pumping Program*

- Efforts to change program, develop application and process to certify inspectors (100 hours, \$5-8,000 one-time)

- Grant process developed for sand bottom tank buyouts (30 hours, \$2,000 one-time)
- Grant applications to state/federal government programs to increase funding sources and amounts (20 hours, \$2,000 annual)
- Education and outreach to support these efforts (40 hours, \$10,000 one-time, \$5,000 annual)

3.1.2. Permit Tracking and Reporting

- Changes to database for additional permit data entry (10 hours, \$500)
- Major changes to develop comprehensive database, MS Access or web-based (40 hours and \$5,000 one-time, \$4,500 annual; or web-based \$15,000-20,000 one-time, \$4,000 annual)

3.1.3. Water Use Tracking and Reporting

- Changes to database for additional data entry (10 hours, \$500)
- Education and outreach to reduce water use (20 hours, \$10,000)

3.1.4. Water Quality Monitoring Program

- Added Enterococcus sampling (10 hours, \$8,000/year)
- Added surface water points (30 hours, \$4,000/point one-time)

3.1.5. Intensive Individual System Monitoring Study

- Conduct daily and weekly monitoring over summer (100 hours, \$10,000-20,000 one-time)

3.1.6. County Paper Permit Data Collection

- Convert paper permit data to electronic at County Health Dept. (120 hours, \$20,000-30,000 one-time (less if use interns for data collection); 20 hours, \$2,000 annual)

3.1.7. Integrated Stormwater/Onsite System Analysis

- Analyze existing water quality data in relation to stormwater impacts (40 hours, \$30,000-40,000 one-time)

3.1.8. Overall Education and Outreach

- Conduct town-wide education and outreach efforts, including 2 mailings, 1 workshop, and outreach materials (80 hours, \$15,000 annual)

3.1.9. Zoning Regulation Changes

- Develop changes to zoning regulations to support onsite management (40 hours, \$1,500)

3.1.10. Ongoing Analyses and Program Review

- Annual report and program review (30 hours, \$1000 annual)
- Scientific analysis of data and program review (every 2-3 years, \$30,000-50,000)

3.2. Potential Program Funding Sources

The Septic Health Initiative program is currently being funded through revenue generated from the Town's Water Department, and administered by Planning Department staff. No change is anticipated immediately to this source, but there are several potential considerations for future funding of pieces of the program as follows.

3.2.1. Potential Local Funding Sources

The Town could consider developing Wastewater Management User Fees. These fees can be based on a flat fee per household, or developed using wastewater design flows. Another potential funding source could be a Town-wide general tax. A combination wastewater/stormwater user fee could also be established.

3.2.2. Loan and Grant Program for Upgrades and Repairs

The Town Supervisors have recently allocated \$100,000 towards funding a grant program for paying for repairs and upgrades of sand bottom septic tanks and substandard systems. The Town is considering using this funding as local match for state and/or federal funds. Some potential funding sources include:

- Non-Point Source Pollution Section 319 Funds
http://h2o.enr.state.ne.us/nps/section_319_grant_program.htm – grants and loans for best management practices, water quality monitoring and modeling, environmental education
- North Carolina Cleanwater Management Trust Fund (www.cwmtf.net) – grants to acquire conservation easements, repair failing septic tanks and straight pipes, stormwater management and other water quality projects
- Clean Water State Revolving Funds (SRF) – loans and grants can be approved through this source, mostly construction related projects
- Federal State and Tribal Assistance Grants (STAG) – this is a project-specific grant usually promoted through state legislators. The grants are quite competitive and require a 45% local match

*Nags Head Decentralized Wastewater Management Plan
Town of Nags Head, North Carolina
Table 1: Matrix of Technical Report Conclusions & Recommendations and DWMP Options*

Report Conclusions & Recommendations	DWMP Options
Older substandard systems such as sand bottom septic tanks exist	Encourage inspections, offer loans and grants for upgrades, education and outreach
Individual owners are responsible for management of most conventional residential systems	Provide assistance through voluntary inspections, pumpout pricing, grants and loans for upgrades, education and outreach
Inspection program identified 16% failure rate (including sand bottom tanks), and over 60% of these have not submitted applications for repairs/upgrades to County	Track repair and replacement permits from County, informal contacts to encourage repair/upgrade, grants and loans, education and outreach
Town zoning regulations and building permit included in overall permit process. Once the County issues the Operation Permit, the Town can issue their Certificate of Occupancy	Consider using zoning regulations for design incentives favorable for onsite systems
Current inspection program uses septic tank pumpers to perform inspection, mostly of the septic tank. This can lead to conflicts of interest (such as unnecessary pumpouts) and individuals with lesser knowledge and training on other components of the system.	Change to trained wastewater professionals with background and training to make sound judgements, with separation from those directly involved with the design, permitting, and maintenance of systems
Excess water use in summer occurs on many properties, including above peak flows, particularly commercial and seasonal properties	Track water use, take water meter readings during water quality sampling events, conduct intensive study on peak daily use, informal contacts to owners and rental agencies, education and outreach
Impacts from onsite systems generally localized due to how pollutants move in groundwater	Realign some groundwater monitoring wells to better capture pollutant movements now identified in discrete areas approximately the width of the drainfield and directly downgradient of the systems
Systems closest to surface waters have high environmental impact potential	Target areas along Sound and beach for inspections and upgrades
Systems with insufficient separation to seasonal high groundwater table not adequately treating wastewater	Refine groundwater table depths, share data with County regulators, encourage owners to upgrade with I/A, raised or fill systems, education & outreach

Systems with sufficient separation to groundwater can have impacts due to system age and condition, excessive water use, and proximity to surface waters	Inspections of older systems, encourage water use reductions including plumbing upgrades
Data currently located in various spreadsheets and databases including the County, town planning & water depts.	Develop and manage comprehensive database for tracking, reporting and analysis purposes
Water quality sampling procedures & data entry not currently under a Quality Assurance Project Plan (QAPP)	Develop and implement QAPP for data integrity and potential future use for any project including federal funding
There are currently no background surface water quality sampling points	Add 2 or more background water quality sampling points on the beach and Sound
Water quality program is not currently sampling for Enterococcus, which is used in beach closing advisories	Add Enterococcus to list of sampling constituents
Stormwater impacts on water quality in surface waters unknown	Analyze water quality data in relation to stormwater impacts, develop comprehensive program to serve both water quality issues
I/A systems are increasingly used to maximize building coverage, however they require careful operation and maintenance	Track inspections and monitoring reports to Health Dept., informal contacts, consider zoning incentives for open space, educ. and outreach
Maintenance inspections and monitoring of I/A systems reported to County indicates need for followup on problems discovered in inspection, and effluent monitoring results indicate some systems not performing to standards	Track inspections and monitoring reports to Health Dept., informal contacts, educ. and outreach

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Nags Head Decentralized Wastewater Management Plan
Town of Nags Head, North Carolina
Table 2: Summary of Maintenance and Management Requirements for Type I-VI Systems

System Classification	System Description	Health			Management Entity	Management Entity Inspection/Maintenance Frequency	Responsibilities	Reporting Frequency
		Department Internal Review Frequency	Management Entity Frequency	Management Entity Frequency				
Type I & II	a. Waterless toilets, grease traps, conventional septic system (single family or 480 gpd or less), 750 LF of nitrification line or less; shallow placement systems	N/A	Owner	N/A	N/A	N/A	N/A	
Type III	a. Conventional septic systems >480 gpd (excluding single family residences), single effluent pumps, gravity fill, dual gravity fill, PPBPS systems, large diameter pipe, other non-conventional trench systems	N/A	Owner	5 yrs (systems with pumps or siphons only)	N/A	N/A		
Type IV	a. Any system with LPP distribution b. System with more than 1 pump or siphon	3 yrs.	Public Management Entity with a Certified Operator or a private Certified Operator	2/yr.	12 mos.			
Type V	a. Sand filter pretreatment system b. Any > 3,000-GPD septic tank system with a nitrification field designed for > 1500 GPD c. Aerobic Treatment Unit (ATU) d. Other mechanical, biological, or chemical pretreatment plant (< 3000 GPD) including peat biofilters	12 mos.	Public Management Entity With a Certified Operator or a private Certified Operator	a. 2/yr (0-1500 GPD) 4/yr (1500-3000 GPD) 12/yr (3000-10000 GPD) 1/wk (> 10000 GPD) b. 12/yr (3000-10000 GPD) 1/wk (> 10000 GPD) c. 4/yr. d. 12/yr.	6 mos.			
Type VI	a. Any > 3,000 GPD system with mechanical, biological, or chemical pretreatment system plant b. Wastewater reuse/recycle	6 mos.	Public Management Entity With a Certified Operator	a. 1/wk (3000-10000 GPD) 2/wk (10000-25000 GPD) 3/wk (25000-50000 GPD) 5/wk (> 75000 GPD) b. 12/yr.	3 mos.			

Source: North Carolina Sewage Treatment and Disposal Systems Rules
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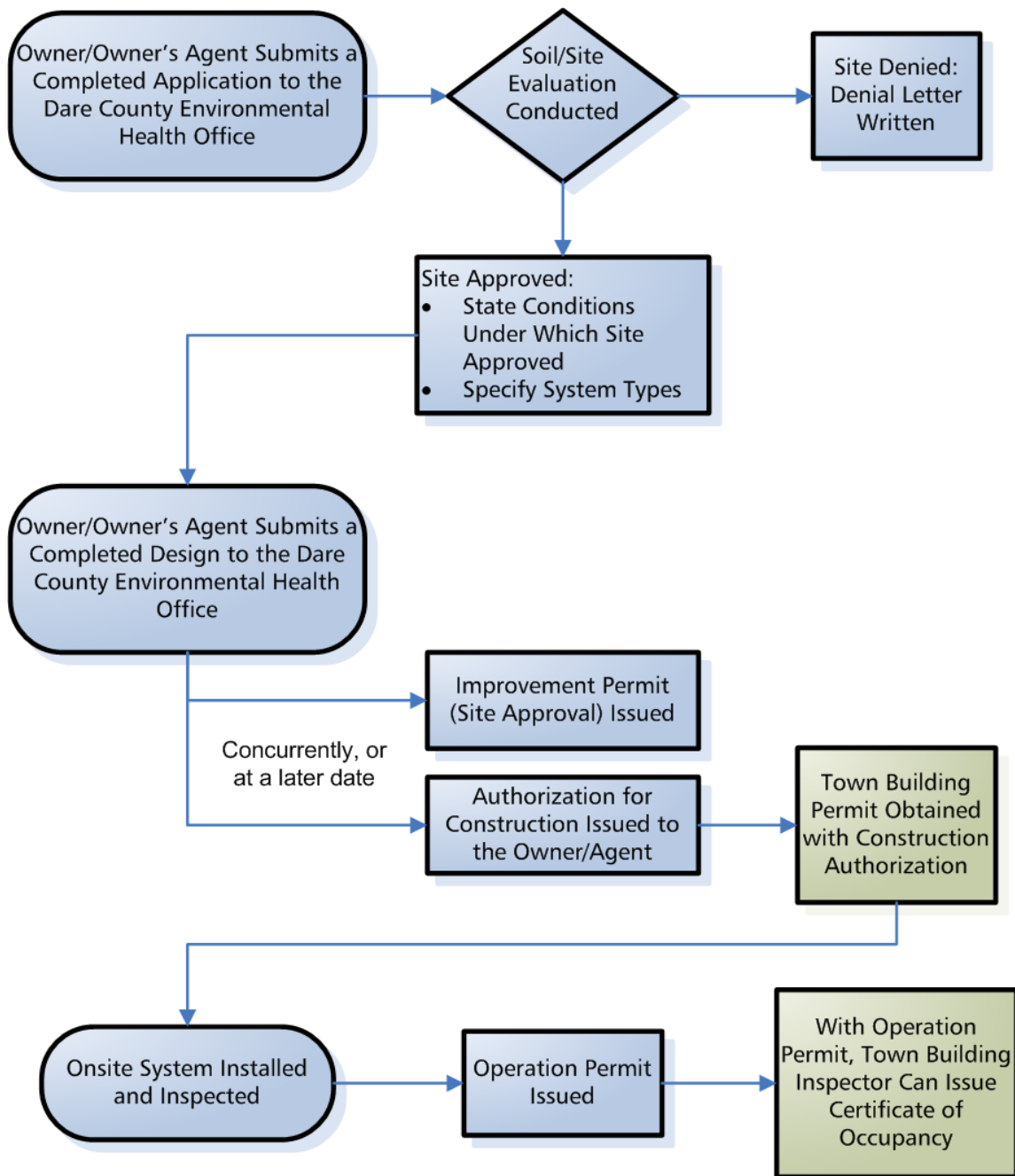


Figure 1: Permit Process Flowchart

